A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE IN THE SCHOOL OF MEDICINE AT THE UNIVERSITY OF THE FREE STATE

by

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DECLARATION

I hereby declare that the work submitted here is the result of my own independent research. Where help was sought, it has been acknowledged. I further declare that this work is submitted for the first time at this university/faculty in fulfilment of the requirements for a Ph.D. degree in Health Professions Education and that it has never been submitted to any other university/faculty for the purpose of obtaining a degree.

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DEDICATION

I would like to dedicate this thesis to my wife and best friend, Hymne, who has been my consistent inspiration, support and source of wisdom. Without her love and sacrifice this work would never have been possible.

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LIST OF ABBREVIATONS AND ACRONYMS

AABB	**American Association of Blood Banks**
ABD	**Autologous blood donation**
AIDS	**Acquired immune deficiency syndrome**
BTS	**Blood Transfusion Service**
CHE	**Council on Higher Education**
CPD	**Continuing professional development**
DoE	**Department of Education**
DoH	**Department of Health**
EBM	**Evidence-based medicine**
ETQA	**Education and Training Quality Assurer**
FDA	**Food and Drug Administration**
FET	**Further education and training**
FFP	**Fresh frozen plasma**
FoHS	**Faculty of Health Sciences**
GDBS	**Global Database on Blood Safety**
GVHD	**Graft-versus-host-disease**
HDI	**Human Development Index**
HEQC	**Higher Education Quality Committee**
HEQF	**Higher Education Qualifications Framework**
HIV	**Human Immunodeficiency Virus**

HLA	**Human Leukocyte Antigen**
HoDs	**Heads of Departments**
HPCSA	**Health Professions Council of South Africa**
IoM	**Institute of Medicine**
ISBT	**International Society of Blood Transfusion**
JCAHO	**Joint Commission on the Accreditation of Healthcare Organisations**
LMG	**Leadership and Management Group**
NHLBI	**National Heart, Lung and Blood Institute**
NBC	**National Blood Committee**
NBI	**National Bioproducts Institute**
NQF	**National Qualifications Framework**
NSB	**National Standards Body**
OBE	**Outcomes-based education**
OSCE	**Objective Structured Clinical Examination**
PEPFAR	**United States President's Emergency Plan for AIDS Relief**
RPL	**Recognition of prior learning**
RSA	**Republic of South Africa**
SAMA	**South African Medical Association**
SANBS	**South African National Blood Service**
SAQA	**South African Qualifications Authority**
SASH	**South African Society for Haematology**
SGB	**Standards Generating Body**

SoM	**School of Medicine**
TEAF	**Treasury Enterprise Architecture Framework**
TMAA	**Transfusion Medicine Academic Awards**
TTI	**Transfusion-transmissible infection**
UK	**United Kingdom**
US	**United States**
USA	**United States of America**
vCJD	**variant Creutzfeldt-Jakob disease**
WHO	**World Health Organisation**
WPBTS	**Western Province Blood Transfusion Service**

SUMMARY

Key terms: Delphi process; medical education; model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine; postgraduate diploma; postgraduate education; professional education; programme development; transfusion medicine; questionnaire

In this research, an in-depth study was done to construct a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State.

Transfusion medicine as a discipline has experienced major advances over the past few decades with an emphasis on increased blood safety and the improvement of systems, technology and administrative processes. Unfortunately, attention has largely been focused on laboratory aspects and clinical transfusion medicine has lagged behind. This has resulted in the present situation where clinical transfusion medicine has become totally underrepresented in medical curricula, despite the fact that many doctors are involved in administering blood and blood products. This has led to a number of studies and publications on the increasing rate of preventable transfusion-associated deaths resulting from errors on the part of medical personnel. Many researchers have made the link between these errors and the inadequate education and training received by doctors in respect of transfusion medicine.

This begs the question as to how this gap in the knowledge market can adequately be bridged and further what a model for the academic

development and implementation of a Postgraduate Diploma in Transfusion Medicine should look like.

Against this background, the problem that was addressed in this study was the absence of such a model. As far as the researcher could ascertain, no such model existed prior to his embarking upon this research. The goal of the research was thus to develop a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine – specific to the South African context – with a view to contributing to safer and more cost-effective transfusion practice by clinicians. A further aim of the study was to develop this model specifically in the School of Medicine at the University of the Free State.

Both qualitative and semi-quantitative research methods were employed and used in a complementary fashion. The methods used included a study of the literature, semi-structured questionnaires and a Delphi survey.

The literature review provided insights into the current status of education in transfusion medicine with special reference to the changing arena of transfusion practice. Also, a perspective was provided on some of the key issues that should be taken into account during the development and implementation of a model for a Postgraduate Diploma in Transfusion Medicine.

Semi-structured interviews were conducted with experts in transfusion medicine from all over the world. Open-ended questions were asked, which allowed for an interactive discussion between the researcher and the interviewees. Prior to the interviews, a letter of request and explanation was provided to the participants and formal, informed consent obtained.

The purpose was to collect information on a number of issues related to clinical transfusion medicine practice. As well as wanting to determine the nature of the challenges with which clinicians are faced, the researcher set out to delineate their scope of practice. Questions dealt with the roles, tasks, functions, skills, deficiencies, areas of clinical knowledge and competences practised by doctors involved in transfusion medicine. An attempt was furthermore made to determine not only the relevant outcomes of a Postgraduate Diploma in Transfusion Medicine but also the relevant academic, educational and sustainability factors.

The results of the semi-structured interviews were analysed and collated in tables. These, combined with the findings from the literature review, formed the basis of the statements used in compiling the Delphi survey.

The Delphi survey was used to test the criteria derived from both the literature review and the semi-structured interviews qualitatively and semi-quantitatively. The Delphi questionnaire was provided to South African doctors with appropriate experience in transfusion medicine and medical education subsequent to their receiving an information letter and giving informed consent. The Delphi questionnaire was divided into sections corresponding to the main themes in the semi-structured interviews. After analysis by the researcher, the findings of the Delphi survey were presented in the form of a description of the findings, a discussion and recommendations.

Aspects discussed in the model comprised the premises for the development of the model, the points of departure, the key internal and external role players who could potentially influence the model and the different elements that should be included and/or addressed in the model. Perspectives were provided on the model and its implementation, including some thoughts on procedural, policy and management issues.

The researcher proposed that, before anything else, a situational analysis had to be done to identify the needs, deficiencies and challenges related to transfusion medicine practice and education. This needed to be done in consultation with all the relevant role players. Subsequently, the educational, academic and sustainability factors relevant to the programme had to be identified. Careful planning was required within the context of a qualified and motivated team. Once the structure, programme content, timeframe, target audience and funding streams had been identified, and the appropriate approvals for the programme obtained, the programme would have to be marketed. Cooperation and networking with all role players through continuous dialogue would allow for the linkage of resources and lay the foundation for long-term collaborative relationships. Finally, continuous feedback from role players, including students would be required to determine whether goals had been achieved and if not, to use this as the basis for continuous improvement.

In that the stated problem was addressed and the goal and objectives of the research were met, this study makes a unique contribution to transfusion-medicine education by providing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Final conclusions were drawn and the limitations and recommendations of the study were highlighted.

It is hoped that this study will make a contribution to the better education of clinicians in the clinical aspects of transfusion medicine and that this will, in turn, translate into patients' receiving better and safer transfusions.

OPSOMMING

Sleutelterme: Delphi-proses; mediese onderwys; model vir die akademiese ontwikkeling en implementering van ’n nagraadse diploma in transfusiegeneeskunde; nagraadse diploma; nagraadse onderwys; professionele onderwys; programontwikkeling; transfusiegeneeskunde; vraelys

In hierdie navorsing is ’n diepgaande studie gedoen om ’n model daar te stel vir die akademiese ontwikkeling en implementering van ’n nagraadse diploma in transfusiegeneeskunde aan die Universiteit van die Vrystaat.

Die terrein van transfusiegeneeskunde het in die laaste aantal dekades groot veranderinge ondergaan met die klem op toenemende veiligheid van bloed, asook die verbetering van stelsels, tegnologie en administratiewe prosesse. Ongelukkig is die aandag grotendeels toegespits op laboratoriumaspekte van transfusiegeneeskunde en het kliniese transfusiegeneeskunde tot ’n groot mate agterweë gebly. Die gevolg hiervan is die situasie waarin ons ons tans bevind, naamlik dié van ’n dissipline gekenmerk deur swak verteenwoordiging in mediese kurrikula, ten spyte daarvan dat die meeste dokters bloed en bloedprodukte toedien as deel van hul daaglikse praktykvoering. Dit het gelei tot ’n verskeidenheid studies en publikasies wat wys op die toenemende aantal voorkombare transfusieverwante sterftes as gevolg van foute deur mediese personeel. Verskillende navorsers het die verband tussen hierdie foute en ontoereikende opleiding in transfusiegeneeskunde kon aantoon.

Die vraag wat dus ontstaan het, was hoe hierdie leemte in die kennismark voldoende oorbrug kan word en hoe ’n model vir die akademiese

ontwikkeling en implementering van ’n nagraadse diploma in transfusiegeneeskunde daar moet uitsien.

Teen hierdie agtergrond, is die probleem van die afwesigheid van so ’n model in hierdie studie aangespreek. So ver as die navorser kon vasstel, was daar ten tyde van die aanvang van die navorsing, geen sodanige model beskikbaar nie. Die doelstelling van die navorsing was dus die ontwikkeling van ’n model vir die akademiese ontwikkeling en implementering van ’n nagraadse diploma in transfusiegeneeskunde, spesifiek toegespits op die Suid-Afrikaanse omgewing, ten einde ’n bydrae te maak tot veiliger en meer koste-effektiewe bloedoortappingspraktyk deur mediese dokters. Die doel was dan ook om die model spesifiek binne die Skool van Geneeskunde aan die Universiteit van die Vrystaat te ontwikkel.

Die navorsingsmetodiek het uit sowel kwalitatiewe as semi-kwantitatiewe elemente bestaan wat komplementêr tot mekaar gebruik is. Dit het ’n literatuuroorsig, semi-gestruktureerde onderhoude en ’n Delphi-oorsig en -vraelys ingesluit.

Die literatuuroorsig het ’n dieper insig gebied in die huidige stand van sake rakende onderwys in transfusiegeneeskunde met besondere aandag aan die veranderende omgewing van transfusiepraktykvoering. In die lig van die bevindinge uit die literatuur, het die navorser ’n perspektief probeer gee op die sleutelkwessies van belang by die ontwikkeling van ’n model vir die ontwikkeling en implementering van ’n nagraadse diploma in transfusiegeneeskunde.

Semi-gestruktureerde onderhoude is gevoer met deskundiges in transfusiegeneeskunde van oor die hele wêreld. Oop-einde vrae is gebruik wat ’n interaktiewe bespreking tussen navorser en deelnemer tot gevolg

gehad het. Vooraf is 'n brief ter inligting en verduideliking aan die deelnemers verskaf en formele, ingeligte toestemming verkry.

Die doel van die semi-gestruktureerde onderhoude was om inligting te versamel betreffende 'n aantal aspekte van die praktyk van kliniese transfusiegeneeskunde. Hiermee is gepoog om vas te stel wat die uitdagings is waarmee mediese dokters te kampe het en wat die omvang van hul praktykvoering is. Vrae het gehandel oor die rolle, funksies, vaardighede, gebreke, areas van kliniese kennis en bevoegdhede van mediese dokters wat kliniese transfusiegeneeskunde praktiseer. 'n Poging is ook aangewend om die relevante uitkomste en die akademiese, onderwyskundige en volhoubaarheidsaspekte van 'n nagraadse diploma in transfusiegeneeskunde te bepaal.

Die bevindinge van die semi-gestruktureerde onderhoude is ontleed en in tabelvorm opgesom. Hierdie bevindinge, tesame met die literatuuroorsig, het die grondslag vir die Delphi-oorsig gevorm.

Die Delphi-oorsig is gebruik as 'n kwalitatiewe en semi-kwantitatiewe toets vir die kriteria voorstpruitend uit die ontleding van die literatuuroorsig en die onderhoude. Die Delphi-vraelys is aan Suid-Afrikaanse dokters met toepaslike ondervinding in transfusiegeneeskunde en mediese onderwys voorsien nadat hulle 'n inligtingsbrief ontvang en ingeligte toestemming gegee het. Die Delphi-vraelys is in afdelings onderverdeel in ooreenstemming met die hooftemas van die semi-gestruktureerde onderhoude. Die bevindinge van die Delphi-oorsig is ontleed, gevolg deur 'n beskrywing van die bevindinge, 'n bespreking en toepaslike aanbevelings.

Aspekte wat met betrekking tot die model bespreek is, het die basiese voorveronderstellings vir die ontwikkeling van die model, die vertrekpunte, die sleutel interne en eksterne rolspelers wat die model kan beïnvloed, asook

die onderskeie elemente wat ingesluit behoort te word, omvat. Benewens ’n perspektief op die model en sy implementering, is oor aspekte rakende prosedures, beleid en bestuur besin.

As eerste stap het die navorser voorgestel dat ’n situasie-ontleding gedoen word om die behoeftes, gebreke en uitdagings rakende transfusiegeneeskundepraktyk en -onderwys te identifiseer – uiteraard in oorleg met al die relevante rolspelers. Hierna behoort die onderwyskundige, akademiese en volhoubaarheidsaspekte relevant tot die program bepaal te word. Omsigtige beplanning behoort binne die konteks van ’n toepaslik gekwalifiseerde en gemotiveerde span gedoen te word. Sodra die struktuur, programinhoud, tydsraamwerk, teikengehoor en bronne vir befondsing geïdentifiseer is en die toepaslike goedkeuring vir die program verkry is, moet die program bemark word. Samewerking en deurlopende gespreksvoering met alle rolspelers is van die grootste belang om beskikbare hulpbronne saam te snoer en sodoende die grondslag te lê vir suksesvolle langtermyn samewerking. Laastens behoort deurlopende terugvoer vanaf rolspelers, insluitend studente, verkry te word om te bepaal of doelwitte behaal is al dan nie. Dit kan ook help om die program oor tyd te verbeter.

Deurdat die gestelde probleem aangespreek en die oorhoofse doelstelling en doelwitte van die studie bereik is, maak hierdie studie ’n unieke bydrae tot transfusiegeneeskunde-onderwys by wyse van ’n model vir die akademiese ontwikkeling en implementering van ’n nagraadse diploma in transfusiegeneeskunde. Finale gevolgtrekkings is gemaak, die beperkinge van die studie is uitgelig en aanbevelings is gemaak.

Die navorser koester die hoop dat hierdie studie ’n daadwerklike bydrae sal maak tot beter onderrig van mediese dokters, veral met betrekking tot die kliniese aspekte van transfusiegeneeskunde en dat dit uitdrukking sal vind in beter en veiliger bloedoortappings vir pasiënte.

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

Transfusion medicine and its application form part of most doctors' daily activities. Virtually all doctors involved in direct patient care make use of blood and blood products on a regular basis. It is thus imperative that the doctor be able to use this scarce, potentially life-saving resource in an appropriate and cost-effective manner because the inappropriate use and/or the non-availability of blood and blood products may have dire consequences.

The arena of transfusion medicine is rapidly changing. The increase in transfusion-transmissible infections (TTIs), in particular the Human Immunodeficiency Virus (HIV) epidemic and, to a lesser extent, emerging infections such as variant Creutzfeldt-Jakob Disease (vCJD), have both necessitated and stimulated a number of changes and advances in the field of transfusion medicine.

One factor that has remained relatively unchanged – despite the explosion in knowledge and advances in technology, molecular biology and informatics – is that of human error. Although it would be wishful thinking to imagine that this weakest link in the chain of health care delivery will ever go away, a number of issues need to be faced, their origins aggressively sought and mechanisms put in place to decrease their incidence and prevalence. In other words, the weakest link, namely the human factor, needs to be actively explored, and every possible way considered in which to strengthen this part of the service-delivery chain.

Evidence of this is also apparent in the field of transfusion medicine. A total of 355 transfusion-associated fatalities were reported to the United States (US) Food and Drug Administration (FDA) during the period 1976 to 1985 (Sazama 1990:583). All of these were due to errors and all were deemed to have been preventable (Hathaway 2005:174S). A total of 8923 transfusion-associated sentinel events were reported to the Joint Commission on the Accreditation of Healthcare Organisations (JCAHO) between 1995 and 2010, with the majority of these errors having arisen from a lack of orientation and training (Sentinel Statistics 2010:1).

With the teaching of transfusion medicine being somewhat limited during the undergraduate years, especially in the context of many universities in South Africa having adopted a shortened undergraduate medical qualification study period, it becomes critical to ensure that doctors are comfortable with the use of blood and blood products and moreover with the management of transfusion-related complications. For this reason, a Postgraduate Diploma in Transfusion Medicine could fill a particular hiatus in the medical knowledge market. Furthermore, there is currently no formal academic model available anywhere in the world for such a diploma. This research has endeavoured to lay the foundation for such a programme by looking at the major issues relevant to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

Although a small number of postgraduate certificates and diplomas in transfusion science and technology are available elsewhere in the world, they focus mainly on training for a career in the transfusion laboratory and blood banking. Accredited postgraduate training programmes in transfusion medicine in Africa is sorely lacking. In terms of Africa as a continent, the Faculty of Pharmacy in Tunisia offers both a Postgraduate Diploma in Transfusion Medicine and a Master's degree in Transfusion Medicine for

French-speaking students only. Furthermore, the Institute for International Development in Transfusion Medicine at the University Medical Centre of the Faculty of Medical Sciences of the University of Groningen in the Netherlands was initiated by Dr Jean Emmanuel with the aim of providing institutionalised education, expertise and services at the academic level in the field of transfusion medicine to countries with limited resources. The Institute for International Development in Transfusion Medicine offers a Master's in Management of Transfusion Medicine for senior management in the industry. Generally, these programmes are aimed at blood banking and management rather than clinical transfusion medicine and transfusion practice in the patient care setting. Diplomas or training programmes in transfusion medicine, aimed at the clinician, are very rare.

Within the context of financial and human-resource constraints in the South African health care sector, and also specific health and education policies at the national and the university levels regarding academic programmes, the researcher considered it imperative that a well-structured model for the academic development of a sustainable Postgraduate Diploma in Transfusion Medicine be established. The aim was that this would underpin its development and implementation with a view to contributing to the provision of a safer and more cost-effective transfusion service to the community, while at the same time building capacity in this important medical field.

The value of this research was that it laid the foundation for the development of a specific Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State, taking into account the important influencing factors and policies unique to this university and to the South African context. On a broader scale, it may have the potential to be used as a model for the development of similar programmes in other institutions in Africa or, indeed, the world.

The word *model* needs some explanation in that it can be defined in many different ways and is used in a variety of contexts, be they science, molecular biology, business or engineering. The word *model* is derived from the French word *modelle*, which comes from the Italian *modello*, in turn derived from the Vulgar Latin term *modellus*, which is the diminutive form of the Latin word *modulus* or 'small measure' (Merriam-Webster Collegiate Dictionary 2008). At the most basic level, a *model* can be defined as a simplified representation used to explain the workings of a real-world system or event (Wiktionary 2007). A model can also be seen as a pattern, plan, representation, or description designed to show the structure or workings of an object, system or concept (Wikipedia 2007). A definition taken from the US Treasury Enterprise Architecture Framework (TEAF) is worth noting as it may have some components of use in the context of this research. In enterprise architecture, a model is defined as "a representation of a set of components of a process, system, or subject area, generally developed for understanding, analysis, improvement, and/or replacement of the process or a representation of information, activities, relationships, and constraints" (TEAF 2000:140).

Academic programme development usually encompasses a series of processes that include development, review, approval and accreditation. It further relates not only to changes to existing programmes, but also to changes to policies and procedures affecting graduate programmes, the latter including a number of established administrative processes with set guidelines. These guidelines can be seen as a framework or guide that serves as a useful point of departure in academic programme development. Nevertheless, all of these need to be transformed into a fully working model, applicable and properly interfaced with current trends in education and advances in transfusion medicine, stakeholder needs, good management principles and continuous process improvement systems so as eventually to be able to create a model that is useful, practical and sustainable.

1.2 PROBLEM STATEMENT

The problem that was addressed was the absence of a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. As far as could be ascertained, no such model existed in the world.

1.3 OVERALL GOAL OF THE STUDY

The overall goal of this research was to develop a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine, specific to the South African context, with a view to contributing to safer and more cost-effective transfusion practice by clinicians.

1.4 AIM OF THE STUDY

The aim of the study was to establish and develop a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State.

1.5 OBJECTIVES OF THE STUDY

The purpose of this research was to provide a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State.

In order to achieve the overarching goal, the following objectives were pursued:

- Gaining a deeper insight into the current status of transfusion-medicine education. This objective was attained by means of an in-depth discussion of the relevant issues, questions, challenges, constraints and

needs that affect it against the backdrop of the changing arena of transfusion medicine. While pursuing the said objective, the researcher endeavoured to provide reasons to justify the further education of clinicians in transfusion medicine. This provided the necessary context to the study and was done by means of a literature review.

- Providing a perspective from the literature on some of the relevant issues in respect of the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. This was achieved by means of a literature review.

- Determining the envisaged roles, tasks, functions, skills and competences of the clinician in transfusion medicine relevant to the changing arena of transfusion medicine for a clinician doing a Postgraduate Diploma in Transfusion Medicine. This was achieved by means of a literature review, semi-structured interviews and a Delphi survey.

- Determining the outcomes for clinicians completing a Postgraduate Diploma in Transfusion Medicine, which will enable them to practise transfusion medicine as part of their day-to-day responsibilities not only in a resource-limited but also in a resource-rich setting. A literature review, semi-structured interviews and a Delphi survey were utilised to reach this objective.

- Establishing a set of criteria needed for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State and determining the relevance, importance and practical application of such criteria. This too was achieved by means of a literature review, semi-structured interviews and a Delphi survey.

- Using the results obtained by pursuing the above objectives, to construct a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine with an emphasis on the alignment of the described roles and competences with learner assessment and outcomes. Although this study did not set out to provide a management model, the proposed academic model could well inform the development of a management framework for a Postgraduate Diploma in Transfusion Medicine.

1.6 SCOPE OF THE STUDY

This study was carried out in the fields of health sciences education and clinical haematology and lies within the domain of academic programme development. The focus was on developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State, one that is specific to the South African context and with a view to contributing to the provision of a safer and more cost-effective transfusion service to the community as well as laying the foundation for the building of sorely needed capacity in the field of transfusion medicine in South Africa.

1.7 VALUE OF THE STUDY

A model developed purposely for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine, specific to the South African context, in the School of Medicine at the University of the Free State would yield:

- An understanding of the current status of transfusion-medicine education.
- A perspective on the issues that need to be taken into account when developing a learning programme in transfusion-medicine education.

- A description of the roles, tasks, functions, skills and competences of the clinician involved in transfusion medicine.
- An understanding of the challenges faced by clinicians involved in blood transfusion.
- A description of the outcomes in respect of a Postgraduate Diploma in Transfusion Medicine.
- An understanding of the involvement of role players and stakeholders and how effectively to consider and involve them in the development of such a programme.
- A perspective on the academic, educational and sustainability issues that inform the development of a Postgraduate Diploma in Transfusion Medicine.
- A model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

Although the model was developed with the School of Medicine at the University of the Free State in mind, many of its components should be applicable and adaptable to other universities both nationally and abroad.

1.8 RESEARCH DESIGN

Both quantitative and qualitative elements used either in isolation or in combination, were part of the research design. Although this was a qualitative study, semi-quantitative elements were employed in the Delphi survey. According to Babbie and Mouton (2001:27), qualitative research is appropriate when studying the attitudes and behaviours of people and also processes in their natural settings. They further state that the qualitative research paradigm refers to "the generic research approach in social research according to which research takes its departure point as the insider perspective on social action" (Babbie & Mouton 2001:53).

Mouton (2001:149) states that "Studies that are usually qualitative in nature aim to provide an in-depth description of a group of people or community. Such descriptions are embedded in the life-worlds of the actors being studied and produce insider perspectives on the actors and their practices." Maykut and Morehouse (1994:88) emphasise the importance of questions in qualitative research being open-ended, inviting the interviewee to participate in a conversation, rather than having discrete 'yes' or 'no' answers.

According to Henning (2004:3), the distinction between the qualitative and the quantitative paradigm is that the former strives for understanding and for in-depth inquiry. She states that the focus in a quantitative study will be on the control of all the components in the actions and representations of the participants – the variables will be controlled and the study will be guided by an acute focus on how the variables are related. In this setting, "respondents or research subjects are usually not free to express data that cannot be captured by the predetermined instruments". In contrast to this, Henning (2004:3-4) maintains: "In a qualitative study the variables are usually not controlled because it is exactly this freedom and natural development of action and representation that we wish to capture. We want to understand, and also explain in argument, by using evidence from the data and from the literature, what the phenomenon or phenomena that we are studying are about." McMillan and Schumacher (2001:165) note that the design of a qualitative research project involves the choosing of subjects, data collection techniques (e.g. questionnaires, observations or interviews) and also the procedures both for gathering the data and for implementing treatments.

Babbie and Mouton (2001:49) further state that, in referring to the quantitative paradigm, one usually has a number of related themes in mind, with the emphasis on the quantification of constructs, i.e. "assigning numbers to the perceived qualities of things". In this paradigm, variables

play a key role in the description and analysis of human behaviour, while the control for sources of error remains central to the research process.

In this study, the researcher endeavoured to gain a deeper insight into the current status of transfusion-medicine education with a discussion of the relevant issues, questions, challenges, constraints and needs that affect it, while simultaneously taking into account both the changing arena of transfusion medicine and the key role players in the field. It was endeavoured in this objective to give reasons for the further education of clinicians in transfusion medicine. This provided the background information for putting into context the academic development of a postgraduate diploma in transfusion medicine. This was attained by a literature review making use of electronic and paper media. Key articles were identified, evaluated and references scanned in order to identify other related and useful publications. An electronic search was done utilising keywords (e.g. transfusion, transfusion medicine, education, training, course(s), diploma(s), degree(s), graduate programme(s), blood product(s), postgraduate) and the following electronic databases and search engines were used: PubMed, Medline, and Google Scholar.

Secondly, it was endeavoured to gain a deeper understanding of and clearer perspective on the major issues that should be considered in the development of such a programme and then to show how these, in practice, would apply specifically to a Postgraduate Diploma in Transfusion Medicine. This was done by means of a literature review and semi-structured interviews.

Thirdly, the roles, tasks, functions, skills and competences of the clinician in transfusion medicine in the changing arena of this discipline were determined and described and the relevant outcomes for such a programme determined. This was done by making use of a literature review and semi-structured

interviews. These interviews targeted medical professionals who were actively involved and experienced in transfusion medicine practice.

Fourthly, making use of the findings from the literature review and semi-structured interviews, a set of criteria was compiled for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. This formed the basis of the Delphi survey that was developed to evaluate the relevance, importance and practical application of these criteria.

The above focus areas attempted to provide reasons for establishing such a programme, while simultaneously studying how the described processes together with their constraints, benefits, challenges and possible solutions – that have been established within the more general context of academic university programmes – may have a bearing on the establishment, development and implementation of this specific postgraduate programme in transfusion medicine.

Lastly, using the results from the above, a model was developed and described for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine and this was followed by a discussion on the final conclusions, limitations and recommendations emanating from the research.

Figure 1.1 contains a schematic overview of the research process (cf. Figure 1.1).

Preliminary literature study and preparation
Protocol preparation
Submission of protocol to Evaluation Committee and approval
Approval by Ethics Committee
Literature study
Semi-structured interviews
Data analysis and interpretation of the semi-structured interviews
Delphi survey
Data analysis and interpretation of the Delphi survey
Compilation of model and discussion of the results
Finalising thesis

FIGURE 1.1: A schematic overview of the study.

[This schematic overview was prepared by the researcher, Louw (2010), as part of the Ph.D. research project.]

1.9 IMPLEMENTATION OF THE FINDINGS

This thesis, containing the research results, will be brought to the attention of the Management of the Faculty of Health Sciences, the Division of Health Sciences Education and the university bodies involved with programme planning and development. The findings will also be used in the future as part of the continuous improvement cycle of a newly developed Postgraduate Diploma in Transfusion Medicine and the results will be used to ensure that its content and outcomes are aligned with the model.

Abstracts will be submitted for presentation at national and international conferences and for publication in peer-reviewed academic journals. In these ways, the researcher hopes to make a contribution to academic programme development, with specific reference to the field of transfusion medicine.

1.10 ARRANGEMENT OF THE THESIS

This study will be reported on as follows:

In Chapter 1, ***Orientation to the study***, the background to the study is provided, the problem is stated and the overall goal and objectives provided. The scope of the study is delineated, its value and significance in the field of transfusion medicine are described and the research methods employed are introduced and briefly discussed. This should provide the reader an overview of what the thesis contains.

In Chapter 2, ***The current status, needs and challenges of education in transfusion medicine***, the current status of education in transfusion medicine is described with special reference to the changing arena of transfusion medicine. Attention is devoted to aspects such as global training needs, policies and support for training programmes in transfusion medicine; the need for transfusion-medicine education with special emphasis on issues like human error; the inappropriate use of blood and blood products; the lack of trained professionals; the image of the transfusion medicine profession; challenges in transfusion medicine – with the emphasis falling on issues of quality and on the standardisation of transfusion-medicine education and also on diversity in the transfusion-medicine workforce; retention of personnel in transfusion medicine; available programmes in transfusion medicine and both their benefits and shortcomings.

In Chapter 3, ***Perspectives on key issues related to the academic development of a Postgraduate Diploma in Transfusion Medicine***, a perspective is provided on some of the key issues that formed the backbone of the design of the semi-structured interviews. The intention in this chapter is not to cover the complete field of either transfusion-medicine education or programme development, but is an attempt by the researcher to explore and reflect on some of the most important issues encountered in the literature.

In Chapter 4, ***Research design and methodology***, the theoretical basis for and the practical aspects of the research and utilised methods are explained and described. The development and use of the semi-structured interview and the Delphi process as data collection tools are described. The use of these instruments in this study is discussed in detail.

In Chapter 5, ***Results, data analysis and findings of semi-structured interviews***, the findings and results of the analysis of the semi-structured interviews are reported and discussed.

In Chapter 6, ***Results, data analysis and findings of the Delphi survey***, the findings and results of the analysis of the Delphi process are reported and discussed.

In Chapter 7, ***A model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State***, the model as the final outcome of this study is provided through synthesising the findings from the literature review, the semi-structured interviews and the Delphi process.

In Chapter 8, ***Conlusions, limitations and recommendations of the study,*** the most important conclusions, limitations and recommendations to have emanated from the study, are provided.

1.11 CONCLUSION

Chapter 1 has provided the necessary introduction, background and context to the research undertaken regarding the development of a model for the academic development and implementation of a Postgraduate Diploma in

Transfusion Medicine in the School of Medicine at the University of the Free State.

The problem was stated and the overall goal and objectives provided. The scope of the study was delineated; its value and significance in the field of transfusion medicine were described and the research methods used were introduced and briefly discussed. Finally, an overview of the study and a structural arrangement of the thesis were summarised.

The next chapter, Chapter 2, entitled ***The current status, needs and challenges of education in transfusion medicine***, is a study of the relevant literature related to needs and trends in transfusion-medicine education.

CHAPTER 2

THE CURRENT STATUS, NEEDS AND CHALLENGES OF EDUCATION IN TRANSFUSION MEDICINE

2.1 INTRODUCTION

Transfusion medicine is a profession associated with transfusing "the gift of life" from one individual to another (Hathaway 2005:172S). Comprising a field of widely diverging elements, it affords opportunities for interaction with patients and donors and confronts clinicians with clinical and academic challenges in both the bedside and laboratory settings (Hathaway 2005:172S). At the same time, law- and policymakers are often challenged by the range of ethical, legal, regulatory and accreditation requirements (Hathaway 2005:172S).

Concomitant with the rise and spread of TTIs, there has been a redirection of attention, focus and awareness towards blood safety. A World Health Organisation (WHO) study showed that 5 to 10 percent of HIV infections worldwide are transmitted through the transfusion of contaminated blood, while many more recipients are infected by hepatitis B and C viruses, syphilis and other infectious agents, such as Chagas' disease (WHO Blood Safety Unit 2005:22), vCJD and others. Furthermore, each new infection contributes to the widening pool of infection in the general population (WHO Blood Safety Unit 2002:1). For this reason, the WHO has proposed an integrated strategy (WHO Blood Safety Unit 1998a:1), which include:

- "Establishment of a well organised, nationally coordinated blood transfusion service that can provide adequate and timely supplies of safe blood for all patients in need;

- The collection of blood only from voluntary unpaid blood donors from low-risk populations;
- The screening of all donated blood for transfusion-transmissible infections, blood groups and compatibility;
- Production of blood components to maximise the use of donated blood and enable the provision of therapeutic support for patients with special transfusion requirements;
- Appropriate clinical use of blood and the use of alternatives, where possible, to minimise unnecessary transfusions."

In the context of the present research, *minimising unnecessary transfusions* is defined as the reduction of unnecessary transfusions by using blood only to treat life-threatening conditions or when significant morbidity cannot either be prevented or managed effectively by other means (WHO Blood Safety Unit 2002:2). The effectiveness of the above strategy depends greatly on the knowledge, skills and experience of staff involved in transfusion medicine, the availability of resources and the will to see evidence-based practice guidelines implemented.

It is widely accepted that training and education in transfusion medicine are essential for the delivery of a high-quality transfusion service; a number of constraints have nevertheless been identified. The WHO has, in preparation for its distance-learning programme, identified the following challenges within blood transfusion services (WHO Blood Safety Unit 1998b:1):

- "Large numbers of staff require updating or further training.
- There is a wide variation in the training needs of staff working at different levels of the health care system.
- Staff members requiring training are often spread out over a large geographical area and many are distant from training centres.

- Few countries have an adequate budget for conventional training courses, particularly for travel and subsistence costs.
- There is a shortage of suitable training facilities and residential accommodation.
- There are an inadequate number of suitably qualified and experienced trainers.
- Few training and reference materials are available.
- Services face increased pressure when members of staff are absent for training.
- Many staff members are reluctant to leave their families for long periods of training."

In this chapter, the current status of education and training in transfusion medicine will be discussed in more detail, as will some of the effects of inadequate training that must be taken into account when developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

2.2 THE CURRENT STATUS OF EDUCATION AND TRAINING IN TRANSFUSION MEDICINE

2.2.1 Global perspective

Despite the existence of opportunities for postgraduate training for specialist physicians and clinical pathologists in many developed countries, other providers are empowered to make most transfusion-related decisions. Both the identified deficiencies and the general need for improvement in transfusion medicine education were accentuated by the National Heart, Lung and Blood Institute (NHLBI)-sponsored Transfusion Medicine Academic Awards (TMAA) Programme, an initiative providing funding for education at the medical school, specialist and postdoctoral levels (Cable, Thal, Fink, Calhoun & Petz 1995:465). Support for this endeavour came from a study on

320 clinical residents where data showed that the majority of them felt that their knowledge and educational opportunities in transfusion medicine were inadequate (Eisenstaedt, Glanz & Polansky 1988:537).

More recently, a study done at the University of Texas looked at the calls received by physicians on call for transfusion medicine in order to determine the scope of the responsibilities of such clinicians (Bryant, Alperin & Indrikovs 2005:35). Categorising calls according to the reason for the call, it was revealed that 8.9% of the calls were related to donor issues, 4.0% to therapeutic procedural issues, 1.8% to patient issues, 14.7% to physician-education issues and 70.6% to "requests for blood components not meeting previously defined transfusion guidelines" (Bryant *et al*. 2005:38). Of the requests for blood not meeting guidelines, 39.8% were refused (Bryant *et al.* 2005:38), which emphasises the need for the ongoing education of medical doctors in transfusion medicine.

Making use of standardised patient simulations and a written test in the form of a quiz (O'Brien, Champeaux, Sundell, Short & Roth 2010:1649), knowledge of transfusion medicine was tested in a study focusing on 116 recently qualified medical school graduates (from 50 out of 150 United States (US) medical schools) who had entered residency programmes. Significant deficiencies in transfusion-medicine knowledge were revealed in test scores ranging from 24.0% to 67.1% (mean 39.0%) (O'Brien *et al.* 2010:1652). About one out of three participants (34.5%) stated that they had had no more than a single lecture on transfusion medicine at medical school, while 20.7% had had a lecture series. Remarkably, 41.4% said that they had had no formal transfusion medicine training at all during their undergraduate studies (O'Brien *et al.* 2010:1652). The author concluded that "medical schools and graduate medical education programs are obliged to reevaluate their transfusion medicine curricula in the interest of patient care and safety" (O'Brien *et al.* 2010:1653).

The medical practitioner trained and skilled in transfusion medicine often assumes the role of a medical officer or a medical director in a blood service. This individual must not only be skilled in transfusion medicine, but must also demonstrate positive leadership skills and offer support in decisions that are best for patients and other professionals (Hathaway 2005:172S). In the US, large medical centres typically attract the best of these medical directors, with rural areas and smaller hospitals experiencing great difficulty in respect of recruiting and compensating individuals at this level of training and expertise (Hathaway 2005:172S). This often leaves these smaller or more remote facilities without the knowledgeable leadership to implement the latest standards of practice (Hathaway 2005:172S). This is of particular relevance to the South African context in that a large proportion of patients are treated in rural areas.

The WHO has noted that education and training are fundamental to every aspect of blood safety, yet evidence from the WHO Global Database on Blood Safety (GDBS) for 1998-1999 indicated that 72% of countries were unable to meet their identified training needs, while many of the factors threatening the safety of the global blood supply could be attributed, in part, to inadequate training (WHO Blood Safety Unit 1999:8). These figures seemed to have improved as indicated in the most recent WHO GDBS Report of 2004-2005, with regular Blood Transfusion Service (BTS) staff training being available in 92 (71%) of 129 countries and a further 15 (12%) being in the process of setting up a training system. Formal educational programmes leading to a university degree or diploma were available in only 47 (49%) of 96 countries, while a further 2 (2%) were in the process of developing such a programme (WHO Blood Safety Unit 2005:11).

In the WHO GDBS Report of a survey done during 2001-2002, it was found that when countries were divided according to their Human Development

Index (HDI) (Human Development Report 2002) into low-, middle- and high-HDI groups, based on life expectancy, educational attainment and adjusted income, a number of important facts emerged. Firstly, in 2001-2002, opportunities for in-service training of staff responsible for key areas of work in the Blood Transfusion Service (BTS) were not always available in medium-HDI countries and particularly not in low-HDI countries. Of note is the fact that in-service training of prescribers of blood on the BTS staff was provided in only 22%, 40% and 56%, respectively, of low-, medium- and high-HDI countries (WHO Blood Safety Unit 2002:11). Less than half of the countries had formal training for all categories of staff. When considering the same for medical officers on BTS staff, the picture is not much better, with in-service training provided for 25%, 49% and 70% of low-, middle- and high-HDI countries respectively (WHO Blood Safety Unit 2002:11).

Close consideration – per HDI category – of the availability of formal education courses for the different staff involved in the transfusion process reveals the following: for prescribers of blood, formal education programmes inside their own countries are available in 22%, 36% and 43%, respectively, for low-, medium- and high-HDI countries. Formal education programmes outside the country were available to prescribers of blood in 11%, 22% and 22%, respectively, of low-, medium- and high-HDI countries (WHO Blood Safety Unit 2002:11). Finally, scrutiny of the data regarding the number of countries with no training available whatsoever, reveals that for prescribers of blood, 12, 23 and 6 of the WHO member states in the low-, medium- and high-HDI categories, respectively, had no training available whatsoever (WHO Blood Safety Unit 2002:11). Similarly, no training was available to medical officers on the BTS staff in 11, 12 and 3, respectively, of the WHO member states in the low-, medium- and high-HDI categories (WHO Blood Safety Unit 2002:12).

2.2.2 Status of training in Africa

Before the initiation of the development of a Postgraduate Diploma in Transfusion Medicine at the University of the Free State, no formal postgraduate qualification existed in the field in sub-Saharan Africa (Louw, Nel, Leipoldt, Badenhorst, Hay & Nel 2010:70).

South Africa has fewer than 50 registered clinical haematologists for a population of about 49.99 million (Statistics South Africa 2010:1), of which most are working primarily in laboratories and fewer than 20 in clinical practice (Louw *et al*. 2010:70). The latter are divided more or less equally between private and public health care facilities (Louw *et al*. 2010:70). No South African university currently offers specific subspecialty training for haematologists in transfusion medicine (Louw *et al*. 2010:70). South Africa has only two medical specialists in transfusion, one working for the South African National Blood Services (SANBS) and the other for the Western Province Blood Transfusion Service (WPBTS). There are no other specialists in transfusion medicine working in either the public or the private sector.

To put these figures into perspective, one can consider, for example, the United Kingdom (UK), a high-HDI country with a comparable population size. In 2006, 896 consultant haematologists were working in England, Scotland, Wales and Northern Ireland (Intercollegiate Committee on Haematology and the British Society for Haematology 2008:13). Of these, 97 NHS consultants had session appointments in transfusion medicine. These figures excluded part-time consultants (Intercollegiate Committee on Haematology and the British Society for Haematology 2008:14). A further 62 transfusion medicine consultants were employed in the four UK blood transfusion services, of which 42 were employed full-time (Hill, Hill, Allard & Murphy 2009:2).

In the rest of Africa, accredited postgraduate training in transfusion medicine is very limited. In terms of Africa as a continent, the Faculty of Pharmacy in

Tunisia offers a Postgraduate Diploma in Transfusion Medicine, and also a Master's degree in Transfusion Medicine for French-speaking students. One should note that these programmes are not aimed at medical doctors only, and they have a focus that differs from what is being addressed in this research.

Working conditions, financial constraints, patient profile and the spectrum of disease seen in Africa differ greatly from those seen in Western Europe and the United States of America (USA) where many of the available training programmes for transfusion medicine are hosted. In most cases, these programmes are more focused on training in laboratory transfusion medicine, management and blood banking rather than on the clinical aspects of the field, which is something this research has attempted to address. Issues regarding relevance, focus, language and costs related to such programmes often make the latter less accessible and less useful to African doctors.

2.2.3 Lack of national policies for transfusion medicine

Another parameter of the quality of transfusion medicine service delivery that impacts on education in transfusion medicine is the availability of a national policy on blood transfusion. A WHO report reveals that only 48% of WHO member states reported having a policy on the clinical use of blood, although a further 23% of countries did report that a policy was being developed, while in 7%, 11% and 10% of low-, medium- and high-HDI countries, respectively, no national blood policy was in place (WHO Blood Safety Unit 2002:21). In the 2004-2005 survey, only 49% of countries had a national policy on appropriate blood use, the situation thus being virtually unchanged from before (WHO Blood Safety Unit 2005:37).

Similarly, only 83 countries (47%) had hospital transfusion committees (ranging from 1% to 100% of hospitals), despite these being considered vital

in the implementation of national guidelines on clinical blood use and the monitoring of their implementation (WHO Blood Safety Unit 2002:22). Reporting mechanisms and ways of investigating transfusion reactions and infections were to a variable extent available in low-, medium- and high-HDI countries, respectively (WHO Blood Safety Unit 2002:22). This report concluded that "the training of laboratory technical staff has received much more attention than the training of other categories of staff involved in the transfusion process, and that there is a great need for the training of blood donor recruiters, blood donor counsellors, quality managers, prescribers of blood and nurses involved in the administration of blood and blood products" (WHO Blood Safety Unit 2002:26).

2.2.4 Standardisation of training in transfusion medicine

Both variations in clinical practice and escalating health care costs have compelled the scientific and health economic debates to identify the factors that influence clinical decision making by doctors.

One of the challenges confronting clinical training in respect of transfusion medicine in South Africa is the lack of standardisation. Registrars in haematology and specialists undergoing training in the subspecialty of clinical haematology are required to undergo training in transfusion medicine as part of their curriculum. This is a formal requirement from both the College of Pathologists of South Africa and the South African Society for Haematology (SASH). These specialists and subspecialists are trained in eight different medical schools around the country, yet at present no standardised curriculum exists. This problem is currently being addressed through a task team commissioned by the National Blood Committee (NBC) to investigate and provide feedback on this matter.

One of the approaches used elsewhere in an attempt to resolve this conflict has been the use of computer-based clinical decision support systems. These

have been shown not only to improve the performance of physicians, but have also led to improved patient outcomes (Garg, Adhikari, McDonald, Rosas-Arellano, Devereaux, Beyene, Sam & Haynes 2005:1223; Hunt, Haynes, Hanna & Smith 1998:1339; Rothschild, McGurk, Honour, Lu, McClendon, Srivastava, Churchill, Kaufman, Avorn, Cook & Bates 2007:228). These systems have further been shown to have great potential in bringing evidence-based guidelines to the point of care (Randolph, Haynes, Wyatt, Cook & Guyatt 1999:67). In a recent study, the percentages of inappropriate non-emergency transfusion orders during the baseline phase for the entire staff and randomly assigned junior house staff were 72.6% (2154/2967) and 71.9% (1259/1752) respectively (Rothschild *et al.* 2007:228-39). In this particular study, this improved after conventional education to 63.8% (1699/2663; $p<0.0001$) and 63.3% (1263/1996; $p<0.0001$) respectively. The percentage of inappropriate orders in a computer-based clinical decision support systems intervention group continued to improve (59.6%, 804/1350; $p<0.0001$). Physicians were willing to accept 14% (133/939) of new computer-recommended orders, especially recommendations to increase transfusion doses (73%) (Rothschild *et al.* 2007:228). One can thus conclude that, although these interventions do indeed make a difference, they do not, however, solve the problem completely.

More commonly, clinicians use clinical practice guidelines. Evidence-based clinical guidelines represent the reference standard against which the appropriateness of blood transfusions is measured and their use could be a valuable tool for improving the quality of patient care (Simmons, White, Eastridge, Mace, Wade & Blackbourne 2010:S75).

For clinical guidelines to be useful, they need to be evidence-based, which means that they should fulfil three criteria, namely that they should be compiled by a multidisciplinary group, that the adopted statements be based on a systematic examination of the best available literature and that the

quality of evidence be classified, while simultaneously also reporting the strength of the recommendations provided (Verlicchi 2010:89). One of the pioneers of evidence-based medicine (EBM) defined EBM as "the conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient. It means integrating individual clinical expertise with the best available external clinical evidence from systematic research" (Sackett, Rosenberg, Gray, Haynes & Richardson 1996:71).

Guidelines for clinical transfusion practice have been adopted in many countries, including South Africa, and have the potential to be a useful adjunct to transfusion-medicine practice (Roback, Caldwell, Carson, Davenport, Drew, Eder, Fung, Hamilton, Hess, Luban, Perkins, Sachais, Shander, Silverman, Snyder, Tormey, Waters & Djulbegovic 2010:1227; Szczepiorkowski, Winters, Bandarenko, Kim, Linenberger, Marques, Sarode, Schwartz, Weinstein & Shaz 2010:83). Unfortunately, the integration of published transfusion guidelines into actual clinical practice remains slow (Cabana, Rand, Powe, Wu, Wilson, Abboud & Rubin 1999:1458; Likosky, Fitzgerald, Groom, Jones, Baker, Shann, Mazer, Spiess & Body 2010:114; Wilson, MacDougall, Fergusson, Graham, Tinmouth & Hebert 2002:1224).

2.2.5 Diversity in the transfusion medicine workforce

The personnel involved in transfusion medicine often consist of a mixture of generations, with the workforce encompassing an age timeline of almost 50 years (Hathaway 2005:173S). Each of these groups have competencies and knowledge in different areas related to the profession and these generational differences in education, work ethic and experience must be acknowledged and dealt with proactively (Hathaway 2005:173S). Each of these generations has different assets, competencies and knowledge to offer in different areas related to the profession. While this adds diversity, it also creates challenges in the workplace, and the transfusion-medicine specialist must be able to

design working environments that effectively harness all the available strengths and assets (Hathaway 2005:173S). These variations in levels of experience and training needs may complicate the design of a transfusion education programme that will adequately cater for the needs of all trainees. Although job satisfaction for employees is essential, an understanding of the social aspects of this complex workforce is critical in respect of recruiting and retaining employees (Hathaway 2005:173S).

Furthermore, the workforce involved in transfusion medicine consists of a diverse group of occupations other than physicians – one that includes nurses, administrative support personnel, medical technologists, and others – who each have their own particular needs in terms of education, licensing requirements, incentives and salary requirements to be taken into account regarding the retention of personnel (Hathaway 2005:173S). Educators and trainers, because they tend to focus on the different attitudes and expectations of different groups and generations regarding learning, often struggle with the challenge of how to keep each group or generation stimulated (Hathaway 2005:175S).

Having the necessary communication skills and leadership abilities to function within such a team should be considered when developing a training programme in transfusion medicine.

2.2.6 Retention of personnel in transfusion medicine

It has been noted that there is an alarming exodus of qualified personnel from the fields of transfusion medicine and laboratory medicine in certain countries (Hathaway 2005:174S). It has been forecast that by 2010, retirees of the entire health care force will outnumber entrants by 13800 per year (Ward-Cook 2002:364). This may contribute to the medical error rate, as patient care is left in the hands of less experienced graduates (Hathaway 2005:174S). Among the factors that have been identified as possible reasons

for this exodus are the poor recruitment and retention processes, the poor quality of life enjoyed by laboratory personnel, financial compensation relative to the amount of responsibility, work schedules, etc. (Hathaway 2005:174S). The importance of this is that the suboptimal use of orientation, training and continuing education in recruitment and retention processes may result in educational deficiencies (Hathaway 2005:174S).

South Africa and many other developing countries have lost large numbers of graduates to other countries over the past decade, this resulting in what is commonly referred to as the 'brain drain'. In a study on emigration patterns of medical graduates, Mullan (2005:1813) established that international medical graduates constitute between 23 and 28 per cent of physicians in the United States, the United Kingdom, Canada, and Australia, with lower-income countries supplying between 40 and 75 per cent of these international medical graduates. India, the Philippines, and Pakistan are the leading sources (Mullan 2005:1810). Canada, Australia and the United Kingdom draw a large number of physicians from South Africa, and the United States from the Philippines (Mullan 2005:1810). Nine out of the 20 nations with the highest emigration figures are situated in sub-Saharan Africa and the Caribbean (Mullan 2005:1810). In 2002, 6993 South African doctors were working in the United States, the United Kingdom, Canada and Australia. At the same time, a total of 30,740 physicians were practising in South Africa (Mullan 2005:1815). This translated into one of the highest emigration factors for physicians in the world (Mullan 2005:1815). Looking at these figures by region, sub-Saharan Africa has the highest emigration factor for physicians in the world (Mullan 2005:1816).

Although there may be some gain to the source country, especially if the emigrating physicians return to their home country, the loss is usually immense, especially in terms of the impact on the health system by means of financial losses (e.g. investment in education) and loss of human and

intellectual capital (Mullan 2005:1816). It has also been shown that many of the medical training programmes in source countries are influenced by the 'Western aspirations' of their students, with curricula and training programmes not well aligned with local needs, patterns of disease and levels of technology (Bundred & Levitt 2000:245; Loefler 2000:1196; Mullan 2005:1816).

The result is that graduates become dissatisfied with opportunities in their own countries, are inappropriately trained for local problems, and inclined to seek placement abroad (Mullan 2005:1816). "The inadequacy and instability of the physician workforce in many lower-income countries are major impediments to disease-reduction initiatives sponsored by the Global Fund, the WHO, the World Bank, the US government, and many others" (Habte, Dussault & Dovlo 2004:23; Mullan 2005:1816).

Programmes have been put into place by the four major recipient countries mentioned above so as further to increase the numbers of physicians in their countries and also the numbers of internationally trained doctors (Mullan 2005:1816). This is likely to increase the negative impact on the health systems of developing countries as mentioned above. The natural result of this 'brain drain' is that the physician workforce is weakened, thereby limiting the ability of many nations to deal with HIV, Acquired immunodeficiency syndrome (AIDS) and other pressing health care needs (Mullan 2005:1817). It is to be expected that this loss of highly qualified and experienced graduates will have an impact on transfusion medicine in South Africa and also in many other developing countries if something is not done either to reverse or to compensate for this trend.

2.2.7 Support for transfusion medicine education

Weak health infrastructure and inadequate supplies of safe blood increase the risk of contracting HIV and other TTIs from a blood transfusion (United

States President's Emergency Plan for AIDS Relief [Emergency Plan/PEPFAR] Blood Safety Report 2009:28). Women and children are at greatest risk in that blood transfusions are commonly used to treat pregnancy complications and childhood anaemia associated with malaria and trauma (RSA DoH 2006:10). With this in mind, the United States President's Emergency Plan for AIDS Relief [Emergency Plan/PEPFAR], a five-year, 15 billion dollar international health initiative was established in 2003 and dedicated to the fight against HIV.

The PEPFAR Programme supports programmes that reduce the threat of transfusion-associated HIV infection, and also programmes to train health care workers in universal medical precautions. Amongst the six priorities of the blood-safety component of the PEPFAR Programme, two relate specifically to training and education in blood transfusion, namely "Education for physicians and other clinicians in transfusion practices and utilisation guidelines to reduce inappropriate use of blood as a clinical therapy, which has been linked to shortages", and "Training for laboratory and clinical staff in all aspects of blood collection, storage, testing and utilisation" (United States President's Emergency Plan for AIDS Relief [Emergency Plan/PEPFAR] Blood Safety Report 2009:1).

The International Society of Blood Transfusion (ISBT) is a global scientific society, founded in 1935 and which has more than 1000 members from over 90 countries. ISBT members include blood-transfusion specialists, clinicians, researchers and other health care professionals who share an interest in blood banking and transfusion medicine. In 2007, the Foundation of the ISBT was established as a non-profit organisation with as its primary objective the enhancement of global health care, with a special focus on transfusion-medicine education. Its aims include expanding knowledge and education on health care with particular emphasis on blood-transfusion medicine, transfusion science, blood banking and related disciplines. It hopes through education initiatives to create infrastructure in health care in countries of

greatest need, while utilising the skills and depth of knowledge of ISBT members on a global scale by involving them in education programmes to improve the practices of those in need. It further endeavours not only to establish an International School of Transfusion Medicine, but also to support educational courses in transfusion medicine and to set up a global consultant database.

The above are some examples of organisations involved in initiatives that aim to strengthen health care systems through the support of educational programmes in transfusion medicine.

2.3 THE EFFECTS OF INADEQUATE TRAINING AND EDUCATION ON TRANSFUSION MEDICINE PRACTICE

2.3.1 Human error

According to Hathaway, "the primary stakeholders in transfusion medicine are the patients, the workforce and the blood donors and thus patient safety should be the number one concern" (Hathaway 2005:173S).

Regardless of a greater emphasis in general on regulation, standardisation and accreditation in the medical world in general, the medical error rate remains exceptionally high. Medical errors are estimated to be the cause underlying up to 98,000 deaths per year in the United States (US) alone, more than the deaths caused by AIDS, breast cancer or motor-vehicle accidents (Kohn, Corrigan & Donaldson 2000:26). In a report released by the Institute of Medicine (IoM) in 2000, the US Agency for Healthcare Research and Quality estimates that medical errors are among the eight leading causes of death in the US (Kohn *et al.* 2000:26).

This trend is not unique to the United States: in 2004, the Canadian Adverse Events study reported a 7.5% overall incidence rate of adverse events in

Canadian hospital admissions. This means that of the almost 2.5 million annual hospital admissions in Canada similar to the types of admission studied, about 185 000 were associated with an adverse event and about 70 000 of these may have been preventable. It was estimated that in the year 2000 alone, between 9250 to 23750 deaths from adverse events could have been prevented (Baker, Norton, Flintoft, Blais, Brown, Cox, Etchells, Ghali, Hébert, Majumdar, O'Beirne, Palacios-Derflingher, Reid, Sheps & Tamblyn 2004:1678-86). This confirmed what had been seen in many other studies from countries all over the world (Brennan, Leape, Laird, Hebert, Localio, Lawthers, Newhouse, Weiler & Hiatt 2004:145; Davis, Lay-Yee, Briant, Schug, Scott, Johnson & Bingley 2001:81; Davis, Lay-Yee, Briant, Ali, Scott & Schug 2002:U271; Davis, Lay-Yee, Briant, Ali, Scott & Schug 2003:U624; Leape, Brennan, Laird, Lawthers, Localio & Barnes 1991: 377; Thomas, Studdert, Burstin, Orav, Zeena, Williams, Howard, Weiler & Brennan 2000:261; Vincent, Neale & Woloshynowych 2001:1395; Wilson, Runciman, Gibberd, Harrison, Newby & Hamilton 1995:458). It has been estimated that individual errors account for 15% of incidents, while the remaining 85% are organisational in origin (American Association of Clinical Chemistry Annual Meeting 2003:4).

In the South African Maternal Deaths Report of 2006, the lack of blood for transfusion or the existence of problems related to transfusion was noted to be avoidable factors in maternal deaths in 9.2% of cases (RSA DoH 2006:10). The same report included, as one of its ten key recommendations, that not only should an adequate blood supply be ensured in places where peripartum care is delivered, but health workers should further also be trained in the proper use of blood and blood products and in preventive measures to minimise the use of blood (RSA DoH 2006:15).

Reports from the Food and Drug Administration (FDA), the Joint Commission on the Accreditation of Healthcare Organisations (JCAHO), and the Institute

of Medicine (IoM) have raised a number of questions regarding the reasons for the high number of fatalities associated with blood transfusion (Kohn *et al.* 2000:26; Sazama 1990:589). "Assuming that education is critical to assuring good practices and patient safety, the first issue that merits consideration is the quality of education and training being promoted in transfusion medicine within medical schools, residency programmes, fellowship programmes, medical technology programmes, and within nursing curricula" (Hathaway 2005:174S). The "magnitude of the medical error rate should stimulate responsible personnel to scrutinise the following variables: the educational programmes, the content and structure of material within such programmes, the quality of the instructor, and the validation of the first three variables through the successes of graduates in transfusion medicine" (Hathaway 2005:174S). The sustainability of any profession relates directly to the success of graduates in programmes related to the profession (Hathaway 2005:174S).

2.3.2 Inappropriate use of blood and blood products

Many factors play a role in the inappropriate use of blood, for example the complexity of the decision-making process when blood components are selected and ordered for hospitalised patients (Hasley, Lave & Kapoor 1994:112; Salem-Schatz, Avorn & Soumerai 1990:476), a fact accentuated by the great deal of variability seen in clinical practice (Corwin, Gettinger, Pearl, Fink, Levy, Abraham, MacIntyre, Shabot, Duh & Shapiro 2004:39).

Whether health-related procedures are performed appropriately, has been a topic that has received considerable attention in recent years, especially in the light of escalating health care expenditure and costs (Verlicchi 2010:89). Clinical appropriateness has been defined as "the use of interventions 1) with documented clinical effectiveness, 2) for conditions in which the effectiveness has been proven and 3) with expected benefits exceeding the expected negative consequences˝ (Verlicchi 2010:89). Put more simply, this

means giving "the right care, to the right patient, in the right way" (Verlicchi 2010:89).

A distinction needs to be drawn between *clinical appropriateness* and *organisational appropriateness,* where the latter refers to "applying clinically appropriate interventions on the condition that they use a reasonable amount of resources and providing that the consumption of these resources is as efficient as possible" (Verlicchi 2010:89). Some countries – such as Italy – have made the need to assess the appropriateness of blood transfusion a regulatory requirement and part of their good-practice standards (Grazzini 2008:187).

A number of studies have indicated that the inappropriate use of blood transfusions is not uncommon (Bray, Salil, Weiss & Porter 2003:17; Schofield, Rubin & Dean 2003:117) in cases where simpler, less expensive treatments would have provided equal or greater benefit (WHO Blood Safety Unit 2002:1). Bearing in mind the fact that blood is considered a scarce resource and moreover a national asset in many countries, including South Africa, this is a wasteful practice and one that exposes recipients to unnecessary risk of serious adverse reactions, transfusion-related reactions and TTIs (WHO Blood Safety Unit 2002:1).

Also, the number of inappropriate transfusions remains unacceptably high. In 2006, for example, 14,650,000 units of blood were transfused in the USA with an average number of 3.0 units transfused per patient (United States Department of Health and Human Services 2007:2). Previously published figures showed that 47%, 32% and 15%, respectively, of platelets, plasma and red cells were inappropriately transfused, while 27% of blood components given were unnecessary (Goodnough, Brecher, Kanter & AuBuchon 1993:509). In a more recent study, 30.4% of 5887 platelet transfusion episodes were found to have been inappropriate (Lin, Chang,

Yeh & Wu 2010: Epub ahead of print). One can thus deduce that on average, each patient transfused in 2006 may have received more or less one unit of blood either inappropriately or unnecessarily. If one adds to this the risk of transfusion-related complications, varying from 0.3% to 10% for serious adverse events – such as the transmission of TTIs, to transfusion reactions, such as potentially life-threatening haemolytic reactions and immune modulation – it becomes clear that the number of avoidable complications become potentially huge. At the same time, the mean institutional cost per patient in the study by Lin *et al.* (2010: Epub ahead of print) for blood components transfused was $397 +/- $244 (mean +/- SD), while the mean cost per patient of components inappropriately transfused was 24% of this, or $96 +/- $89 (Goodnough *et al.* 1993:509).

Despite blood being a very expensive and extremely limited resource (Sullivan & Wallace 2005:148) and even though transfusion of blood products involves a number of serious risks (Busch, Kleinman & Nemo 2003:959; Kopko, Marshall, MacKenzie, Holland & Popovsky 2002:1968; Raghavan & Marik 2005:295), the overuse of blood remains common and efforts to improve clinician decision making regarding transfusion has met with limited success (Rothschild *et al.* 2007:228).

A number of studies have shown that transfusing red blood cells in a more restrictive manner in critically ill patients (Hebert, Wells, Blajchman, Marshall, Martin, Pagliarello, Tweeddale, Schweitzer & Yetisir 1999:409) or in other hospital settings (Rao, Jollis, Harrington, Granger, Newby, Armstrong, Moliterno, Lindblad, Pieper, Topol, Stamler & Califf 2004:1555) is both safe and lead to improved outcomes. Despite the fact that there is an increasing awareness of the risks involved, the problem of inappropriate transfusion prescribing remains an important challenge (Corwin 2005:232; Goodnough, Brecher, Kanter & AuBuchon 1999:438; Lin *et al.* 2010: Epub ahead of print).

Coupling these facts with the progressive decline over time in the number of blood donations at every level of HDI and a donation rate in low-HDI countries that is 15 times lower than that in high-HDI countries (range 0.3–69.5 donations per 1000 population), it becomes imperative to address the inappropriate use of this scarce resource (WHO Blood Safety Unit 2005:34).

2.3.3 Image of the transfusion medicine profession

The lack of education and training of medical personnel, as manifested in the number of preventable deaths due to errors, has led to a poor image both of transfusion medicine personnel and of the profession (Hathaway 2005:174S). It has been suggested that the field of transfusion medicine is in need of an overhaul so that the image of the dedicated individual in transfusion medicine will be one of a "complete professional who serves and contributes as a valued member of the total healthcare team" (Hathaway 2005:174S).
Richard Steinecke, of the College of Medical Laboratory Technologists of Ontario, defines the characteristics of a *profession* to be concern for others beyond self-interest, pride in one's work beyond compensation, and commitment to life-long learning (Steinecke 2003:6). To achieve this aim in the context of transfusion medicine education, a certain set of skills, attitudes, values and knowledge needs to be acquired. What precisely these attitudes, values and knowledge components are, have not as yet been clearly defined, which may be one explanation for the widespread lack of standardisation in postgraduate education in transfusion medicine.

It is evident that, if the profession of transfusion medicine is to survive and thrive in the new millennium, standards will have to be defined, applied and maintained, at both the individual and the regulatory levels, on the one hand, while, on the other, ensuring that continuing education and training takes place among those who practise transfusion medicine. Improving the image of the profession should attract more clinicians into a career in transfusion medicine.

2.4 CONCLUSION

This chapter has focused on the status of transfusion medicine education and training by providing global, African and South African perspectives. A lack of national policies and standardisation was discussed and the diversity of the transfusion medicine workforce and the difficulty of retaining personnel in the profession were highlighted. Some of the available support programmes for the development of educational initiatives in transfusion medicine were mentioned.

The effects of inadequate training and education in transfusion medicine were subsequently discussed. These included human error, the inappropriate use of blood and the poor image of the profession.

In the next chapter, Chapter 3, perspectives on the key issues related to the academic development of a Postgraduate Diploma in Transfusion Medicine will be provided.

CHAPTER 3
PERSPECTIVES ON KEY ISSUES RELATED TO THE ACADEMIC DEVELOPMENT OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE

3.1 INTRODUCTION

The previous chapter provided an overview of the current status, needs and challenges of education in transfusion medicine and a rationale was provided for a Postgraduate Diploma in Transfusion Medicine. During the literature review, it became clear that a large number of issues transcend the boundaries of single disciplines, and these form a recurring theme and common thread throughout the literature. These issues seemed to form a cohesive web that held the whole together and were considered by most of the authors in the field to be the non-negotiables in transfusion-medicine education and practice.

This chapter deals with the most important of these issues and provides some perspective on their bearing on the development of a model for a Postgraduate Diploma in Transfusion Medicine. An overarching topic that seemed to be one of the key links connecting many of the challenges identified in transfusion practice was the one pertaining to the medico-legal and ethical challenges prevalent in the field. Furthermore, a reflection on the challenges – both current and anticipated – related to the medico-legal and ethical domains, provides a more specific starting point for the contextualisation of broader issues and challenges in the field.

Another broad, but encompassing theme was that of sustainability and the academic and educational factors that need to be taken into account when

developing a model for a Postgraduate Diploma in Transfusion Medicine. These areas overlap in many ways and will be discussed together.

Discussing the above in a more focused fashion does not intend to negate the value of other findings in the relevant literature, nor does it imply that they lack importance; rather it emphasises the key issues as a framework for reflection in preparation for the semi-structured interviews.

3.2 MEDICO-LEGAL AND ETHICAL CHALLENGES FACED BY THE CLINICIAN DEALING WITH THE TRANSFUSION OF BLOOD

3.2.1 Background

Transfusion medicine is currently being practised in an era of rapid change in which new developments, often in response to old, new and anticipated threats, prevail. It is practised in the precarious setting of a world in which a variety of often contradicting value systems, beliefs, ethical, moral and medico-legal frameworks exists. These should be considered, reflected upon and be calculated into decision-making algorithms, not only for individual patients, but also for larger systems, such as blood transfusion services and health policy-making that may have an impact on society as a whole. The difficulty of dealing with these multilayered complexities experienced by the individual who often practises in isolation, especially in the South African and African contexts, should not be underestimated and needs to be considered carefully when developing a teaching programme for clinicians doing a Postgraduate Diploma in Transfusion Medicine.

In the following subsections, an overview will be given of some of the most important medico-legal and ethical issues that need to be taken into account when developing an academic model for a Postgraduate Diploma in Transfusion Medicine.

3.2.2 Fundamental ethical principles in transfusion practice

According to Perlin, there are five overriding principles of medical ethics that inform decision making in transfusion medicine, namely "autonomy, veracity, beneficence, non-maleficence and justice" (Macpherson, Domen & Perlin 2000:7). The concept of *autonomy* is rooted in the right to privacy and the notion of individual freedom. It is fundamental to informed consent and the right to refuse treatment. *Veracity*, or truth telling, deals with being honest to donors and patients and forms the basis of an open relationship between doctor and patient. *Beneficence* implies having the intention to do good and to promote the well-being of others, a principle that is essential to the professional obligation of helping those in need. *Non-maleficence* embraces the commitment to avoid harm to others and the obligation to protect patients from danger, pain and suffering. Lastly, *justice* encompasses being fair and respecting the human equality of persons. It finds its application in transfusion medicine, for example, in ensuring the allocation of scarce resources, such as blood, in an equitable manner.

3.2.3 Levels and schools of ethics

Ethical issues and challenges encompass a wide variety of concepts, principles, disciplines and theories and range from the global and more conceptual to the most personal and practical (Macpherson *et al.* 2000:17).

There are a number of levels at which we 'do ethics', namely the mega or global, the macro or societal, the meso or institutional and the micro or individual level (Macpherson *et al.* 2000:17). As Margaret Somerson states, "the ethical complexity already inherent within any given level of this range is exponentially augmented when there is conflict between the ethics at these different levels" (Macpherson *et al.* 2000:17-18).

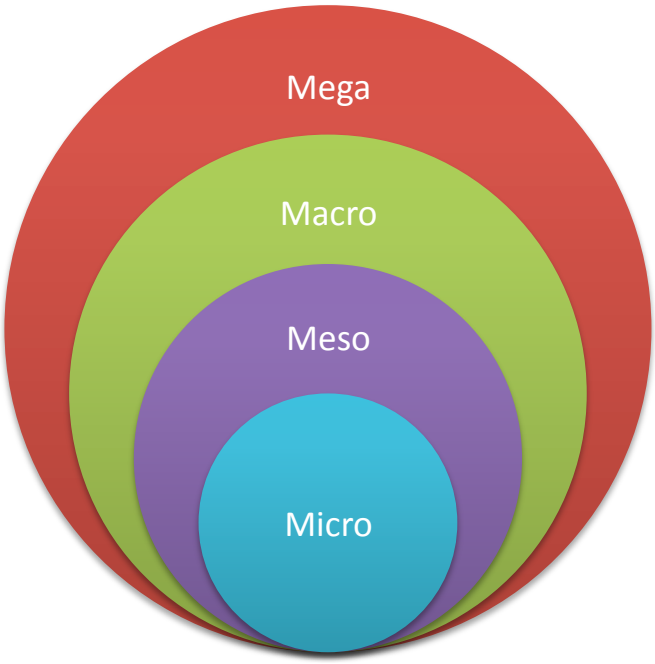

FIGURE 3.1: The different levels at which ethics are practised [This diagrammatic representation was compiled by the researcher, Louw (2010) as part of this Ph.D. research project.]

'Doing ethics' requires of individuals to identify their values as these values are not simply personal preferences, but need to be justified (Macpherson *et al.* 2000:19). The different types of justification, each corresponding to a different way of 'doing ethics', can be separated into different groups, which are referred to as schools of ethics (Macpherson *et al.* 2000:17). Examples of these include the deontological, utilitarian, consequentialist, narrative, feminist, hermeneutical, casuist, situational and virtues schools of ethics.

The complexity of dealing with ethical issues becomes apparent when we consider the large number of variables involved in any ethical situation – the unique characteristics of the situation, the levels of ethics involved, the values, conflicts of interest, decision-making powers and schools of ethics being utilised, the legal frameworks, and the potential interplay and conflicts between these factors. To further complicate matters, ethical issues in blood

transfusion in particular, have in the past been the source of some important conflicts between law and ethics (Canadian AIDS Society vs Ontario 1996). The main characteristics if the different schools of ethics are summarised in Table 3.1.

School of ethics	Description
Deontological	Obligations-based or principle-based ethics
Utilitarian	Seeking the greatest good for the greatest number of people
Consequentialist	Variation of utilitarian school. Emphasis is given to the consequences when evaluating the 'rightness' or 'wrongness' of an action
Narrative	Seeks to find the relevant ethical response in telling 'the story' that raises the ethical dilemma and analysing the roles and relationships of all the participants involved
Feminist	Focuses on preserving individual relationships rather than on the individuals as such; emphasis on an ethic of care, which can translate into a greater emphasis on responsibilities rather than on rights
Hermeneutical	Seeking to find the ethics or deeper meaning in textual or quasi-textual analysis
Casuist	Functions on the basis that ethics can only be approached on a case-by-case basis, although prior cases can guide us on what we should do in a present case
Virtues	Also known as character ethics; finding an ethical response by allowing persons of virtue to take the decisions that have to be taken

TABLE 3.1: The different schools of ethics

[This table was compiled by the researcher, Louw (2010) as part of this Ph.D. research project and is a summary of the discussion by Somerton in Macpherson *et al*. 2000:19].

It can be said that, although these different schools of ethics and the different levels at which ethics can be practised are undeniably valuable in giving the decision-maker a broader perspective on a particular situation, conflicts between values, schools and levels can, however, create complexities that may be very difficult for individual clinicians to disentangle and can delay decision making in potentially life-threatening situations. Nevertheless, clinicians doing a Postgraduate Diploma in Transfusion Medicine need to have an awareness and basic understanding of such issues and the concomitant difficulties in order to assist them in making ethical decisions while practising blood transfusion medicine.

3.2.4 Medico-legal and ethical challenges in transfusion medicine

3.2.4.1 *Introduction*

During the literature review, a large number of challenges that have an impact on the ethical practice of transfusion medicine were identified. These challenges can be summarised in a number of categories, including challenges of change, practice, worldview, donors, products, the blood service, liability and informed consent. Each of these will be discussed briefly and examples will be given of some of the challenges that are currently faced by blood transfusion services and clinicians dealing with blood transfusion. Some of the anticipated future challenges will also be mentioned. Challenges of worldview have been discussed in the section dealing with levels and schools of ethics and will not be repeated here.

3.2.4.2 *Challenges related to change*

In terms of challenges of change, ethical guidelines and laws and the application or enforcing of these are challenged by changing products that may have their own inherent ethical considerations and may require amendments to laws and regulations. Examples include public *versus* for-

profit umbilical cord blood banking, embryonic stem-cell research, etc. Other challenges of change include changing and conflicting value systems within societies, changing environments, budgets and laws, the latter often coinciding with changes in government. These are often informed by political and economic considerations and may be beyond the control of the blood transfusion service or practitioner, yet may heavily impact on their practice and decision-making.

3.2.4.3 *Challenges related to practice*

In terms of challenges of practice, the clinician may be faced with challenges such as conflicting values between doctor and patient and a refusal of blood on the basis of religious or cultural beliefs. Conflicts may arise between what is legal and what can be considered ethical in a particular situation. Also, the clinician has to assume responsibility for a product coming from an external party, i.e. the blood bank.

3.2.4.4 *Challenges related to blood donors*

A number of issues are important in respect of challenges related to blood donors. These include challenges of confidentiality, informed consent and whether blood is considered a gift or a commodity for which a donor should receive remuneration. If remuneration is to be given, one has to decide what would be considered legal and ethical and where motivational manipulation or coercion starts. There are challenges related to the fact that while blood donation is voluntary, it is not without risk. Honesty – in terms of discussing risks with the donor – and also honest and full disclosure by the donor of risky behaviour during the screening process that may lead to their deferral, may be a further concern. There are challenges relating to the asking of intimate questions, which may conflict with societal or individual values and compromise the blood transfusion service's ability to collect sufficient blood.

Furthermore, there are challenges related to human rights *versus* patient safety, and ensuring an understanding of the risk of donating infected blood.

Autologous blood donation (ABD), as another example, has its own challenges, both medico-legally and ethically. In the ABD scenario, the patient becomes his or her own donor. This raises a number of questions: should an HIV-positive patient be allowed to donate blood for his or her own use? Does the right to autologous donation therefore differ between seronegative and seropositive patients? If seropositive patients have the same right to protection from the risks of allogeneic blood transfusion, how does one balance this against the risk of a seropositive unit of blood to health care workers in terms of needle-stick injuries and the risk of transfusing a seropositive unit to the wrong patient? It is also a legal requirement that donors must be informed that donations will be tested for TTIs and labelled as biohazardous if found to be positive, which may forfeit a degree of confidentiality.

Finally, there is the challenge in respect of protecting blood donors. This challenge includes ensuring that only persons who have voluntarily applied give blood, that they are healthy, that the minimum criteria for donation are met, that an adequate interval between donations is prescribed and that not more than the maximum amount of blood is withdrawn.

3.2.4.5 *Challenges related to the blood product*

One also has to consider the challenges inherent to the blood product itself. As this is human tissue and every transfusion can be considered a form of transplantation from one human being to another, a totally different set of laws, standards and regulations guides the safety, quality, handling and management of blood, than the set being used for pharmaceuticals and therapeutic devices.

With each indication for transfusion one has to consider the relative risks and benefits of the products that can potentially be used, while at the same time taking into account cost-effectiveness and budgetary constraints. There is the issue of whether a blood service that obtains its product for free from volunteers should operate with a not-for-profit motive or on a for-profit basis.

Furthermore, products need to comply with international standards, but the latter may not be taking into account the ever-increasing divide between what is available and affordable in terms of these standards in low- *versus* high-HDI countries. Whether to implement costly new technologies with clear but limited benefits, such as, for example, universal leukodepletion, is a matter of continuous ethical debate. This challenge relating to the allocation of scarce resources is particularly relevant in that blood is seen as a national and scarce resource. This brings with it an ethical imperative on the users (clinicians) and providers (the BTS) of blood to ensure that this scarce resource is not wasted or used inappropriately.

Some of these challenges particular to the South African context will be discussed in the section dealing with legislative and ethical issues in South Africa (cf. 3.2.5).

3.2.4.6 *Challenges related to medico-legal liability*

Another challenge that merits consideration is one of medico-legal liability. This can be broadly divided into liability due to negligence, liability due to lack of informed consent and liability for the withdrawal of blood (Van Wyk 1999:870). In terms of liability due to negligence, it is worth noting that South African law does not provide for no-fault or strict liability for harm caused to a consumer by a defective product, the so-called 'products liability'. This implies that if a patient has contracted HIV or hepatitis from a blood transfusion, this fact in itself does not mean that the transfusion

service or the medical doctor acted negligently (Van Wyk 1999:870). It has to be proven that a wrongful act or omission on the part of the defendant led to the complication and that there was negligence on the part of the defendant (Van Wyk 1999:871).

Wrongfulness, as mentioned here, means that a legal norm was violated or where clear legal norms are non-existent, the legal convictions of the community may be used as a yardstick to determine wrongfulness (Van Wyk 1999:871). A challenging question that merits consideration is the one dealing with the level of blood safety that would be required for a particular country. One needs to balance the odds of improving safety through expensive testing methods, which may lead to unaffordability of blood to society *versus* the risk of not having an adequate supply of low-risk blood for the needs of the population. The next challenge is that of liability resulting from a lack of or inadequate informed consent. Informed consent is required from a patient and donor for any legal medical intervention, such as blood withdrawal and transfusion. In cases where this is not obtained, legal liability may ensue. Informed consent is affected by a large number of challenges on its own, and is relevant to both donors and recipients of blood. This will be discussed in more detail in Subsection 3.2.4.7.

3.2.4.7 *Challenges related to informed consent*

Domen and Smith described informed consent as a process containing four elements, namely "the disclosure of information to the patient by the doctor; an adequate understanding of that information by the patient; the patient's freedom or voluntariness throughout the consent process and the patient's possession of sufficient mental competence or decisional capacity to make the medical decision at hand" (Macpherson *et al.* 2000:46). Figure 3.2 illustrates some of the issues that may need to be taken into account in the process of informed consent.

The process of informed consent is fraught with challenges. Firstly, one has to take into account the different role players involved. On the one side of the figure is a female (in blue circle) representing the clinician or blood-bank representative obtaining consent from the man (in blue circle) on the opposite side representing the patient or donor giving consent for transfusion or donation, respectively. The same principles apply to both sets of circumstances. For the purpose of this illustration, we will first use as an example the doctor and patient informed consent scenario and after that discuss some issues pertaining specifically to donor informed consent.

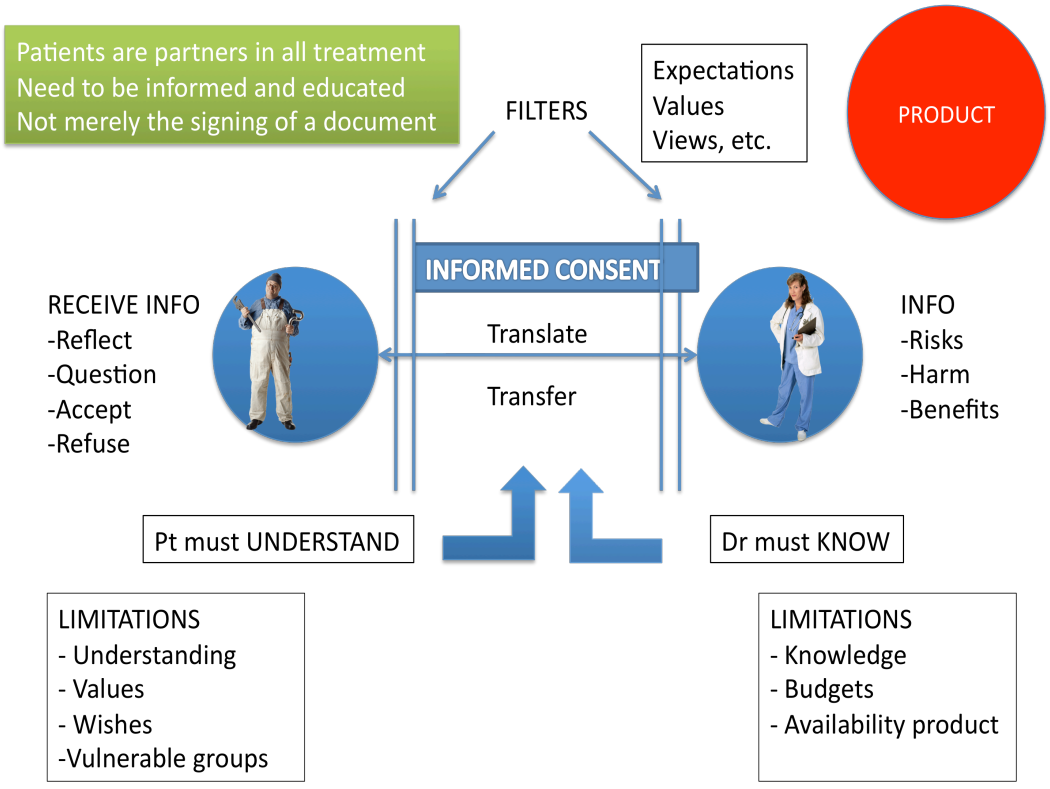

FIGURE 3.2: The process of informed consent [This diagrammatic representation was compiled by the researcher, Louw (2010) as part of this Ph.D. research project.]

Apart from the direct relationship between doctor and patient, parent or legal guardian, the blood transfusion service provides the blood product, indicated

in red at the top right of the figure, a product that the clinician will administer and for which he/she will assume responsibility, even though it has been obtained from a third party (in this case the BTS). Then, there is society with its value systems that may have an effect on the views and values of both patient and doctor and may influence what will be conveyed and understood by doctor and patient, respectively. These values, views and expectations can be seen as filters that may influence how information will be transferred from doctor to patient, while at the same time influencing how this transferred information will be understood.

Therefore, the doctor has information regarding the risks, harms and benefits of the transfusion. This knowledge may be limited and the information provided may moreover be influenced both by the availability of products and of resources to fund them. The doctor transfers this information that should be the content of the 'informed' part of informed consent to the patient who will receive and translate this information through the lens of his or her filter systems. The patient must get to an understanding of the transferred information by reflecting on and questioning it and must then finally decide to accept or reject it.

Challenges that may arise here include limitations in respect of understanding, which, for instance, result from language differences, individual wishes, cultural or family norms and expectations, religious beliefs and the ability to afford the transfusion treatment. One should note particularly vulnerable groups here, such as prisoners, the mentally ill or mentally challenged, the young and those who may be under pressure from family, religious or cultural groups to accept or refuse certain treatments.

Another challenge to be considered is the level of information that should be given to a patient. The concept of a reasonable professional standard and a reasonable patient standard applies here. In the former, the question that

needs to be answered pertains to what a similarly situated professional peer would disclose in similar circumstances, and, in the latter, what would a reasonable, similarly situated, prudent person find relevant and need to know in order to make a similarly informed choice (Macpherson *et al.* 2000:48). These are difficult boundaries to delineate.

In terms of informed consent taken from donors, a number of issues have emerged. These include challenges related to conflict of interest, where the blood transfusion service needs to ensure sufficient supply of product, while simultaneously being responsible for alerting donors to the risks of the donation process. This becomes even more complicated if the blood transfusion service works on a for-profit basis. There is the issue of whether repeat donors should go through the whole informed consent process with each donation, or whether information should simply be made available to them. A common problem that arises is the issue regarding how donors should be informed and by whom if they become seropositive for HIV, for instance. At the same time, should the sex partners also be informed and whose responsibility would this be?

Other pertinent questions arising here involve the archiving of blood samples from donors and their subsequent testing if a new TTI is discovered. Would the BTS be required to inform the donor? The results may impact on a patient's life insurance premiums and he/she may be discriminated against if this information were to become more widely known. The relationship between BTS and donor now changes to a doctor-patient relationship and the BTS is not equipped to routinely handle this. On the other hand, if the BTS withholds this information while the patient may have received treatment for such a condition, this may also be considered unethical or even negligent.

Furthermore, there are challenges relating to donor confidentiality. Confidentiality is considered to be one of the cornerstones of ethical behaviour in medicine and is seen as a right to which a donor is entitled. It is not an absolute duty and can be breached in certain circumstances, for instance to protect innocent people from harmful situations, for example child abuse. This dedication to confidentiality can and is sometimes abused by donors who see the BTS as a safe, secure and free testing site for viral diseases, such as HIV. This may lead to an increase in costs and risk to the blood supply, as the donor, suspecting a possible TTI, will have to be dishonest on the donor questionnaire. Infections that are still in the window period may thus be missed with contaminated donations entering the blood supply.

In conclusion, one should accept that the process of informed consent is not merely the signing of a document, but forms part of the partnership between patient, parent or legal guardian and doctor where the reasonable expectation would be that patients are as fully educated and informed as possible, to enable them to take a reasonable decision. Embedded in this process of informed consent is not only the ability to make an informed decision to accept a blood transfusion or to donate blood, but also the right to informed refusal.

3.2.5 Legislation and ethics in South Africa

Although many clinical challenges are universal, certain legislative and ethical issues pertaining to South Africa warrant mention. Some of these will be highlighted here.

The Human Tissue Act (Act No. 65 of 1983) at present regulates blood transfusion services in South Africa, together with the Regulations relating to Blood and Blood Products (No. R1935 of 17 Aug 1990), as amended in 1993 (RSA DoH 1993) and the HPCSA Standards for the Practice of Blood

Transfusion in South Africa (HPCSA 1999). These standards are based on international standards laid down by the WHO, the International Red Cross and the United States Food and Drug Administration (FDA).

The Human Tissue Act, as specified above, deals with definitions, confidentiality, age of consent, and procedures to be followed, and it denotes responsible persons (Van Wyk 1999:867). The Standards of Practice document contains the minimum requirements that need to be complied with before the administration of blood and blood products. It sets out the minimum standards for everything from collection, testing, record-keeping, storage and processing until the eventual issuing of blood products by licensed blood transfusion services and plays a complementary role to existing legislation (Van Wyk 1999:868). The intent of these laws, regulations and standards, above all, is to ensure the safety of donors, recipients and any individual working in the blood supply chain.

One of the current challenges that clinicians need to deal with regarding the legislative framework dealing with blood transfusion services and practices in South Africa, is the fact that Chapter 8 of the South African National Health Act (Act No. 61 of 2003) has not as yet been promulgated. Chapter 8 deals specifically with blood, blood products and transplantation and once promulgated, will replace the Human Tissues Act of 1983.

Unfortunately, Chapter 8 still has serious problems with content, definitions and a number of inherent contradictions, which leaves an area of uncertainty within which clinicians are expected to function and take decisions. It has lost much of its applicability in a world where many technological advances and innovations have become part of the ambit of clinicians and transfusion services' day-to-day practices. Although the principles of ensuring the safety of the blood supply still remain valid, some of these new and controversial advances, such as the use of different kinds of stem cells, their manipulation

and transplantation, have brought with them major medico-legal and ethical issues.

At this stage, the non-promulgation of Chapter 8 opens up an unfortunate void within which acts that are considered unethical and illegal in many developed countries in the world may be practised without legal consequence in South Africa. In terms of ethical codes, the South African Blood Transfusion Services subscribe to the ISBT Code of Ethics adopted in 2000, which was revised in 2006 (ISBT 2006:1). This code is endorsed by the WHO, Red Cross and Red Crescent and contains 18 principles and rules guiding all aspects of blood transfusion. The objective of this code is to define the ethical principles and rules to be observed in the field of transfusion medicine, relating to blood transfusion services, donors, hospitals and patients.

3.2.6 Conclusion

In conclusion, one would do well to bear in mind that blood is a gift and not only a commodity. Decisions about donation and transfusion rest on an ethic of autonomy and responsibility and the safety of blood is a commitment made by all who collect, store and distribute it. The wise distribution of blood is considered a social responsibility. There are different values, levels, schools and basic premises guiding ethical behaviour and a number of laws, regulations and standards that enforce them. All of these need to be integrated into a model for a Postgraduate Diploma in Transfusion Medicine, as these form the basis for determining and putting into practice all the knowledge, skills, competences and attitudes that will be acquired.

3.3 ACADEMIC, EDUCATIONAL AND SUSTAINABILITY FACTORS

3.3.1 Background

A number of academic, educational and sustainability factors are found in the development of every postgraduate programme. Depending on the discipline involved and the type of programme that is being developed, these may differ in content, emphasis and scope. Apart from the more theoretical academic and educational issues, a number of more practical, management, structural and logistical aspects will be discussed in the following sections.

3.3.2 Programme structure and organisation

3.3.2.1 *Introduction*

Programme structure and organisation include a number of issues, for example programme duration, infrastructure, staff, administrative support, networking and financial viability. A perspective on each of these will be provided in the following sections.

3.3.2.2 *Programme duration*

One of the considerations in terms of programme structure deals with the duration of the course and whether it should be a full-time or a part-time course. Firstly, one should take into consideration the fact that a full-time programme on the level of a postgraduate diploma is unlikely to attract many practising clinicians, as this would interfere with their careers, families, community responsibilities, professional commitments and practices. As these doctors form the target group for the programme, more realistic options worth considering would include a part-time course between 12 and 24 months in duration with intermittent, intensive contact sessions and home assignments or a very intense full-time course of short duration. The likelihood of being able to produce a short full-time programme of adequate substance that will fulfil both the extensive training requirements and the

requirements of the regulatory authorities is probably scant. Furthermore, a part-time course would allow for integration of knowledge, skills and attitudes in 'real time', enabling doctors to apply what they learn while they are learning.

3.3.2.3 *Infrastructure*

Infrastructure can be defined as the underlying foundation or basic framework of a system or organisation (Merriam-Webster Online Dictionary 2010:1). Appropriate infrastructure is key to providing a learning environment conducive to success and enjoyment for both learners and faculty. Appropriate lecturing facilities, including modern technology, such as computers, data projectors, Internet access and email facilities, have become synonymous with most modern teaching programmes. Although some of these may be optional, having Internet and email access are minimum requirements for any part-time or distance-learning programme, so as to ensure timeous delivery of assignments and feedback, to enable and allow for adequate and rapid communication and distribution of learning materials and electronic documentation, and to have access to electronic databases at the base university's library or on the Internet.

As the teaching of transfusion medicine incorporates many largely laboratory-based practical skills and tasks, access to laboratory space where practicals can be done and assessed would be required. If not available, or where technology to blood processing is not available in a facility, agreements need to be negotiated, ideally with a local BTS, to allow students access to practical exposure and experience in laboratory techniques related to transfusion medicine.

On a more practical note, learners need access to faculty buildings, the library, cafeteria, and to areas where they can relax or interact with fellow students between sessions.

3.3.2.4 *Academic staff*

According to Nair and Webster (2010:860) both of whom studied health education in emerging market economies (including South Africa), the academic staff in a medical training programme "represent the major link between a good educational curriculum and its final product". The academic staff, defined here as the team assuming responsibility for the running and organising of the course need to be adequate in number and should have the relevant knowledge, teaching skills and experience (Nair & Webster 2010:860). They need amongst them postgraduate qualifications in clinical and laboratory haematology and/or transfusion medicine and/or medical education. It would be ideal if at least one of them were qualified and experienced in blood banking. Team members must hold registrations with their respective professional boards, such as the Health Professions Council of South Africa (HPCSA), which are relevant to their roles in the programme. They need to have experience in transfusion medicine, adult learning and research supervision.

It is not necessarily required that all of the staff members should be physicians. The advantages of having non-physicians in medical training programmes and the unique set of skills and the value that such staff contribute have been expounded by Pilkington, Hart and Bundy (2010:1398) and Bylund, Brown, Lubrano di Ciccone, Diamond, Eddington and Kissane, (2009:348). Experts in blood banking or medical education do not as a rule have a medical qualification; yet they do have skills and knowledge that are often lacking in their physician colleagues (Bylund *et al.* 2009:348).

The workload, the number of students and the scope of the programme and its managerial requirements will determine the size of the faculty. A staff-to student ratio appropriate to the anticipated needs of students must be determined and maintained. Student numbers may have to be limited to

ensure feasibility of running the programme adequately. Having a variety of faculty members from different backgrounds will have the added advantage of exposing learners to teachers from different fields and spectra of expertise.

The academic staff is responsible for ensuring that all the regulatory requirements for such a programme are met, including planning the curriculum, outcomes, assessment, contact sessions, regulations, administration, accreditation and guidelines. They will also plan assignments, mark them, give feedback, do teaching and have to be available at scheduled times to answer questions from learners, support them and guide them. They are also responsible for managing the programme, evaluating applications, deciding on recognition of prior learning (RPL), finding financial support, writing business plans and giving feedback to sponsors.

The team members will have to meet on a regular – at least weekly to two-weekly – basis so as to ensure that momentum is maintained, especially during the initial development phase of the course. This should guarantee that communication channels remain open, that feedback can be given on the status of different planning and administrative aspects and also facilitate planning. This will further create an opportunity to discuss student-related issues and ensure that everyone is well informed and agrees on the courses of action taken. This will enhance quality and congruency in dealing with student needs between all role players.

A formal, shared workload-allocation model needs to be developed for the faculty, one in which the roles of faculty members need to be clearly defined and documented to ensure an equitable sharing of the workload, and also to align roles with individuals' interests and expertise. Faculty members may be involved on a full- or part-time basis, but need to have the dedication, motivation and commitment to see it through.

3.3.2.5 *Administrative support*

Every programme needs good administrative support. Ideally a part-time or full-time administrative assistant who deals exclusively with learners and programme-related issues should be appointed. Learners need to know who this person is, have his/her contact details and when s/he will be available. Clear, written instructions regarding routes to be followed and what documentation requires completion must be provided to learners.

The administrative person should have the necessary organisational, communication, typing, computer, recordkeeping, archiving and filing experience to ensure the effective running of the programme. Such a person will be responsible for providing information, managing the programme-information system, and must be able to deal with the needs of a diverse student population. The administrative assistant also needs to assist with registration and the administration of continuous professional development systems, while ensuring the integrity and confidentiality of the processes leading to certification of the qualification obtained through the programme.

3.3.3 Networking

Many higher education facilities are limited in terms of their resources, especially in respect of human and financial capacity. One way of 'getting more done with less', is to network with key stakeholders. The first step would be to identify these role players and find areas of mutual interest and potential cooperation. Roles and responsibilities will need to be established and documented. In determining these, the major issues from the stakeholders' perspectives need to be borne in mind. Also, the relationship among the different role players needs to be considered strategically to ensure smooth collaboration. The potential internal and external role players

and stakeholders that were identified from the literature search and semi-structured interviews are listed in Table 3.2.

REGULATORY AUTHORITIES AND SOCIETIES
The Department of Health (DoH)
The Department of Education (DoE)
Health Professions Council of South Africa (HPCSA)
South African Qualifications Authority (SAQA)
Higher Education Qualifications Framework (HEQF)
Council on Higher Education (CHE)
Higher Education Quality Committee (HEQC)
Education and Training Quality Assurer (ETQA)
Directorate Further Education and Training (FET)
Standards Generating Body (SGB)
National Standards Body (NSB)
National Qualifications Framework (NQF)
South African Society for Haematology (SASH)
Colleges of Pathologies for South Africa
South African Medical Association (SAMA)
Universities
BLOOD TRANSFUSION SERVICES AND RELATED ORGANISATIONS
International Society of Blood Transfusion (ISBT)
The South African National Blood Service (SANBS)
The Western Province Blood Transfusion Service (WPBTS)
The National Bioproducts Institute (NBI)
The American Association of Blood Banks (AABB)
The World Health Organisation (WHO)
UNIVERSITY OF THE FREE STATE (UFS)
Planning Unit
Programmes Committee UFS
University Board
School of Medicine (SoM) Executive Committtee
Faculty Board of the Faculty of Health Sciences
Education Committee, School of Medicine
Departments involved with blood-transfusion medicine

TABLE 3.2: Potential role players and stakeholders in a Postgraduate Diploma in Transfusion Medicine. [This table was compiled by the researcher, Louw (2010) as part of a Ph.D. research project].

Close cooperation with other relevant departments, such as the Division of Health Sciences Education, the University Programme Planning Unit and the committees dealing with programme development and implementation is needed from an early stage of programme development. Also, having formal agreements, or at least a Memorandum of Understanding, between the department developing the diploma on the one hand, and the blood transfusion services, on the other, may greatly facilitate the success of such a programme.

Traditionally, blood banks have had strong ties with industry, but despite many of the new developments and innovations in transfusion medicine having been spearheaded by universities, the relationship between academia and blood banks remains a field of largely untapped potential (McCullough 2006:855). The BTS may be in a position to provide guest lecturers and experts to assist with teaching and learning during contact sessions. At the same time, it builds capacity, facilitates networking and creates interest in and an awareness of the programme in the larger blood transfusion arena.

Other advantages of networking and cooperation would be: the sharing of resources, ideas, innovation and manpower; the incorporation of both theoretical and practical aspects of blood-transfusion medicine into the programme; improved marketing; workload sharing and subsequent cost-savings (McCullough 2006:858). Getting buy-in and involvement from all stakeholders through consultation would increase the chances of having a single, high-quality programme, rather than having duplication with various small, fragmented and ineffective programmes existing within a single country.

Generally, networking may expand the strength, both individually and jointly, of all stakeholders. A good network is based on relationships and these are key to working together towards reaching a common goal and meeting the

unmet needs in the field. Furthermore, networks need to be maintained by keeping communication lines open between role players, especially during periods of change. The net effect of the above is that it enhances the sustainability of such a programme.

3.3.4 Financial viability and good governance

Financial viability is a key factor in ensuring programme sustainability. Although the university usually provides infrastructure and pays the salary of full-time faculty members, supplementary financing is needed to ensure that a high-quality, state-of-the-art programme can be provided to students. Additional financing requirements could include, amongst others, funding for international and national guest speakers attending contact sessions, providing bursaries to needy students, financing an administrative assistant if the latter cannot be provided by the institution, and providing for day-to-day expenditure related to the smooth running of the programme.

A business plan and formal budget are usually required by the institution as proof of the viability of the programme, especially in the initiation phase to ensure that the programme can be provided without being dependent on non-negotiated institutional support. The above should be based on careful short- and long-term planning that takes into account anticipated institutional, national and international economic trends and funding formulae. Also, initial provisional accreditation and later full accreditation are required from regulatory authorities, the latter being responsible for providing subsidy to the institution for successful graduates of the programme.

Options to consider in accessing external funding include approaching foundations focused on educational programmes related to blood safety and blood transfusion, private-sector stakeholders such as blood transfusion services that may have a need to employ medical doctors trained in

transfusion medicine. Also, the pharmaceutical industry may be willing to support such a programme as part of their social consciousness initiatives. In all the above cases, clear memoranda of understanding or agreements need to be in place in which the extent and limitations of reciprocation for funding received are clearly delineated and in order to ensure that no uncertainty exists regarding the expectations of the parties involved.

Having a niche programme that addresses an unmet need may facilitate the process of attracting funds, especially from government. The National Education Policy Act states that institutions of higher learning should be "encouraged to develop themselves into niche institutions with specialist excellence in specific fields or disciplines" as this will "increase quality and improve cost-effectiveness" (RSA DoE 2008:49). Furthermore, collaboration between institutions rather than duplication of programmes aimed at a relatively small target population, have similar benefits to merger academic programmes – such as savings on operating and capital expenditure and the sharing of limited resources (Rider & Esterbrook Longmaid 2003:794).

To ensure accountability, regular annual or six-monthly reports, outlining in detail the progress made and also delineating the usage of funds, need to be provided to all stakeholders and funders. Furthermore, regular auditing by reputable external auditors, with audit reports being provided to funders, is an important aspect of good governance. This should lead to the establishment and building of trust and, hopefully, continued support in the form of funding renewal at the end of each funding cycle, which will in turn increase financial sustainability and viability.

3.3.5 Value creation

3.3.5.1 *Introduction*

Burke (2001:47) asserts that value creation and value management are about "clarifying and satisfying customer needs" The need for a

Postgraduate Diploma in Transfusion Medicine needs to be determined in relation to the specific context in which it will be provided. This includes identifying the 'market', in other words, determining who the doctors are who would benefit most from doing such a diploma, finding the programme's place within the programme qualification mix of the particular institution of higher education and aligning the programme with the health-education needs of the region. Similarly, the programme ideally needs to be a stepping-stone in a career path, for instance, by being aligned with opportunities for further study, such as a Master's Degree and a Ph.D. in Transfusion Medicine.

3.3.5.2 *Delineating the scope and boundaries of the product*

In a study on health education in emerging market economies, Nair and Webster (2010:857) point out the common mismatching between health needs and health education. This will have to be taken into account, as the content of a postgraduate programme cannot be removed from its context. Finding a balance between population perspectives and the teaching of clinical competence may be challenging, but it is nevertheless key to a programme being socially accountable and community oriented (Richards 2001:364).

At the micro-level, the breadth and depth of the programme's content have not only to be in line with the determined outcomes for such a programme but also with the pre-identified deficiencies in current undergraduate training in transfusion medicine. This is key to closing the gap in the knowledge market effectively.

Also, the scope of practice, the skills, competences, roles, tasks, functions, clinical knowledge, challenges and deficiencies of medical practitioners dealing with transfusion on a regular basis need to be ascertained, so as to plan the programme in such a way that the content is accurately interfaced

with the envisaged requirements. Inviting the active participation of potential students, stakeholders and experts both in transfusion medicine and in medical education is key to fully delineating the extent and boundaries of the total educational 'product', in this case a Postgraduate Diploma in Transfusion Medicine aimed at medical doctors.

In summary, a Postgraduate Diploma in Transfusion Medicine should be tailored to societal needs, institutional considerations, professional requirements and the available resources.

3.3.5.3 *Value management*

While value creation is undeniably important, so is value management. Value management has been defined as "a structured, systematic and analytical process which seeks to achieve value for money by providing all the necessary functions at the lowest total cost consistent with required levels of quality and performance" (Burke 2001:47). A key factor that needs to be accounted for here is that the programme needs to be considered as a whole – and not only as a sum of its parts. It must have a clear purpose and appropriate quality and performance criteria (Burke 2001:47). Cost-effective ways in which to satisfy the stakeholder's needs need to be found by optimising the use of resources and finding alternative ways of doing things more effectively by simplifying procedures and processes and by promoting innovation (Burke 2001:47). A virtuous cycle of continuous improvement through feedback from end-users and stakeholders, may lead to an increase in the programme's value, attractiveness and sustainability.

3.3.5.4 *Recognition programme*

For any programme to have value to potential participants, it needs to be recognised by the relevant governing bodies. In the South African context, these bodies include, *inter alia*, the university presenting the postgraduate

diploma, SAQA, the HPCSA, the NBC, the DoE and the HEQC. Furthermore, recognition by peers and experts in the fields of transfusion medicine should enhance the image and the potential value of the course. On a global scale, recognition by international bodies, such as the ASBT and the ISBT, may encourage enrolment in the course by international students.

Ideally, such a programme should fall under a regulatory framework that requires certification in transfusion medicine for physicians involved in the transfusion of blood and blood products. Such a regulatory framework, aimed specifically at transfusion medicine, does not at present exist in South Africa. Frameworks do exist for medical education in general and these can be used as a starting point. Furthermore, a certifying agency that would certify such a programme according to specified criteria is required. In South Africa, this role is fulfilled by the HEQC and provides preliminary accreditation to all new programmes and full accreditation once a pre-specified set of criteria have been met.

Providing continuing professional development (CPD) accreditation to participants for lectures or tutorials attended, may meet a specific need amongst medical professionals, and increase the interest in and thus the sustainability of such a programme.

3.3.5.5 *Admission criteria and recognition of prior learning*

A Postgraduate Diploma in Transfusion Medicine aimed at medical doctors will, by definition, require a basic medical degree as a minimum requirement. Students should be required to provide proof of such a qualification. Nevertheless, this should be regarded as the minimum and the course structure and content may prescribe additional requirements, such as basic linguistic skills (i.e. proven competence in reading, writing and speaking the course language), computer literacy, Internet access, etc.

If selection criteria need to be applied because of an exceptional demand for spaces in the programme, RPL and previous experience in the field of transfusion medicine may be considered as criteria on which to base student selection. The need for expertise in transfusion in certain underrepresented regions or countries may also favour candidates working or intending to work in these areas.

3.3.5.6 *Career-path development*

Socio-cognitive career theory – as applied to health sciences by Bakken, Byars-Winston and Wang (2006:91) has indicated that factors such as self-efficacy or a "belief in one's abilities" coupled with "positive outcome expectations", are necessary in career choice (O'Sullivan, Niehaus, Lockspeiser & Irby 2009:336). Developing a career path in transfusion medicine will not only add to the value creation of the programme, but will also meet an as yet unmet need in the South African health care context.

Medical doctors who are adequately trained in transfusion medicine are required to staff blood banks, to run hospital-based clinical transfusion services, e.g. transfusion safety officers, lead hospital transfusion committees, do research and audits in transfusion medicine and guide and educate fellow health care workers in the safe use of blood and blood products.

Also, as described in the previous chapter, the requisite expertise is virtually absent in the institutional academic environment in South Africa. Therefore, creating opportunities for and improving perceptions of an academic career in transfusion medicine should enhance the value of the programme. O'Sullivan *et al.* (2009:335) identified five factors that would stimulate doctors to follow an academic career, namely early exposure to research, having received mentoring by good role models, the availability of clear

career pathways, personal and social factors and career support for junior faculty members.

O'Sullivan *et al.* (2009:337) found that exposure to research was more important than the depth of such research and that the lack of exposure to research was the main factor to hold some back from an academic career. Participants in the same study emphasised that opportunities should be created from a 'very, very early' stage to interact with mentors and role models (O'Sullivan *et al.* 2009:337). It was found that "students and residents often have difficulty seeing a clear and transparent career trajectory" or "do not understand what the pathway is" and that substantial service responsibilities may compromise graduate medical education (O'Sullivan *et al.* 2009:338). Personal and social factors that were shown to have an impact on career choices included the "ability to combine both patient care and research", financial considerations and the view that research is a burden to some (O'Sullivan *et al.* 2009:338).

Ideally, the training of clinicians in transfusion medicine through a postgraduate diploma will create a need for and an interest in the developing of transfusion medicine as a formally recognised subspecialty area in South Africa.

3.3.6 Continuous improvement

3.3.6.1 *Introduction*

A Postgraduate Diploma in Transfusion Medicine should not remain a static entity: it needs to be sufficiently flexible to respond both to trends and changes in the clinical environment and to new technological advances. Programme providers need to be in touch with advances in the discipline and stay abreast of developments and important discoveries. In this way, the course can be continuously improved and adjusted to be responsive to

external realities. On the other hand, internal realities and needs must also be taken into account, for instance, obtaining and utilising feedback from students and invited lecturers, stakeholders and from team members who are responsible for delivering the programme.

3.3.6.2 *Understanding the need for improvement*

Improvement comes from the application of knowledge or data that suggest that change may be more beneficial than maintaining the status quo. It is vitally important that there be a clear understanding of why change is called for and what change is needed before embarking on a process of change implementation. Furthermore, the change required needs to be delineated properly, thought through and tested before final implementation (Langley, Moen, Nolan, Nolan, Norman & Provost 2009:3).

3.3.6.3 *Feedback as a foundation for change*

Feedback is considered one of the central principles of improvement theory (Langley *et al.* 2009:16). Feedback from students, stakeholders and team members may be very useful in identifying areas in need of improvement. Such feedback can be obtained in a structured and formal manner, but also informally. There is, however, a number of dangers when dealing with feedback, some of which include a hostile environment in which either no, superficial or incomplete feedback is given. This may lead to a perception that everything is fine and no improvement is required or to an incorrect understanding of the feedback communicated so that the resulting actions towards intended improvement fall short of what was required.

At the other end of the spectrum, there is the danger that all feedback is perceived to require a response in the form of change. Keeping lines of communication open, judiciously considering the feedback given, debating all the issues and carefully planning before making any changes, should limit

mistakes that may have a negative effect on resources, morale and momentum (Langley *et al.* 2009:24). Also, any improvements planned should be evaluated against the goals of the programme, reflected upon, and appropriate and useful suggestions and changes should be integrated into the system only after proper consideration of the impact that such change may have both on the specific area involved and also on the programme as a whole (Langley *et al.* 2009:25). Ideally, any change deemed worthy of implementation should first be tested and piloted in an attempt to determine and, where appropriate, measure its effects on the functioning of the procedure, system or programme involved (Langley *et al.* 2009:18). Any changes made should be reevaluated to ensure that the envisioned improvements and thus "client" satisfaction were achieved (Langley *et al.* 2009:25).

Making appropriate changes in response to stakeholder needs is a fundamental part of being accountable towards those who support your programme, while always remaining true to the core vision, mission and goals of your programme.

3.3.7 Programme content and outcomes

Arguments have been advanced for and against outcomes-based education (OBE). Those in favour, argue *inter alia* that it "promotes high expectations and greater learning from students"; that students are better prepared for life and work in the 21st century; that more authentic forms of assessment are fostered and that it "encourages decision-making regarding curriculum, teaching methods, school structure and management" (Education Commission of the States 1995:2). Arguments against OBE include that OBE may conflict with university admission requirements and practices; that "some outcomes focus too much on feelings, values, attitudes and beliefs, and not enough on the attainment of factual knowledge"; that it "relies on subjective evaluation, rather than objective tests and measurements" and

that it "undermines local control" (Education Commission of the States 1995:2).

Whether one decides to adopt a purely outcomes-based programme or a blend of OBE, problem-based learning (PBL) and other systems, OBE is likely to form an important component of a modern learning programme. The organising principles of OBE as identified by Spady (1994:25), who first proposed outcomes-based education in 1988, include clarity of focus, designing backwards, having high expectations of students, and, the provision of expanded opportunities that allow for the achievement of outcomes in a variety of ways. It has been argued by Sue Willis, as quoted by Lawson and Askell-Williams (2007:14) that clarity of focus "can enhance the coherence of what is actually taught to students"; that "a commitment to common outcomes" can enhance equity; that OBE supports "an accountability that respects collective professional judgement and decision making in schools" and emphasises that "the decision to specify outcomes need not compromise the exercise of responsibility by teachers about how to achieve outcomes". She further states that OBE supports a "shared responsibility for achievement of established outcomes" and acknowledges the importance of "aligning learning, teaching and assessment".

During the XLVIII National Meeting of the Mexican Association of Medical Schools in 2005, members of staff and deans from a variety of medical schools attempted to "define the outcomes of medical education in Mexico" (Elizondo-Montemayor, Cid-García, Pérez-Rodríguez, Alarcón-Fuentes, Pérez-García & David 2007:692). The outcomes selected were included in nine categories, namely: (i) clinical skills; (ii) communication skills; (iii) public health and health systems; (iv) knowledge of the scientific basis of medicine; (v) information management; (vi) critical thinking and research; (vii) teaching skills, which include the teaching of peers, patients and families; (viii) administrative and legal skills in medical practice, and (ix) values,

attitudes, ethics and professionalism (Elizondo-Montemayor *et al.* 2007:695).

Developing outcomes for a Postgraduate Diploma in Transfusion Medicine can be likened to reverse-engineering the future. A specified end-result should be determined, based on an in-depth study of the needs, challenges (current and anticipated), roles, skills, tasks and functions required of the clinician practising transfusion medicine, while at the same time taking into account the varying realities and environments within which different clinicians practise. Starting with this predetermined end in mind, the developers of a Postgraduate Diploma in Transfusion Medicine can carefully plan the curriculum, programme content, its practical implementation and also the management of such a course while clearly focusing on the final goal that needs to be achieved.

Similarly, students participating in a programme of this nature will know what the intended end-result is and what knowledge, skills, competences and attitudes will be required of them, which should enable them to both focus their studies in a useful manner and systematically to bridge the divide between their initial knowledge, skills and attitudes and the outcomes required at the end. Finally, clear outcomes will form the basis of assessment planning, which needs to be aligned as closely as possible with the predetermined outcomes.

3.3.8 Assessment

"Give me but one firm spot on which to stand, and I will move the earth" (Archimedes ca. AD 340).

It is a curious fact that the majority of learners will learn what they think they will be tested on, irrespective of the model of education used, be it outcomes-based, problem-based or focused on learning content (Biggs 2003:140). This is called 'backwash', meaning that assessment rather than

the curriculum determines what students will learn (Biggs 2003:140). The truth is, assessment drives learning and therefore defines the real curriculum (Geyser 2004:90-91). Therefore it becomes evident that assessment is the most powerful lever educators have to influence the way students learn (Geyser 2004:90-91). If assessment is properly aligned to what students should be learning, this 'backwash' effect becomes positive (Biggs 2003:141).

To understand the different forms of assessment 'levers' available, modern education experts refer to 'traditional' and 'alternative' perspectives and practices of assessment of learning in higher education. There is room to argue that many of the so-called 'alternative' methods have their roots in ancient wisdom and may actually be more 'traditional' than we realise. It is useful to consider these two major perspectives on assessment and the reasons for the shift from a more traditional towards an alternative and so-called 'modern' approach.

The main shift in focus becomes clear when we view assessment in terms of its purpose. Students may need to be graded at the end of a unit or course, but they also require continuous feedback to know how their learning is proceeding. This may not only improve learning, but could also serve to improve teaching (Biggs 2003:141). One must move away from seeing assessment as a mere add-on experience at the end of learning to one of viewing assessment as a process that "encourages and supports deep, constructive learning and thinking" (Geyser 2004:90). Traditionally, students were motivated to learn *for* assessment, rather than learning both *for* and *from* assessment. Thus it becomes clear that these two perspectives are complementary and can thus be seen as two ends of a continuum, and that lecturers should be encouraged to include both in their programmes and modules (Geyser 2004:91).

Traditionally, the main form of assessment used was summative in nature, taking place at the end of the learning programme in order to ascertain whether learners have achieved the learning outcomes for the entire programme or whether they have complied with the purpose for which the training programme was developed (Le Roux 2004:57). Examples of methods used in summative assessment include practicals and written tests (Le Roux 2004:62). Although not aiming to abolish summative assessment, the alternative, formative assessment, endeavours to monitor the learner's abilities throughout the training programme (Le Roux 2004:57). Examples of methods employed to achieve this end are activities and feedback on activities, role-play, projects and group activities (Le Roux 2004:62). This type of assessment takes place continuously throughout the period of study in contrast to summative assessment that takes place only at the end (Le Roux 2004:57). The purposes discussed above are related to the different forms of assessment. Summative assessment contributes to the marks for a module, level or degree.

The current shift from traditional to alternative perspectives and practices brings with it a new set of methods, instruments and sources of learner assessment. In the modern context, the source refers to the person such as the lecturer or peer group who performs the assessment. In Geyser's words, "Traditionally, assessment has been almost entirely summative in nature, with a final explanation and the educator was the sole and unconditional judge" (Geyser 2004:90). Where methods now include objective structured clinical examinations (OSCE's), portfolios, problem sheets, presentations and projects, a final written exam paper might previously have been considered adequate towards probing a student's learning.

With novel methods came modern instruments, the latter being defined as the-source-in-conjunction-with-the-instrument. An example would be where the *method* is a project, the *source* is the student's peer group and the

instrument a marking scheme or rubric. An example of a traditional method would be a written exam paper, the source being the lecturer and the instrument a memorandum. Thus, a multimethod, -source and -instrument assessment model will not only serve to probe the depths of a learner's knowledge and understanding of content, but have at its core the function of improving the learning and teaching processes.

According to SAQA, "assessment in education and training is about collecting evidence of learners' work so that judgments about learners' achievements, or non-achievements, can be made and decisions arrived at" (SAQA 2001:15). It has also been defined as "a structured process for gathering evidence about the candidate's (i.e. learner's) achievements in relation to specific learning outcomes" (Kenwright 2003:12).

Assessment needs to be fair, valid, reliable and practicable (Le Roux 2004:60-61; SAQA 2001:16). *Validity* in assessment refers to "measuring what one says one is measuring, that is when evidence demonstrates that outcomes have been met, be it knowledge, behaviour, subject content, skills, information, etc. that is being assessed" (SAQA 2001:17). *Reliability* implies that "the same judgments are made regardless of context" (Le Roux 2004:60). The principle of *fairness* implies that the assessment "should not in any way hinder or advantage the candidate" (SAQA 2001:16) and that it "does not disadvantage anybody on the basis of race, gender, ethnicity, disability, language or location" (Le Roux 2004:61). *Practicability* refers to "ensuring that assessments take into account the available financial resources, facilities, equipment and time" (SAQA 2001:19). Together, fairness, validity, reliability and practicability contribute to the *credibility* of the assessment process (SAQA 2001:19).

There are also other factors that need to be taken into account when assessing students (SAQA 2001:9). The process of assessment needs to be

transparent. It should be integrated with learning and teaching and not just added as an appendix to learning (Geyser 2004:90; SAQA 2001:9). It needs to be flexible, taking into account and accommodating differences in learner contexts, needs and personal circumstances. It has to be consistent, with clear and unambiguous assessment criteria, utilising well-trained assessors and a variety of assessment methods (SAQA 2001:9). Assessment is a structured process and may not be done haphazardly (SAQA 2001:16). Also, it should be directly related and aligned to specific learning outcomes.

3.4 CONCLUSION

This chapter has provided perspectives on some of the overarching topics relevant to transfusion medicine education, including the academic, educational and sustainability factors that are important in the development of a postgraduate training programme.

The following chapter comprises an exposition of the research design and methods that were employed in the study and further provides a reflection on the rationale for each of the research techniques utilised.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

This chapter deals with the research design and the methodology employed in the execution of this study. General perspectives on the research design will firstly be provided and this will be followed by a detailed rationale for and description of each research technique utilised. The methodology, process and procedures of designing the interview questionnaires, the Delphi questionnaire and the pilot studies, as well as the sample selection and data analysis will be described. The research design comprised both quantitative and qualitative elements and these were used both in isolation and in combination, depending on the particular objective studied. This was for the greater part a qualitative study with quantitative components.

4.2 THEORETICAL PERSPECTIVES ON THE RESEARCH METHODOLOGY

According to Babbie and Mouton (2001:27), qualitative research is appropriate when studying people's attitudes and behaviours and processes in their natural settings. These authors further state that the qualitative research paradigm refers to "the generic research approach in social research according to which research takes its departure point as the insider perspective on social action" (Babbie & Mouton 2001:53).

Mouton (2001:149) gives the following definition: "Studies that are usually qualitative in nature aim to provide an in-depth description of a group of people or community. Such descriptions are embedded in the life-worlds of

the actors being studied and produce insider perspectives of the actors and their practices." Maykut and Morehouse (1994:88) emphasise that it is important that questions in qualitative research be open-ended, inviting the interviewee to participate in a conversation, rather than having discrete 'yes' or 'no' answers.

According to Henning (2004:3), the distinction between the qualitative and the quantitative paradigm lies in the quest for understanding and for in-depth inquiry. She states that the focus in a quantitative study will be on the control of all the components in the actions and representations of the participants – the variables will be controlled and the study will be guided by an acute focus on how the variables are related. In this setting, "respondents or research subjects are usually not free to express data that cannot be captured by the predetermined instruments".

In contrast to this, according to Henning (2004:3), "In a qualitative study the variables are usually not controlled because it is exactly this freedom and natural development of action and representation that we wish to capture. We want to understand, and also explain in argument, by using evidence from the data and from the literature, what the phenomenon or phenomena that we are studying are about."

Furthermore, McMillan and Schumacher (2001:165) note that the design of a qualitative research project involves not only the choosing of subjects, data collection techniques (e.g. questionnaires, observations or interviews) but also procedures both for gathering the data and for implementing treatments.

Babbie and Mouton (2001:49) further state that, in referring to the quantitative paradigm, we have a number of related themes in mind, with the emphasis on the quantification of constructs, i.e. "assigning numbers to

the perceived qualities of things". In this paradigm, variables play a key role in the description and analysis of human behaviour, while the control for sources of error remains central to the research process.

4.3 METHODS AND PROCEDURES

A literature review formed the basis of the study, while the empirical components of the study comprised semi-structured interviews and a Delphi survey. The appendices related to the semi-structured interviews and the Delphi survey are attached at the end of the study (cf. Appendices A1 to F).

4.3.1 General overview of the study

In the first place, it was endeavoured to gain a deeper insight into the current status of transfusion medicine education and to provide a perspective on the relevant issues, questions, challenges, constraints and needs that affect it against the backdrop of the changing arena of transfusion medicine and the key role players in the field. It was endeavoured in this objective to justify the further education of clinicians in transfusion medicine. This provided the background information for putting into context the development of a Postgraduate Diploma in Transfusion Medicine and was done by means of a literature review.

Next, the researcher determined and described the roles, tasks, functions, competences, skills and areas of knowledge of the clinician in transfusion medicine in the changing arena of this field of medicine, and then determined the relevant outcomes for such a programme. It was simultaneously endeavoured to delineate the scope of practice of clinicians dealing with blood transfusion, the challenges facing them and the deficiencies in terms of their abilities to deal with blood transfusion. Apart from considering the outcomes for a postgraduate diploma and the factors that would make such a diploma sustainable, the researcher explored the

academic and educational factors that need to be accounted for by making use of a literature review and semi-structured interviews with medical professionals actively involved and experienced in transfusion medicine practice. The interview schedule comprised a number of questions relating to the above-mentioned issues (cf. Appendix A3).

From the data generated by both the literature review and the semi-structured interviews, a set of criteria for a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine was derived. This formed the basis of a Delphi survey developed to evaluate the relevance, importance and practical application of such criteria. A Delphi technique was utilised to test the usefulness of each of these criteria in order to determine the final elements that need to be included in the model.

Using the results from all the above, a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine was developed. Also included is a discussion on the management of a programme that has preliminary accreditation with a view to acquiring full accreditation, making use of the information and data gathered.

Bearing in mind the abovementioned focus areas, it was furthermore endeavoured to provide reasons for establishing such a programme, while also studying how the described processes along with their constraints, benefits, challenges and possible solutions – established within the more general context of academic university programmes – may have bearing on the establishment, development and implementation of this specific Postgraduate Diploma in Transfusion Medicine.

4.3.2 Literature review

The aim of a literature review is to contextualise a problem against related theory and research, while also ensuring that the researcher is sufficiently knowledgeable about the field of investigation (Singleton & Straits 1999:544).

In the first place, it was endeavoured to gain deeper insight into the current status of transfusion medicine education in a discussion of the relevant issues, questions, challenges, constraints and needs that affect it with reference to the changing arena of transfusion medicine and the key role players in the field. It was furthermore endeavoured in this objective to justify the further education of clinicians in transfusion medicine. This provided the background information for putting into context the development of a Postgraduate Diploma in Transfusion Medicine. A literature review of both electronic and paper media was used for this purpose.

All of the above, used in combination, provided the necessary background and context to the stated problem. It also informed the development of the questionnaire for the semi-structured interviews and the Delphi survey, by identifying key criteria to be tested in the Delphi survey – the ultimate aim being to develop a scientifically based model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

Electronic searching was utilised by entering keywords (e.g. transfusion, blood banking, medicine, education, training, course(s), diploma(s), degree(s), graduate programme(s), blood product(s), and postgraduate) – both alone and in combination – into search engines like PubMed, Medline and Google Scholar. References were moreover sourced from transfusion medicine-related websites and by scanning the references from academic articles on transfusion medicine for publications relevant to the research.

Preference was given to articles from peer-reviewed international and national journals.

4.3.3 The semi-structured interview

According to Shank (2002:42), interviewing is an act of conversing, and all acts of conversing involve the transfer of information; however, interviewing differs from normal conversation in that normal conversation presupposes a pattern of reciprocation, one which results in a certain symmetry of the disclosure. In the interview the disclosure assumes an asymmetrical pattern – one party seeks information and the other provides the information.

Mathers, Fox and Hunn (1998:1) describe the use of interviews – designed to gain insight into the perspectives of others – as a well-established and important technique in data gathering involving verbal communication between the researcher and the participant. They also reiterate the fact that there is a range of approaches to interviewing, from completely unstructured in which the subjects are allowed to talk freely about whatever they wish, to a highly structured form that limits the subject to answering only direct questions. The quality of the data collected in an interview depends both on the interview design and the skill of the interviewer.

According to Mathers *et al.* (1998:2), semi-structured interviews involve a series of open-ended questions based on the topic areas the researcher wants to cover where "the open-ended nature of the question defines the topic under investigation but provides opportunities for both interviewer and interviewee to discuss some topics in more detail". If the interviewee has difficulty in answering a question or provides only a brief response, the interviewer can use cues or prompts to encourage the interviewee to consider the question further. In a semi-structured interview, the interviewer is also free to ask the interviewee to elaborate on the original response or to follow a line of inquiry introduced by the interviewee.

In this study, semi-structured interviews were utilised. The interview guide and the questions for the semi-structured interviews were developed making use of a literature review. The aim was broadly to determine the roles, tasks, functions, competences, skills and areas of knowledge of the clinician in transfusion medicine. At the same time it was endeavoured to delineate the scope of practice of a clinician involved in blood transfusion, the challenges facing them and the shortcomings in respect of their abilities to deal effectively with blood transfusion-in-practice. Factors that make a postgraduate diploma sustainable as well as the outcomes and the academic and educational factors that need to be considered for inclusion in the model were also explored.

The interviews were directed at medical professionals actively involved and experienced in transfusion medicine practice. Before each interview, the participant was provided with a letter of request explaining the process (cf. Appendix A1) and an informed consent form that had to be signed (cf. Appendix A2). The interview consisted of a number of questions relating to the role, outcomes and competencies of a clinician completing a Postgraduate Diploma in Transfusion Medicine, as established in the literature review. The questions were asked in an open-ended fashion to each of the respondents (cf. Appendix A3). This part of the research provided a list of criteria for inclusion in the Delphi survey and formed the foundation for the elements that were eventually included in the model.

4.3.4 The Delphi survey

Two research scientists at the Rand Corporation, Olaf Helmer and Norman Dalkey pioneered the Delphi survey method. The initial aim was to develop a tool to forecast future events and their probable effects on society using questionnaires with controlled-opinion feedback (Dalkey & Helmer 1963:458). Participants are usually solicited experts in the field of study, who

are given an open-ended questionnaire in order to obtain specific information regarding the field of study. The Delphi method consists of several rounds in which participants rate the relative importance of individual items during each round as 'essential', 'useful' or 'unnecessary'. The process is designed to yield consensus through a series of rounds, usually three. As this set of procedures was developed to improve forecasting, it was called the 'Delphi method', referring to the oracles at Delphi in ancient Greece to whom kings would come to consult with the Greek god, Apollo (Van Zyl 2004:251).

Dajauni, Sincoff and Talley (1979:83) maintain that consensus is assumed to have been achieved when a certain percentage of responses fall within a prescribed range for the value being estimated. Therefore, the aim of the Delphi process is to attain a level of consensus among the expert panel members on a specific statement. According to Larson and Wissman (2000:46), consensus is reached when 80% of the participants indicate a similar value (for a specific item) as their choice. In this study, consensus was defined as having been reached when 80% of the participants' votes fell within the same bracket on the scale. Stability has been described as the natural tendency for opinions of experts to centralise (Linstone & Turoff 1979:277) after a number of rounds.

The Delphi method rests on two assumptions: first, that group decisions are more valid than those made by a single person (especially if the group members are experts in a particular field of study); and, second, that face-to-face interaction might be influenced either by domineering members or by group bias (Murry & Hammons 1995:426). Since the decision-making is not left to a single person, the success, credibility and validity of the process are all increased (Clayton 1997:373). The method renders discussion between experts more productive, especially in a situation where complete scientific knowledge is lacking, and decision makers thus have to rely on their own

intuition or on expert opinion (Philips, Longoria, Sturm, Delaney & Taylor 1991:227-233).

Utilising the Delphi technique in this study had a number of advantages (Critcher & Gladstone 1998:432; Linstone & Turoff 1979:4; Murry & Hammons 1995:426). It is a relatively fast and cost-effective method of gathering expert opinions and the difficulties and problems inherent in face-to-face discussion are effectively avoided. The study allowed equal participation of a range of respondents from various backgrounds with expertise in both medical education and transfusion medicine, even when these were geographically separated. Participants were given the opportunity to carefully consider their responses in their own time; and, both qualitative and quantitative approaches were combined, which made this a suitable method of research on the topic of the development of an academic model for a Postgraduate Diploma in Transfusion Medicine.

The Delphi technique makes allowance for anonymous contributions by experts and for physical separation of participants, which, in turn, limits individual dominance and iteration through the use of multiple rounds allowing consideration of controlled feedback by fellow participants. Semi-quantitative analysis of responses, provided to the Delphi panel allows each of the participants to evaluate their response to each statement while comparing them with those of the group. This allowed participants to change their views in subsequent rounds if they felt that it was indeed appropriate to do so.

4.4 SAMPLE SELECTION

The method used during sample selection can best be described as a combination of different forms of purposive sampling, namely intensity sampling and criterion sampling.

Cohen and Crabtree (2006:1) define *intensity sampling* as the process of selecting or searching for rich or excellent examples of the phenomenon of interest. Intensity sampling allows the researcher to select a small number of rich cases that provide in-depth information and knowledge of a phenomenon of interest. Patton (2001:38) points out that "this form of sampling requires prior information and exploratory work to be able to identify intense examples".

According to Patton (2001:238), *criterion sampling* involves selecting cases that meet some predetermined criterion of importance. Criterion sampling "can be useful for identifying and understanding cases that are information rich and provide an important qualitative component to quantitative data" (Cohen & Crabtree 2006:1).

The above forms of purposive sampling, namely intensity and criterion sampling were utilised in both the semi-structured interviews and the Delphi surveys.

4.4.1 The semi-structured interview

Semi-structured interviews, based on a questionnaire compiled by the researcher, were conducted on an individual basis with a number of participants fulfilling certain key criteria relating to their experience in the fields of transfusion medicine and medical education.

4.4.1.1 *Target population*

A target population consists of a group of individuals who possess and share certain specified characteristics (De Vos, Strydom, Fouché & Delport 2002:14). In this part of the study, the target population included individuals with experience in both the fields of transfusion medicine and medical education.

4.4.1.2 *Survey population*

The survey population consisted of national and international professionals with experience in both the fields of transfusion medicine and medical education. These professionals had to have as a minimum a postgraduate degree that is relevant to transfusion medicine practice, at least 10 years experience in the clinical practice of transfusion medicine and had to be of national or international standing.

4.4.1.3 *Sample size*

The sample size is the number of semi-structured interviews completed with full, written informed consent. Sampling was discontinued when information redundancy and saturation were achieved. This was taken to be that point at which no new information or themes were seen to be emerging from the data (Cohen & Crabtree 2006:1).

According to Cohen and Crabtree (2006:1), it is important to bear in mind that saturation or information redundancy can be reached prematurely if "one's sampling frame is too narrow, one's analytical perspective is skewed or limited, the method employed is not resulting in rich, in-depth information or the researcher is unable to get beyond the surface or 'status quo' with respondents".

Eight semi-structured interviews were conducted. Three of the interviewees came from South Africa and five from other countries – one each from the USA, India, Belgium, Tunisia and the United Kingdom. Two of these interviews formed part of the pilot study and the remaining six interviews were conducted after the pilot study had been completed.

4.4.1.4 *Description of sample*

The sample included all the professionals with experience both in the fields of transfusion medicine and medical education, who had completed the interviews and given full, written informed consent. No changes were made to the questionnaire for the semi-structured interview during or after the pilot study. Therefore, the two interviews done as part of the pilot study were included in the final analysis.

The aim was to have senior specialists from both the academic environment and private practice who had experience in medical education and in transfusion medicine. Participants were identified on the basis of fulfilling a number of predetermined criteria. Participants were consequently selected from the fields of clinical haematology, haematological pathology, internal medicine and family medicine. All of these were academics of national or international standing.

The specialist from private practice was a senior Clinical Haematologist previously employed for many years by the University of the Witwatersrand. Candidates from other specialty areas (e.g. internal medicine, family medicine, etc.) who fulfilled the stated criteria were also selected.

Interviews were organised and held at different times during international conferences and national meetings, as this provided an ideal opportunity to interview experts from different countries and continents. Participants in the interviews included experts from South Africa, Belgium, India, Tunisia, the United Kingdom and the United States of America, for a total of six countries on four continents.

4.4.1.5 *Pilot study*

A pilot study was conducted to ensure that the questions were clear and unbiased, that the interview was well structured and to determine how much time would be needed for completion. To achieve this, the interview guide with questions was provided to two individuals who met the same criteria as those in the survey population. A formal, digitally recorded, semi-structured interview was conducted with these two individuals to establish the adequacy of the interview guide. Results from these interviews were recorded and noted. Because no changes were subsequently made to the questionnaire, the two interviews were included for analysis in the final sample of interviews conducted after the pilot study.

4.4.1.6 *Data collection*

Written informed consent was obtained from all participants. In all cases, semi-structured interviews were conducted in person by the researcher. Interviews were scheduled on an appointment basis after which an interview guide – which included the informed consent form – was either given or sent to the participant. This was done both to give the interviewees adequate opportunity to prepare for their interviews and to consider the questions that would be asked. They were also informed of the approximate time that would be required for the interview.

Interviews were scheduled in such a way that enough time was allowed so that the interview would take place in a relaxed and unrushed setting. Before the start of each interview, the purpose, nature and process of the interview and the aims of the study were explained to each participant verbally by the researcher. They were reminded of the approximate time that would be required to complete the interview. Participants were given an opportunity to ask questions relating to the study, the interview and the informed consent.

They were also asked whether, should they agree to participate, they had any objections to the interview being digitally recorded.

In asking the questions the researcher adhered to the sequence adopted in the questionnaire. Where necessary, the researcher probed the interviewee to ensure a complete understanding of an answer given to a particular question. In other instances, when a question seemed to have been misinterpreted by the participant, the researcher clarified the question verbally.

Each interview lasted approximately 30 minutes. In two instances, the participants had more time available and needed more time to discuss certain questions. The latter interviews lasted about one hour. The duration of the other interviews was sufficient to cover all the aspects that both the researcher and participants wanted to address. Interviews were conducted in a friendly and collegial spirit and almost all of the participants indicated at the end of the interview that they felt that it had been a useful and interesting exercise and that they had also benefited in some way from the process. Many expressed their appreciation for having been given the opportunity to participate in the study.

All interviews were recorded digitally with the full, written consent of the interviewee and were subsequently transcribed. All the interviews and the transcriptions were done by the same person (i.e. the researcher). The transcriptions were subsequently checked by the interviewer (= the researcher) and his promoter in order to determine that no transcription errors had been made.

4.5 THE DELPHI SURVEY

A Delphi survey was utilised in this study to establish a set of criteria needed for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine and to determine the relevance, importance and practical application of the said criteria.

4.5.1 Target population

In this survey, the target population included experts in the field of transfusion medicine, blood banking and/or blood service administration and policy making, who also have expertise in medical education. *Experts* were defined as individuals with expertise in the fields of transfusion medicine education and/or haematology and who also enjoy national and/or international recognition in these fields.

4.5.2 Survey population

The Delphi process was directed at experts in the field of transfusion-medicine education with knowledge of blood banking and blood-service administration and policy making and who had given informed consent and had also completed the Delphi process.

4.5.3 Sample size

The sample size was the number of surveys completed with full, written informed consent, and included 12 participants.

4.5.4 Description of sample

National and international experts in the fields of transfusion medicine, blood banking and blood service administration and policy making and who moreover had experience in transfusion medicine education were selected.

Experts were defined as individuals with at least 10 years' experience in medical education as well as knowledge of and more than 10 years' experience in clinical blood transfusion medicine. The twelve participants were experts who had been trained in South Africa, and many of them had done postgraduate studies overseas. This is important in that the final model is focused specifically on the South African context and thus the information gleaned both from the international literature and the outside experts needed to be tested for their appropriateness in the South African context.

4.5.5 Pilot study

A pilot study was done to ensure that the questions were clear and unbiased, that the survey was well structured and further to determine the amount of time needed for completion. To achieve this, one individual who met the same criteria as the survey population, was asked to complete the Delphi survey in order to establish ease of use or any problems or uncertainties with regard to the statements in the questionnaire. Final criteria were formulated under the guidance of both the researcher's promoter and co-promoter.

4.5.6 Data collection

After some informal discussions, a letter explaining the process was provided (cf. Appendix B1) and written informed consent obtained from all participants (cf. Appendix B2). Questionnaires were delivered by email to all participants. Participants were given two to three weeks to complete the survey during each round and had then to return them to the researcher by email or by hand. It took three rounds to obtain adequate consensus and stability.

4.6 DATA ANALYSIS

Qualitative data analysis comprises the processes of organising data into categories and identifying patterns in the categories, called content analysis (Katzenellenbogen, Joubert & Karim 1999:180; Mathers *et al*. 1998:17).

Qualitative analyses do not usually follow a linear pattern, but tend to occur in several cyclical, overlapping phases where the researcher moves back and forth between different levels (Leedy 1997:165).

Analysis of the semi-structured interviews and the Delphi survey was done in the context of the findings from the literature review and will be discussed in the following sections.

4.6.1 The semi-structured interview

The researcher was responsible for analysing the data. The transcriptions from the semi-structured interviews were skimmed with a view to obtaining a broad overview and to obtaining a general feeling of what had been said with the aim of noting preliminary interpretations. The researcher's promoter verified the correctness of the transcriptions. Subsequently, concepts were organised, summarised and grouped together in themes. Different themes were grouped to form specific categories with a view to reducing the variety of responses and to simplify the reporting process. This was done carefully and great caution was exercised so as not to change the meanings of the responses. Phrases were linguistically adjusted and/or abbreviated to simplify the reporting of the results.

Finally, the collected data were integrated, summarised, classified and displayed in tabulated form. This, together with the information gathered from the literature review, was used to compile the statements that were used as criteria in the Delphi survey.

4.6.2 The Delphi survey

The data generated by the Delphi survey were analysed by the researcher. The results were reported separately for each round discussing the measuring instrument, detailing the topics dealt with in the different sections

with an analysis of the responses for each round. The findings from each round ended with a summative discussion of findings for that particular round. In this study, consensus was defined as having been reached when 80% of the participants' votes fell within the same bracket on the scale. Statements on which consensus were reached were deemed essential components to be taken into account in the development of the model and were listed as such. Statements on which no consensus was reached, but which displayed stability were listed. Finally, there was an overall discussion of the results, with the derived conclusions and recommendations forming the basis of the model that was developed.

4.7 RELIABILITY, VALIDITY AND TRUSTWORTHINESS

According to Hasson, Keeney and McKenna (2000:1012), reliability is the extent to which a procedure produces similar results under constant conditions on all occasions.

Reliability was enhanced by making use of pilot studies, by determining strict criteria in sample selection, a carefully constructed semi-structured interview and Delphi survey, and by having measures in place to ensure high response rates.

The validity of research results has been defined in a number of ways. Landman, as quoted by Nel (2004:131), defines *validity* as the extent to which an instrument or procedure satisfies the purpose for which it was constructed, that is, it determines that which it was designed to determine.

Utilisation of pilot studies and securing the involvement of carefully selected experts in both the semi-structured interviews and the Delphi survey enhanced the validity in this study. Involving national and international experts from a variety of backgrounds enhanced the external validity of the research, i.e. assured the applicability of the research findings to the wider

population of interest (Bowling 2002:150), as opposed to internal validity, which refers to an instrument being satisfactorily tested repeatedly in the population for which it was designed (Bowling 2002:150). Furthermore, the use of successive rounds in the Delphi was expected further to increase its validity.

Nonetheless, maximum response rates remain essential to obtaining valid results. It was earlier pointed out that there are threats to validity with the Delphi method, arising principally from pressures for convergence of predictions (Hasson *et al.* 2000:1013), and which may undermine the Delphi's forecasting ability. However, according to Goodman (1987:729-734), making use of participants who are experts in their field and who have an interest in the subject area, may help increase the validity of the Delphi. Furthermore, obtaining a high level of consensus in the first round may even further enhance the validity of the results obtained from the Delphi survey.

Trustworthiness is best defined as the 'believability' of a researcher's findings (Maykut & Morehouse 1994:64). Schwandt, Lincoln and Guba (2007:12) discusses four criteria for trustworthiness in qualitative research which are considered to be analogous to criteria used in quantitative research, namely credibility (internal validity), transferability (external validity), neutrality (objectivity) and dependability (reliability).

In this study trustworthiness was ensured by making use of reliable and valid qualitative research instruments, namely the semi-structured interviews and Delphi survey and by providing examples of interviewees' "own words" for the semi-structured interviews. In the Delphi survey, all the comments of participants are provided in their own words (cf. Appendices A1 to F). The Delphi survey is an established, credible research instrument if appropriately used and combines quantitative and qualitative components.

Credibility was enhanced by making use of authorities in the field of transfusion medicine as Delphi panellists. This was further increased by providing the Delphi panel with individual and collective written feedback after every round of the Delphi process. The researcher's prolonged engagement with the topic over a number of years, while making use of accurate referencing (all the digital recordings, notes and reports are available as records), further contributed to the credibility and auditability of the research findings.

Observations in qualitative research are usually defined by the specific context in which they occur, which implies that the qualitative researcher cannot claim that knowledge gained from one context will necessarily be relevant in other contexts (Babbie & Mouton 2001:277). "If there is to be transferability, the burden to prove transferability lies with the one who wishes to apply the findings elsewhere, not with the original researcher" (Lincoln & Guba 1985:298). According to Bezuidenhout (2005:169), the responsibility of the original researcher ends with providing sufficient description to make similar judgments possible. In this study, the possibility of external judgment to consider transferability was ensured by reporting sufficient detail, through the use of purposive sampling that maximised the range of specific information obtained from the context, and further by using participants with a wide range of backgrounds, nationalities and experience.

4.8 ETHICAL CONSIDERATIONS

Approval for the research project was obtained both from the Ethics Committee of the Faculty of Health Sciences at the University of the Free State (ETOVS 156/07) and from the Dean of the Faculty of Health Sciences at the University of the Free State. As no patients were involved in this study, it was not necessary to obtain the approval of the Provincial Executive.

4.8.1 Informed consent

Informed consent was obtained from all participants. A short overview of the study, its purpose and an explanation of what participants were required to do, were provided to all participants. Where applicable, details regarding the Delphi process were also given. Participation was completely voluntary and a written guarantee was included in the informed consent form that all information would remain confidential and anonymous, to all but myself and my promoters. My contact details appeared on the form.

4.8.2 Right to privacy

All personal information was managed in a strictly professional and confidential manner and was only known to the researcher and his promoter and co-promoter. Goodman (1987:729-734) maintains that in the Delphi survey participants do not meet each other face-to-face and therefore they can react to ideas unbiased by the identities and pressures of others.

Anonymity is one of the major features that differentiates this method from other consensus methods (Hasson *et al.* 2000:1012). In order to maintain the rigour of this technique, a response rate of at least 80% was required for each round. To achieve this, the researcher had of necessity to know the identity of respondents, and participants not responding had to be pursued (Hasson *et al.* 2000:1012).

Therefore, the pursuit of true anonymity in a Delphi survey presents problems, and the term 'quasi-anonymity' may be used to indicate that the respondents themselves will be known to the researcher and even to one another, but that their judgments and opinions will remain strictly anonymous (McKenna 1994:1224).

4.9 CONCLUSION

Chapter 4 provided an overview of the research design and methodology utilised in the study and also of the processes and procedures involved.

In the next chapter, Chapter 5, entitled ***Results, data analysis and findings of the semi-structured interviews***, the results of the semi-structured interview as data-collecting method in the study will be reported and discussed.

CHAPTER 5

RESULTS, DATA ANALYSIS AND FINDINGS OF SEMI-STRUCTURED INTERVIEWS

5.1 INTRODUCTION

This research evolved in different stages, comprising a literature review, semi-structured interviews and a Delphi survey. The literature review provided the necessary background, rationale and foundation for the research and as such formed the basis from which the interview guide was designed. The purpose of the interviews was to produce data by means of which to design a draft set of criteria. These criteria – required for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State – were subsequently tested in a Delphi survey to determine its relevance, importance and practical application.

This chapter deals with the results, the data analysis and a description of the findings in the semi-structured interviews.

5.2 REPORTING OF THE RESULTS, THE DATA ANALYSIS AND DESCRIPTION OF THE FINDINGS

The results of the semi-structured interviews are reported within constructed categories and subcategories in order to classify the findings gathered in an informed and logical manner.

Eight in-depth interviews were conducted with a diverse group of role players in the field of blood transfusion and from several different nationalities and backgrounds.

The interviewees are classified and coded as follows:

South African:

- Professor and specialist in Internal Medicine and Pulmonology at Kalafong Hospital, University of Pretoria (S1)
- Professor and specialist in Family Medicine at the Universitas Academic Complex, University of the Free State (S2)
- Specialist in Clinical Haematology in private practice in Johannesburg (S3)

International:

- Professor and specialist in Internal Medicine, Clinical Haematology and Nephrology at the Stuyvenberg Ziekenhuis, Antwerp in Belgium (F1)
- Professor and specialist in Internal Medicine and Clinical Haematology at the Norris Cancer Center, University of Southern California in Los Angeles, USA (F2)
- Professor and specialist in Internal Medicine and Clinical Haematology from the Christian Medical College Hospital in Vellore, India (F3)
- Professor and specialist in Internal Medicine and Clinical Haematology from John Radcliffe Hospital in Oxford, UK (F4)
- Professor and specialist in Internal Medicine and Clinical Haematology from the Hôpital Universitaire Farhat Hached in Sousse, Tunisia (F5)

The results on the following questions are reported:

1. In your opinion, what are the greatest **challenges** faced by clinicians (e.g. paediatricians, physicians or general practitioners) dealing with the

transfusion of blood or blood products in the clinical setting both currently and over the next five years? Please motivate your answer.

2. What, in your opinion, are the main **roles, including tasks and functions** of a **clinician** dealing with the transfusion of blood and blood products in the clinical setting? Please motivate your answer.

3. What, in your opinion, are the main **skills and competences** of a **clinician** dealing with the transfusion of blood and blood products in the clinical setting? Please motivate your answer.

4. What, in your opinion, are the main areas of **clinical knowledge** that a clinician requires in dealing with the transfusion of blood and blood products as part of their day-to-day practice? Please motivate your answer.

5. In your opinion, what are the greatest **deficiencies** in the abilities of clinicians (e.g. paediatricians, physicians or general practitioners) dealing with the transfusion of blood or blood products in the clinical setting. Please motivate your answer.

6. How, in your opinion, will the **scope of practice** of a full-time specialist in transfusion medicine differ from that of a clinician who deals with the transfusion of blood and blood products on an *ad hoc* basis? Please motivate your answer.

7. What are the major **outcomes** that you would like to see included in the curriculum for a Postgraduate Diploma in Transfusion Medicine that is focused at clinicians who want to improve their knowledge, skills and competences in the transfusion of blood and blood products? Please motivate your answer.

8. What are the three major factors that should be taken into account in making a Postgraduate Diploma in Transfusion Medicine a **sustainable** programme? Please motivate your answer.

9. In your opinion, what are the most important – **factors from an academic point of view** – to take into consideration with regard to the academic development and implementation of a postgraduate diploma in transfusion medicine? Please motivate your answer.

10. In your opinion, what are the major **educational factors** that need to be taken into consideration in developing a model for the academic development and implementation of a postgraduate diploma in transfusion medicine? Please motivate your answer.

The results from the semi-structured interviews were tabulated (cf. Appendix A4, Tables 5.1 to 5.10). Due to the huge number of findings from the semi-structured interviews, only a small selection of "own words" of interviewees are provided in the thesis.

5.2.1 Challenges facing clinicians dealing with blood transfusion in the clinical setting

5.2.1.1 *Results*

Table 5.1 (cf. Appendix A4) summarises the challenges faced by clinicians dealing with blood transfusion in the clinical setting. These challenges include:

- Current challenges
- Challenges anticipated in the next five years

5.2.1.2 *Data analysis and description of findings*

Current challenges faced by clinicians involved in blood transfusion in the clinical setting:

Forty-three factors, arranged in six subcategories, were identified as current challenges.

In the *quality and safety* subcategory, ten factors were identified. The importance of maintaining the quality and safety of blood products was emphasised. Limiting transfusion-transmitted infections, such as HIV, West-Nile virus and others were mentioned as important. Managing the side effects of blood transfusion and the high incidence of clerical and sampling errors were emphasised. Increased restrictions on donors and subsequent donor deferral were mentioned as areas that were particularly difficult to deal with, while patients requiring repeated blood transfusion pose unique challenges to the clinician.

In the subcategory dealing with *lack of knowledge and training*, ten challenges were identified. These included the appropriate use of blood and knowledge of the indications, and the value and practical aspects of transfusion of blood products. The lack of training in transfusion medicine was mentioned, as were the lack of knowledge on coagulation and anticoagulants, blood-sample processing, individual blood products and the pathophysiology and management of transfusion-related complications. With regard to doctors involved in transfusion practice, one interviewee said, "*Do they have an understanding of proper use? Do they have an understanding of the safety side and the adverse events related to blood in their setting? I appreciate that those are the two main things that most people all over the world are saying is that they find. The feeling is that if there are two things*

that they would consider that people should know, it is right indication and the management of adverse events."

The subcategory on *access and availability* produced thirteen factors. Challenges noted included that of maintaining an adequate blood supply, with access to blood being a particular problem. An example used was that of the decreasing pool of blood donors, and in particular the lack of platelet donors. This is partially due to factors like the HIV epidemic decreasing the donor pool, while at the same time increasing the demand for blood products because of HIV-related haematological disease, the wastage of blood through inappropriate use, an increasing demand for blood in specialised medical care settings, the use of novel techniques requiring blood transfusion, and increasing restrictions on donors with subsequent donor deferral. Other factors found to impact on the availability and access to blood and blood products included the immigration of people or groups into areas with an inadequate supply of blood for their blood groups and the lack of rare blood groups in the blood supply. Pressure is also put on the blood supply and the availability of blood by patients requiring repeated blood transfusion and patients developing platelet refractoriness resulting from anti-platelet antibodies.

In the *ethical and medico-legal* subcategory, the factors mentioned included the challenge of difficult ethical issues related to blood transfusion, informed consent issues, the refusal of blood on religious grounds, the fact that the physician has to take responsibility for a product delivered to him/her by a third party, and issues flowing from a breach of anonymity between recipient and donor.

In the subcategory on *cultural perceptions and understanding*, the public fear of the blood supply, mainly driven by perceptions of an unsafe blood supply as a result of the HIV epidemic was mentioned. One interviewee was concerned about cultural perceptions of blood transfusions and said, "*… hulle*

is bang vir bloed, want tradisioneel glo hulle as die bloed oorkom as hulle bloed kry, dan glo hulle daai man wie die bloed gegee het, het nou beheer oor hulle" (translation: "… they are afraid of blood, because traditionally they believe that as the blood is transfused, the man who donated the blood gets control over them").

In the subcategory dealing with *cost-effectiveness*, using blood cost-effectively and appropriately – amongst others by limiting unnecessary transfusions – was considered an important challenge.

Thus, to summarise: quality and safety issues, lack of knowledge and training, access to and availability of blood, ethical and medico-legal issues, the cost-effective use of blood, and cultural perceptions and understanding of the blood supply, are all seen as current challenges with which the clinician involved in blood transfusion has to deal.

Anticipated challenges that clinicians involved in blood transfusion in the clinical setting would have to face in the next five years:

Nineteen factors, grouped together in six subcategories, were identified as challenges that were anticipated to surface in the next five years.

In the subcategory dealing with *quality and safety*, many of the current challenges were mentioned again, including the challenge of maintaining quality and safety in the blood supply and the effects of the HIV epidemic on transfusion medicine in general and on safety in particular. Other issues that were raised included the challenge of the changing profile of TTIs and of how to limit such infections. Emerging pathogens like vCJD and the increase in bacterial pathogens were mentioned as examples. There was also some concern about an anticipated increase in transfusion-related graft-versus-host-disease (GVHD).

In the *knowledge and training* subcategory, the lack of input from academic institutions regarding the use of blood in the private sector was noted as a future challenge.

In the subcategory, *access and availability*, issues similar to the current challenges were raised and these included the challenge of maintaining an adequate blood supply that would ensure access to blood, and the shrinking donor pool that would further be compounded by an increased demand for blood as a result of the HIV epidemic. The increasing disparity between the private and public health sectors in terms of availability of the spectrum of blood products was deemed a potential future challenge.

In the *ethical and medico-legal* subcategory, ethical and informed consent issues were considered to be challenges that would continue to be challenging in the next five years. A further ethical challenge was the one pertaining to the increasing disparity between public and private health sectors.

The issue of using blood cost effectively was emphasised as a challenge that was anticipated to remain important in the next five years. It is subcategorised under *cost-effective use of blood*.

In the subcategory on *managing change*, important future challenges identified were the challenge and difficulties of keeping abreast of new developments and managing continual change in the field of blood transfusion and also that of dealing with the changing profile of transfusion-transmitted diseases.

In summary, quality and safety issues, lack of knowledge and training, access to and availability of blood, ethical and medico-legal issues, the cost-

effective use of blood, and change management are all seen as anticipated challenges that clinicians may have to face in the next five years.

5.2.2 The main roles, tasks and functions of the clinician dealing with blood transfusion in the clinical setting

5.2.2.1 *Results*

Table 5.2 (cf. Appendix A4) is an exposition of the main roles, tasks and functions of the clinician dealing with blood transfusion in the clinical setting.

5.2.2.2 *Data analysis and description of findings*

Twenty-six factors, grouped together in six subcategories, were identified as being representative of the roles, tasks and functions of the clinician involved in blood transfusion in the clinical setting.

In the subcategory dealing with *supervision*, it was noted that the clinician should ensure that the correct procedures are followed with regard to the transfusion of blood and blood products and that no clerical errors are made. The clinician should also monitor the clinical use of blood and blood products and should be able to identify the inappropriate use of blood. One interviewee said, "*The main roles are developing policies for clinical transfusion in consultation with other physicians involved in transfusion practice anaesthesists, surgeons, ob-gynae. The second role is to monitor clinical use of blood and blood products and the third and main role is maintaining junior staff adequate competency, nurses and midwives [sic].*"

In the subcategory on *governance*, it was pointed out that clinicians should develop policies for blood transfusion in consultation with colleagues, do audits on the use of blood and give feedback to hospital management on the utilisation of blood and blood products in the hospital.

In respect of the *training* subcategory it was mentioned that the clinician has an important role in the training of medical students, nurses, laboratory personnel and specialists-in-training regarding the use of blood and blood products.

The *scarce resource management* subcategory pointed out the clinician's task in respect of ensuring that blood as a scarce resource was used appropriately, cost-effectively and responsibly. The clinician should have an awareness of the limitations of the blood supply and thus not waste blood. The use of blood should be limited as far as possible, by using appropriate alternatives to blood wherever possible.

Another function, summarised in the *patient management* subcategory, is that of caring for patients receiving blood transfusion. In order to fulfil this duty, the clinician should have adequate knowledge of the indications for blood products, identify the need for transfusion, obtain informed consent from the patient and take personal responsibility for obtaining the cross-match sample in order to limit clerical and/or sampling errors. The clinician should take into account logistical issues, such as transporting blood, ensuring safe blood administration, following the patient up post-transfusion and managing any complications that may arise.

The subcategory on *research* indicated that the clinician dealing with blood transfusion in the clinical arena also has a research function and task, with specific mention being made of interpreting the literature on blood transfusion, supporting research aimed at better identifying the indications for blood transfusion and conducting audits on blood utilisation.

In summary, factors related to supervision, governance, teaching and training, scarce resource management, patient management and doing

research, were considered to be the main tasks and functions required of the clinician dealing with blood transfusion in the clinical setting.

5.2.3 The main skills and competences required when dealing with transfusion in the clinical setting

5.2.3.1 *Results*

Table 5.3 (cf. Appendix A4) reflects the main skills and competences of the clinician dealing with blood transfusion in the clinical setting.

5.2.3.2 *Data analysis and description of findings*

Twenty factors were identified as being representative of the skills and competences of clinicians involved in blood transfusion in the clinical setting. These factors were thematically grouped in seven subcategories.

In the subcategory dealing with *clinical skills*, a number of factors were mentioned. These include clinical examination skills, skill in judging the need for a transfusion, competency in the management and/or follow-up of transfusion complications and resuscitation skills.

In the *technical* subcategory, emphasis fell on being competent in achieving venous access, maintaining the cold chain, using and administering the spectrum of blood products and being competent in doing a cross-match. Although competence in thawing certain blood products was deemed important by two interviewees, one other interviewee specifically felt that it was not a skill needed by the clinician, but one that belongs within the scope of nursing practice.

In the subcategory dealing with *administrative skills*, general administrative skills, with specific emphasis on precise note keeping was mentioned.

In the *social skills* subcategory, communication and interpersonal skills were specifically highlighted.

The factors deemed to be important in the *integration* subcategory were problem-solving skills, competency in interpreting activities in the blood bank and deciding on the appropriateness of a particular transfusion for those who practice medicine in poorly resourced rural areas.

Both teaching and training were regarded as being necessary in the subcategory dealing with *educational issues*.

In the final subcategory, dealing with *research*, auditing skills and the ability to interpret the literature on blood transfusion were noted.

In summary, factors related to clinical, technical, administrative, social, integrative, educational and research skills and competences, were noted as being required of a clinician dealing with the transfusion of blood and blood products in the clinical setting.

5.2.4 The main areas of clinical knowledge required in dealing with transfusion in daily practice

5.2.4.1 *Results*

Table 5.4 (cf. Appendix A4) provides detail on the main areas of clinical knowledge that clinicians require in dealing with blood and blood products as part of their day-to-day practice.

5.2.4.2 *Data analysis and description of findings*

Forty-three factors, thematically grouped into ten subcategories, were identified as being representative of the main areas of clinical knowledge

clinicians require in dealing with blood and blood products as part of their day-to-day practice.

In the first of these subcategories dealing with *knowledge of physiology*, a number of factors, including knowledge on oxygen transfer, biological components of blood, fluid balance, electrolytes, fluid replacement, blood groups and transfusion immunology were deemed important. One of the interviewees said, *"I think in order to understand blood transfusions, you have to understand a little bit about physiology of the blood system, oxygen carrying capacity; understand the biological components of blood - platelets, the clotting factors, the extrinsic and intrinsic factors."* A number of interviewees did not consider in-depth knowledge of transfusion immunology to be required. What was required in their view was merely knowledge of certain concepts, for example a basic understanding of the Human Leukocyte Antigen (HLA) system.

In the subcategory on *pathophysiology*, it was noted that the clinician dealing with blood transfusion should have a good knowledge of the pathophysiology of the underlying diseases that may impact on a patient's need for a transfusion, for example a patient with underlying pulmonary or cardiac disease may have a lower threshold for the transfusion of red blood cells than does a healthy young athlete. Knowledge of the pathophysiology related to blood loss and blood transfusion was also specifically mentioned.

In the subcategory dealing with *knowledge of blood banking*, knowledge of certain issues were deemed to be required, even for clinicians primarily dealing with patients and thus not working in a blood-banking laboratory. This included knowledge of some laboratory-specific aspects of transfusion medicine (e.g. cross-matching), a relevant knowledge of apheresis and knowing how to thaw certain blood products (e.g. fresh frozen plasma (FFP)). Such clinicians also need to know the principles underlying the

issuing of blood and if and when blood products can be returned to the blood bank if not used (F3).

In respect of the subcategory dealing with *haematological knowledge*, it was felt that they should have such knowledge of haematology as is relevant to blood transfusion. They should know about coagulation and anti-coagulant drugs and they should have a good knowledge of anaemias and some knowledge on haemophilia.

A number of factors featured in the *clinical medicine* subcategory, these including the ability to make an informed judgment on the need and indication for a transfusion, an understanding of the different blood products and how to use these products appropriately. Knowledge of co-morbid disease, such as, for example, renal failure and of how to use blood peri-operatively, was considered necessary.

In the *emergency medicine* subcategory, knowledge regarding resuscitation – and the appropriate use of blood during resuscitation – and regarding the use of emergency blood, and also knowing how to manage allergic reactions and anaphylaxis that may occur during transfusion were deemed necessary.

In respect of the subcategory *evidence-based medicine*, it was maintained that in order for clinicians to use blood appropriately, they should know the evidence behind transfusion for different sets of circumstances.

Knowing how to administer blood correctly and deciding on how much blood to give were factors mentioned in the subcategory dealing with the *administration of blood*.

Factors considered to be important in the subcategory *blood conservation knowledge*, included knowing about alternatives to blood transfusion,

autologous transfusions and blood conservation methods. An example used here was that of identifying a patient with platelet-refractoriness early and treating appropriately in order to limit unnecessary wastage of a scarce resource.

The subcategory on *knowledge of blood safety* included amongst its requirements not only knowledge of the complications of blood transfusion, but also knowledge of the contra-indications for blood transfusion, knowing about TTIs, allo-immunisation and haemovigilance, which includes adverse event reporting.

To summarise, clinicians dealing with blood and blood products as part of their day-to-day practice need knowledge on physiology, pathophysiology, blood banking, haematology, clinical medicine, emergency medicine, evidence-based medicine, blood administration, blood conservation and blood safety.

5.2.5 The greatest deficiencies in the abilities of clinicians dealing with the transfusion of blood

5.2.5.1 *Results*

In Table 5.5 (cf. Appendix A4) the greatest deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products are summarised.

5.2.5.2 *Data analysis and description of findings*

Twenty-two factors, arranged in six subcategories, were identified as being representative of the most glaring deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products.

In the *lack of knowledge* subcategory, a number of factors were identified, including knowing the correct indications for transfusion, what the transfusion triggers are and then knowing how to use them, to be familiar with the available products and their complications, as well as with coagulation and haemostasis. One interviewee believed that there was, amongst doctors, a general lack of knowledge on transfusion of blood.

In the *skills* subcategory, the skills to administer blood correctly, to obtain venous access – for example central line placement in a shocked patient – handling blood products correctly and applying clinical skills appropriately, were mentioned as important deficiencies.

In the subcategory dealing with *deficiencies in evidence-based transfusion practice*, the inappropriate use and selection of blood and blood products, unnecessary transfusion of patients, cross-matching and the unnecessary keeping of blood – particularly in the fields of surgery and anaesthesiology – were the most important deficiencies mentioned. The lack of guidelines in South Africa, and the resistance to, and outright non-adherence to guidelines and recommendations in cases where such are indeed available, were further also highlighted.

The *human resources* subcategory indicated the lack of clinicians with an overview of all aspects of transfusion to be an important deficiency. So too was a lack of time to participate in educational activities related to blood transfusion.

Both the lack of awareness of costs and of proper auditing systems were deemed important in the subcategory dealing with the *deficiencies in managing blood as a scarce resource.*

Deficiencies in respect of *attitude towards transfusion medicine* were noted, with transfusion being seen by some as an insignificant part of patient care. One interviewee was concerned that, *"…in the context of the management of a very sick patient, the transfusion support is often perceived as a very small part of the overall equation and inevitably, understandably, it doesn't have such a high profile in the mind of the clinician".*

To summarise, the most prominent deficiencies regarding the abilities of clinicians dealing with the transfusion of blood and blood products include deficiencies in knowledge, skills, evidence-based practice, human resources, scarce-resource management and attitude.

5.2.6 The difference in scope of practice between a specialist in transfusion medicine and the clinician who deals with transfusion on an *ad hoc* basis.

5.2.6.1 *Results*

Table 5.6 (cf. Appendix A4) provides an exposition of the difference in scope of practice between full-time specialists in transfusion medicine and clinicians dealing with blood transfusion on an *ad hoc* basis.

The table thus deals with the following:

- Full-time specialists in transfusion medicine
- Clinicians dealing with blood transfusion on an *ad hoc* basis

5.2.6.2 *Data analysis and description of findings*

The factors in the scope of practice of full-time specialists in transfusion medicine that differentiate them from clinicians dealing with blood transfusion on an *ad hoc* basis:

Eighteen factors were identified as being particularly descriptive of the scope of practice of a full-time specialist in transfusion medicine and that differentiated them from clinicians dealing with blood transfusion on an *ad hoc* basis. These factors were arranged in four subcategories.

In the subcategory dealing with *clinical knowledge*, it was noted that a full-time specialist in transfusion medicine would deal with a much wider spectrum of patients, would have a broader knowledge of disease related to transfusion medicine, would be knowledgeable on transfusion in transplantation medicine and would deal more often with coagulation problems. Such a person would also have in-depth knowledge of a pre-transfusion interview, be able to manage allo-immunisation and would show an interest in new developments.

In the *blood-banking* subcategory, it was stated that the full-time specialist would cover the entire area of apheresis – including stem cell collection – would deal with blood donors, be involved in running a blood bank – including the management of quality control and the administrative aspects of blood banking and the tracking and retrieval of blood and computerisation. Such a person would also have a deeper understanding of the laboratory testing for TTIs.

In the *teaching and training* subcategory, such a person would function as a tutor to colleagues and the tutoring would centre on appropriate use, reducing use, and on optimising the use of blood and blood products.

In the subcategory that considers the full-time specialist's *coordinating and consultative roles*, a number of points were noted, including such a person's coordinating role within the hospital and his/her function as link between the clinical setting and the laboratory. It was stated that such a person would need to have sufficient stature to be able to advise, help and lead new developments, while supporting colleagues across a range of specialties. One

of the interviewees stated that, "*…a full time specialist in transfusion isn't going to be the person who's going to be sitting in trauma actively transfusing as required but they need to have sufficient status and stature to be able to advise, help and lead in developments in this to bring their colleagues along with them".*

In summary, the scope of practice of a full-time specialist in transfusion medicine that sets him/her apart from the clinician dealing with blood transfusion on an *ad hoc* basis, include issues dealing with clinical knowledge, blood banking, teaching and training and also leadership and consultative abilities.

The factors in the scope of practice of clinicians dealing with blood transfusion on an *ad hoc* basis that differentiate them from full-time specialists in transfusion medicine:

Ten factors, arranged in four subcategories, were identified as being descriptive of the scope of practice of clinicians dealing with blood transfusion on an *ad hoc* basis and that differentiate them from full-time specialists in transfusion medicine.

In the subcategory on *clinical knowledge*, it was noted that such clinicians could be of practical assistance by the bedside, applying knowledge in their local settings and that they should be more clinically than laboratory-orientated than the full-time specialist. In terms of knowledge, they should have knowledge of basic things, such as the indications for blood transfusion, but also a limited knowledge of more specialised aspects of transfusion, such as managing a massive blood transfusion.

In the *blood banking* subcategory, it was stated that such a person should be able to do basic cross-matching, blood grouping, blood-smear review and

urine testing and be able to run a small blood bank. Knowledge of technical procedures related to blood banking would, however, be more limited, e.g. they should only know the concepts and principles underlying apheresis rather than have detailed knowledge.

The subcategory *teaching and training*, indicated that this type of clinician can assist with the transfusion-medicine training of doctors, students, paramedical staff and nurses.

The *leadership and consultative roles* subcategory suggested that such a clinician could be consulted regarding transfusion in a big department.

In summary, the scope of practice of clinicians dealing with blood transfusion on an *ad hoc* basis that differentiates them from the full-time specialist in transfusion medicine includes issues related to clinical knowledge, blood banking, teaching and training, in addition to such a person's leadership and consultative roles.

5.2.7 The major outcomes of a curriculum for a Postgraduate Diploma in Transfusion Medicine

5.2.7.1 *Results*

In Table 5.7, the major outcomes for a Postgraduate Diploma in Transfusion Medicine are tabled.

5.2.7.2 *Data analysis and description of findings*

Forty-two factors, here grouped together in eight subcategories, were identified as major outcomes for a postgraduate diploma in transfusion medicine.

In the subcategory dealing with the *basic sciences*, it was stated that students completing a Postgraduate Diploma in Transfusion Medicine should have a proper knowledge of the physiology and pathophysiology related to blood transfusion.

In the *blood-banking* subcategory, a number of potential outcomes were mentioned. These comprise, *inter alia*, having knowledge of the laboratory aspects of transfusion medicine, including an understanding of antibody-identification procedures, knowledge on how cross-matching is performed, how blood typing is done and how blood is processed – which includes an awareness of apheresis and its applications. They should have a proper knowledge of blood and the components of the different blood products, and know about donor selection and donor-related issues and quality assurance in blood banking. Furthermore, they should be familiar with leukodepletion – both in the laboratory and by the bedside – and with the new issues facing blood banking.

The subcategory dealing with outcomes in *haematology* noted knowledge of the relevant aspects of haematology, including haemostasis, as they relate to transfusion medicine.

In the *clinical medicine* subcategory, knowing the indications for blood products, being able to apply knowledge practically in the clinical setting, having an understanding of transfusion in hemolytic anaemias, and managing the transfusion-refractory patient were cited. S/he should comprehend sampling of blood and be able to discuss the indications for stem cell transplantation. Furthermore, a clinician completing such a diploma should be able to use blood appropriately and know how to administer blood. The use of transfusions by such a clinician doing the diploma should decrease, while the quality of the transfusions given should increase, with measures of quality being, amongst others, fewer complications and/or less

wastage of blood products. S/he should also understand the ethical issues concerning the use of blood and blood products.

Outcomes mentioned in the subcategory on *blood conservation* included having an understanding of the context of the issues and problems with the blood supply, knowing about transfusion alternatives and blood conservation procedures, e.g. cell saving and erythropoietins, and cost-effectiveness in transfusion medicine.

In respect of the subcategory *blood safety*, outcomes considered necessary included being able to diagnose and manage complications of blood transfusion, knowing about blood safety, the contra-indications for blood transfusion, TTIs, GVHD, iron overload and its management, allo-immunisation and its management and immunosuppression related to blood transfusion.

Having communication skills and the ability to explain to a patient what a transfusion or transfusion-related procedure entails were outcomes noted in regard to the subcategory dealing with *social skills*.

Outcomes considered important in the *research* subcategory, included being able to participate in clinical research related to transfusion medicine and having an understanding of the need for clinical trials in transfusion medicine.

In summary, the major outcomes for a Postgraduate Diploma in Transfusion Medicine include factors related to the basic sciences, blood banking, haematology, clinical medicine, blood conservation, blood safety, social skills and research.

5.2.8 The major factors that would render a Postgraduate Diploma in Transfusion Medicine a sustainable programme

5.2.8.1 *Results*

In Table 5.8, the major factors that would render a Postgraduate Diploma in Transfusion Medicine a sustainable programme are recorded.

5.2.8.2 *Data analysis and description of findings*

Fifty-five factors, in ten subcategories, were identified as the major ones that would make a Postgraduate Diploma in Transfusion Medicine a sustainable programme.

In the subcategory dealing with *sustainability factors* related to the faculty that runs the programme and delivers the course, a number of issues were mentioned, including the fact that the team that runs the programme should be properly qualified, be dedicated to the task and have clearly defined roles. Students should be exposed to a broad spectrum of lecturers from different backgrounds, different lecturers should be used at different times and they should be able to give the students good guidance. If the full-time staff members are insufficient, part-time faculty members can be used.

In the subcategory dealing with *increasing sustainability through value creation* (*and meeting of needs*), it was stated that there should be a need for the course, that the diploma should be of value to the person who takes the course and that the course should empower the students to go back and research relevant issues in their clinical environment. Furthermore, there should be value in obtaining the qualification, malpractice insurance levies for doctors who practise transfusion medicine without the qualification may make it more attractive, and, that doing the course should allow the students to do certain extra things not otherwise part of their job description. It was said that blood banks should require that their doctors have a formal

qualification in transfusion medicine and that it would be useful to have a follow-up programme after the diploma, for example where students are allowed to return on a regular basis for refresher courses. It was also felt that sponsoring people on a basis of merit to attend may allow more people to participate in the course, which would again have the effect of increasing the sustainability of such a programme.

In the *sustainability through networking* subcategory, it was noted that input should be obtained from a variety of role players and that one should get buy-in from the private sector.

In the subcategory dealing with *sustainability related to financing*, the importance of a revenue stream or a continuous funding source was noted. Getting sponsorship from the private sector, for instance private laboratories, was thought to be one way of securing such funding support.

A following subcategory dealt with *sustainability through structure and organisation.* In this regard, it was mentioned that such a programme should be a part-time programme, as doctors should be able to participate without compromising their practices. If it is full-time, it should be short, but the same person mentioning this felt that a part-time course with intensive contact sessions would be a reasonable alternative. Nevertheless, the course should not be too long or take too much time and would require defined blocks of contact time. Furthermore, it needs to be well organised with good administrative support. There should also be appropriate infrastructure and facilities for running the course. Logistics to present the course should be in place.

In the *sustainability related to programme content and outcomes* subcategory, it was cited that the course should cover a broad spectrum of clinical issues, that it should be relevant and applied to clinical practice and that it should be neither too specialised nor too intensive. The curriculum

needs to be clearly defined, e.g. with well-defined start and end; it needs to be organised in an integrated way; the individual topics need to be well structured, have clearly defined outcomes and should include a problem-based component consisting of case studies where people can learn from mistakes. There should be practical sessions that are relevant to the clinician's practice, including exposure to the actual blood bank and students should be provided with good programme and educational material.

In the subcategory dealing with *assessment*, it was said that sustainability would be ensured by evaluating students' practice and knowledge by making assignments deliverable, having self-assessments and providing feedback to students on assignments.

In the *career-path creation* subcategory it was stated that job opportunities in the field of transfusion medicine should be created, for example posts for doctors who take responsibility for clinical transfusion practice and the transfusion committee in a hospital, as well as job opportunities for those doing research in transfusion medicine.

In the subcategory dealing with *recognition of the programme*, it was noted that sustainability would be enhanced by having a certifying agency, criteria according to which the programme should be certified, and a regulatory framework that requires certification in transfusion medicine. The diploma should be recognised by the relevant governing bodies and the contact sessions and lectures need to have CPD accreditation.

Requirements of the *continuous improvement* subcategory were that feedback should be obtained from the participants and that the outcomes and new developments achieved by the students who have obtained the qualification should be fed back into the course. Also, it was stated that one should diversify and broaden the interest in order to remain sustainable

despite medical and technological advances, for example if artificial blood products were to be developed, the current educational needs in transfusion medicine may change. This would create a virtuous cycle of continuous improvement.

In summary, sustainability will be ensured by devoting attention to factors related to having a good faculty, value creation, networking, financial viability, structure and organisation, programme content and outcomes, assessment, career-path creation, recognition by regulatory authorities and continuous improvement of the programme.

5.2.9 Academic factors that should be taken into consideration with regards to the development and implementation of a Postgraduate Diploma in Transfusion Medicine

5.2.9.1 *Results*

In Table 5.9, the most important factors, from an academic point of view, to be taken into consideration with regard to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine are recorded.

5.2.9.2 *Data analysis and description of findings*

Thirty factors, in seven subcategories, were identified as major factors, from an academic point of view, that should to be taken into consideration in respect of the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

In the subcategory dealing with *programme development*, a number of factors were considered important, such as that the team developing the course should research and define the actual skills and knowledge required. The objectives of the course should be tailored to the actual needs of the

students, i.e. to the problems relevant to their context. It was mentioned that one should look at what other institutions are doing internationally and adapt what is useful to local circumstances. The course should go through the necessary channels of approval. People involved in the project need to have academic standing to give prestige to the project and the curriculum content so that it will inspire confidence in the final product.

Among the issues mentioned in the *programme structure* subcategory, were that the programme should be structured properly and that the duration of the diploma needs to be fixed in advance. The duration of the course should be no more than two years, and if more than 18 months, it should be done part-time, as students will not complete the course if it its duration is too long. The duration of each component should be specified.

In the subcategory *quality control*, it was stated that an appropriate standard should be ensured by internal and external moderation, and the final assessment, in particular, should be externally moderated. Certification needs to be limited in time, i.e. CPD credits need to be obtained on an annual basis to maintain certification to ensure that those who qualify remain up-to-date. A recertification process, by means of correspondence or attendance-based refresher courses will ensure that those who qualified stay up-to-date and it may also be a source of revenue. The programme should be peer reviewed in accordance with accepted criteria, e.g. having a specific number of certified haematologists on faculty. The training programme should be documented – e.g. which lectures are given – and needs to be standardised. A record should be kept of which students attend each session.

In the subcategory dealing with *admission criteria and recognition of prior learning*, it was stated that applicants for such a course should have a basic medical degree yet need not be specialists.

In the *academic culture* subcategory, it was mentioned that a spirit of inquisitiveness and a culture of critical thinking should be fostered, one that would allow students to ask questions about the appropriateness of current practice. There should be a culture of continuous learning and of updating one's knowledge and there should be regular journal reviews and seminars related to transfusion medicine.

A requirement specified in respect of the *research* subcategory was that a research component should be included in the programme and that the faculty be involved in the research programme which would serve to keep them up-to-date and current, that research and education should go hand in hand and that the course should empower the students to go back and research relevant issues in their respective clinical environments. Furthermore, research done should be appropriate for their environment.

In respect of the *continuous improvement* subcategory, the outcomes and new developments achieved by the students who have qualified should be fed back into the course.

In summary, the most important factors from an academic point of view that should be taken into consideration with regard to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine include issues related to programme development, programme structure, quality control, admission criteria and recognition of prior learning, the academic culture, research and continuous improvement.

5.2.10 The major educational factors that need to be taken into consideration in developing a Postgraduate Diploma in Transfusion Medicine

5.2.10.1 *Results*

Table 5.10 (cf. Appendix A4) summarises the major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

5.2.10.2 *Data analysis and description of findings*

Forty-one factors, organised in nine subcategories, were identified as major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

In the *curriculum* subcategory it was stated that there needed to be a well-defined, formal curriculum. The components of the training programme should be enunciated.

In the *educational material and resources* subcategory, it was stated that the students should have good handouts or educational material to enable them to prepare in advance for contact sessions. Lecturers should also make use of the Internet, while students should be provided with a good bibliography, i.e. good books and references to good articles. The course content should be linked to other resources, for example one should ensure direct and online access to the university library to non-resident students. Continuous guidance should be available to students with regard to the use of published and electronic resources. Students should have a quick-reference manual for each block.

In the subcategory dealing with *learning as an experience*, it was noted that the content should be interesting, that attendance should be an enriching experience and that students should be inspired.

In respect of the *assessment* subcategory, the stated requirements were that assignments should be assessed and that a variety of teaching and assessment techniques should be used, for example lectures, journal reviews and seminar presentations. Students should be given deliverable assignments and some form of assessment done on a regular basis – to ensure achievement of outcomes. Assignments should be short and feedback should be provided on assignments. There should be a final assessment to be able to judge whether the course is working and to force students to consolidate what they have learnt. Core knowledge should be assessed in a final assessment. One should make use of peer assessment. Competence should be proven, for example by keeping a logbook that is signed off for certain procedures or skills attained. These logbooks may also be useful for auditing, accreditation and moderation purposes.

The *outcomes* subcategory specified that outcomes should be clearly defined, well delineated and measurable.

The *contact time* subcategory indicated the importance of contact sessions with students. During these contact sessions, time should be made for group work. Sessions with students should be interactive with face-to-face communication and interaction in small groups. Distance-learning components should be built into the programme.

The subcategory dealing with *forms of learning* stated that the emphasis should be on the practical issues of day-to-day clinical practice rather than on theoretical ones, for example seeing cases, evaluating blood-request

forms critically, going to the blood bank laboratory, learning how to prescribe blood, administering blood, transporting blood from laboratory to patient and doing a cross-match, Coombs or a blood grouping. Use should be made of problem-based case studies, for example learning from real-life mistakes. Learning should be integrated; some issues should be taught to give insight, though not necessarily assessed, for example the processing of blood and the politics related to transfusion medicine. Problem-based learning and self-directed learning were considered important.

The requirements in respect of the *teacher* subcategory were that lecturers should be people who are actively involved in blood transfusion on a daily basis, e.g. trauma surgeons, haematologists, and intensivists. Use of lecturers with high positions in transfusion medicine – those who "do not have their feet on the ground" and who are not able to bring the message across – should be avoided. Having speakers from blood transfusion services may be good in terms of allowing the students to build networks with people in the field.

In respect of the subcategory dealing with *alignment*, it was required that the content should be aligned with the needs of the students.

Thus, to summarise, the major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine, include issues related to curriculum, educational material and resources, learning as an experience, assessment, outcomes, contact times, forms of learning, the teacher, and alignment.

5.3 CONCLUSION

This chapter dealt with the results, data analysis and description in respect of the findings in the semi-structured interviews. A large number of factors

were identified and classified in subcategories, and form a valuable base from which to select criteria that could be used, in conjunction with the literature review, to prepare the Delphi survey.

A discussion of the findings and the relevance of this component of the research will follow in the next chapter.

CHAPTER 6

RESULTS, DATA ANALYSIS AND FINDINGS OF THE DELPHI PROCESS

6.1 INTRODUCTION

The previous chapter comprised a discussion of the findings of the semi-structured interviews. These findings informed the final composition of the Delphi survey. The results and key findings of the Delphi survey are reported in this chapter. The Delphi technique was described in Chapter 4 (cf. 4.3.4). The results are described according to the different rounds of the Delphi process.

6.2 DESCRIPTION AND DISCUSSION OF THE DELPHI SURVEY

The results and findings of the Delphi survey are provided for each round with a summative discussion of the outcome of the Delphi survey at the end of the chapter.

6.2.1 Round One of the Delphi survey

This section provides an overview of the process followed and includes explanatory notes with regard to the different sections, subsections, titles, number of statements in each and the measuring scales used, while there is also a summary of the results and the analysis of the responses.

6.2.1.1 *The measuring instrument*

During the first round, a letter (cf. Appendix C1) accompanied the Delphi questionnaire (cf. Appendix C2). In the letter, the researcher explained the

process that was to be followed, how the questionnaire was structured and provided instructions on how to complete the questionnaire.

It was explained that each statement had to be evaluated with regard to its importance on a three-point Likert scale. These points were defined as follows:

1 = Essential (This criterion must **DEFINITELY BE INCLUDED** in the model)
2 = Useful (This criterion **CAN BE INCLUDED** in the model)
3 = Unnecessary (This criterion must **DEFINITELY BE EXCLUDED** from the model)

The layout of the questionnaire is hereby discussed per section and will be done once only in that the basic structure of the survey remained the same in all three rounds.

Section A of the Delphi questionnaire was entitled **THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING** (cf. Appendix C2) and dealt with the description of the main roles, including tasks and functions of the clinician dealing with blood transfusion in the clinical setting. It also dealt with the description of the main areas of clinical knowledge, skills and competences required, as well as the deficiencies regarding the abilities of clinicians dealing with blood transfusion in the clinical setting. This section was divided into three subsections – each subsection containing various statements (n = 90). Space was provided at the end for any additional comments deemed necessary by participants.

Section B of the Delphi questionnaire, entitled **THE SCOPE OF PRACTICE OF THE CLINICIAN INVOLVED IN BLOOD TRANSFUSION** (cf. Appendix C2), dealt with the differences in the scope of practice between a

full-time specialist in transfusion medicine and a clinician who deals with blood transfusion on an *ad hoc* basis. This section was divided into two subsections, each comprising various statements (n=29). Space was provided after each subsection for any additional comments deemed necessary by participants.

Section C of the Delphi questionnaire, entitled **THE CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION** (cf. Appendix C2), dealt with the current challenges faced by clinicians dealing with blood transfusion and also with the challenges anticipated in the next five years. This section was divided into two subsections containing various statements under each subsection (n=63). Space was provided after each subsection for any additional comments deemed necessary by participants.

Section D of the Delphi questionnaire, entitled **DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS** (cf. Appendix C2), dealt with the deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products. This section comprised one subsection containing various statements (n=22). Space was provided for any additional comments deemed necessary by participants.

Section E of the Delphi questionnaire, entitled **PROGRAMME OUTCOMES** (cf. Appendix C2), dealt with the major outcomes of a postgraduate diploma in transfusion medicine. This section comprised only one subsection containing various statements (n=47), and space was provided for any additional comments deemed necessary by participants.

Section F of the Delphi questionnaire, entitled **SUSTAINABILITY** (cf. Appendix C2), dealt with the major factors that would render a Postgraduate Diploma in Transfusion Medicine sustainable. This section comprised one

subsection containing various statements (n=55). Space was once again provided for any additional comments deemed necessary by participants.

Section G of the Delphi questionnaire, entitled **ACADEMIC FACTORS** (cf. Appendix C2), dealt with the factors from an academic point of view that could be taken into consideration in respect of the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. This section comprised one subsection containing various statements (n=30) and space was provided for any additional comments deemed necessary by participants (cf. Appendix C2).

Section H of the Delphi questionnaire, entitled **EDUCATIONAL FACTORS** (cf. Appendix C2), dealt with the major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. This section comprised one subsection containing various statements (n=59). Space was provided for any additional comments deemed necessary by participants.

6.2.1.2 *Analysis of the Round One responses*

The responses obtained from the Delphi participants were analysed manually by calculating the frequency of responses for each statement on the Likert scale. Consensus was considered to be achieved if 80% of the 12 panel members chose the same option on the Likert scale. In some instances, some of the participants chose not to answer a particular statement, because they did not feel qualified to do so. In such cases, the percentage consensus was calculated on the total number of participants who actually did answer the statement. All the statements regarding which consensus was reached in Round One were excluded from Round Two.

6.2.1.3 *The findings of Round One of the Delphi survey*

All 12 members of the Delphi panel completed and returned the Round One questionnaire of the Delphi survey (100% response rate). After Round One, consensus was reached on 136 of the 387 statements in the questionnaire, giving a 34.9% overall consensus. Of the initial 395 statements, five statements (3d1 to 3d5) had to be removed because of accidental duplication. Furthermore, three statements were initially incorrectly counted as consensus (statements 2b5, 5a5 and 7a7). These are shown in italics in Appendix E4. These three statements were therefore removed from the final analysis.

Following the analysis of the Round One questionnaire, a feedback letter was sent to all participants, which contained the results of Round One (cf. Appendix C3a). This was accompanied by a copy of the Delphi questionnaire, shading the statements on which consensus had been reached and further including all comments and questions from the participants. Where uncertainty regarding the meaning of certain statements had been indicated by the participant(s), this was commented on by the researcher so that the issue would be clarified to all the participants. For the findings of Round One of the Delphi survey, see Appendix C3b.

6.2.2 Round Two of the Delphi study

As in the previous section, the measuring instrument used during Round Two of the Delphi survey will be discussed. In addition, the method of analysis and findings are provided.

6.2.2.1 *The measuring instrument*

A few days after sending out the feedback on Round One of the Delphi survey, the Round Two questionnaires were dispatched (cf. Appendix D2). This communication stated the purpose of Round Two and provided instructions for completing the questionnaire. Participants' individual choices on the Likert scale were not indicated, so as to avoid influencing the participants at this stage. Participants could change their opinion if they wished to do so and could thus assign a different level of importance to any of the statements where they considered this to be appropriate. The Round Two Delphi questionnaire that had to be completed is included as Appendix D2.

6.2.2.2 *Analysis of the Round Two responses*

The responses from the Delphi participants were analysed manually by calculating the frequency of responses for each statement on the Likert scale as was done in Round One.

6.2.2.3 *The findings of Round Two of the Delphi survey*

All 12 members of the Delphi panel completed and returned the Round Two questionnaire of the Delphi survey (100% response rate). After Round Two, consensus was reached on 174 of the 387 statements in the questionnaire, amounting to a 45.0% overall consensus. The findings are reported in Appendix D3b as are the comments made and questions raised by the participants. Statements on which consensus was reached during Round Two were shaded. As after Round One, the results of the second round were subsequently sent out to all the participants.

6.2.3 Round Three of the Delphi survey

The third and final round of the Delphi survey was managed in the same way as the previous rounds, with a feedback letter containing the results of Round Two preceding the Round Three Questionnaire (cf. Appendix D3a). In addition, the Round Two questionnaire – together with the comments, the questions from the participants and the researcher's responses to these (where required) – was sent with the feedback letter (cf. Appendix D3b).

After completion of Round Three, a feedback letter was sent with the results of Round Three to all participants (cf. Appendices E3).

This section provides a discussion of the measuring instrument, one in which the emphasis falls on the areas where it differs from the one used in the previous two rounds. An analysis of the responses is given, which specifically indicates the instances in which consensus were reached or stability was achieved for individual statements (cf. Table 6.1).

6.2.3.1 *The measuring instrument*

Similar to what had been done in Round One and Round Two, a letter (Appendix E1) was sent with the Round Three questionnaire (Appendix E2). The purpose of Round Three was to try and reach consensus on the statements in cases where this was still lacking, or failing which, to declare stability.

The participants were once again allowed either to change or stand by their previous opinions. Each participant received an individualised questionnaire indicating with a '#' their rating on the Likert scale for each statement in Round Two. An example of such an individualised questionnaire is provided in Appendix E2.

In the 'comments' column, the choices of the Delphi survey group in Round Two were indicated as the percentage of the total number of participants choosing either 'Essential', 'Useful' or 'Unnecessary' on the Likert scale, for example: (1 = 25%, 2 = 50%, 3 = 25%), with 1, 2 and 3 referring to the respective terms on the Likert scale in the order mentioned above. This allowed the participant(s) to reevaluate an individual response in the light and context of the group's responses, leaving them free to change their mind or to maintain their previous position.

6.2.3.2 *Analysis of responses*

The responses from the Delphi participants were once again analysed manually by calculating the frequency of responses for each statement on the Likert scale in the same way as was done in rounds One and Two.

6.2.3.3 *The findings of Round Three of the Delphi survey*

All 12 members of the Delphi panel completed and returned the Round Three questionnaire of the Delphi survey (100% response rate). After Round Three, consensus was reached on 240 of the 387 statements in the questionnaire, giving a 62.0% overall consensus. Stability was reached on 136 of the 387 statements in Round Three, giving a 35.1% overall stability. The number of statements on which either consensus or stability had been reached was therefore 376 out of 387 (97.2%). The consolidated results are reported in Appendix E4. It should be noted that in the vast majority of cases the Delphi participants opted not to change their views on statements in Round Three.

Table 6.1 provides the details regarding the statements on which stability was reached in Round Three. The percentage of participants selecting a particular point on the Likert scale is indicated as described above. Please

note that because of the rounding-off of percentages, the totals in the right-hand column do not always add up to 100%.

TABLE 6.1: STABILITY STATEMENTS ROUND THREE (FINAL ROUND)

	SECTION A **THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING**				
	This section deals with the description of the main roles, including tasks and functions of the clinician dealing with blood transfusion in the clinical setting. It further deals with the description of the main areas of clinical knowledge, skills and competences required and also the deficiencies in the abilities of clinicians dealing with blood transfusion in the clinical setting. 1 = percentage of participants indicating the statement to be essential and therefore warranting inclusion in the model 2 = percentage of participants indicating the statement to be useful and meriting possible inclusion in the model 3 = percentage of participants indicating the statement to be unnecessary and thus not deserving of inclusion in the model				
1.	**MAIN ROLES, TASKS AND FUNCTIONS**				
	The main roles, including tasks and functions of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
b	**Governance role which include**				
	• Give feedback to hospital management on utilisation of blood products in the hospital	1	2	3	Stability (33:67:0)
c	**A training role, which include**				
	• Clinical undergraduate teaching	1	2	3	Stability (33:58:8)
	• Postgraduate teaching	1	2	3	Stability (33:50:17)
	• Training of nursing and laboratory personnel as well as medical students and specialists-in-training	1	2	3	Stability (42:50:8)
e	**A patient management role which include**				
	• Taking personal responsibility for obtaining cross-match sample from patient	1	2	3	Stability (17:8:75)
f	**A role as researcher, which include**				
	• Interpret the literature on blood transfusion	1	2	3	Stability (42:58:0)
2.	**SKILLS AND COMPETENCES**				
	The main skills and competences of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
b	**Technical**				
	• Competence in thawing of blood products, e.g. fresh frozen plasma	1	2	3	Stability (33:8:58)

e	**Integration**				
	• Practicing transfusion medicine in rural areas	1	2	3	Stability (42:58:0)
	• Competency in interpreting activities in the blood bank	1	2	3	Stability (58:8:33)
3.	**MAIN AREAS OF CLINICAL KNOWLEDGE**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
	The main areas of clinical knowledge required by the clinician dealing with blood transfusion can be described as:				
a	**Physiology**				
	• Blood groups	1	2	3	Stability (58:42:0)
c	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	Stability (8:75:17)
	• Knowledge of blood grouping	1	2	3	Stability (33:67:0)
	• Thawing of blood products	1	2	3	Stability (42:25:33)
	• Knowledge of the principles underlying the issuing of blood	1	2	3	Stability (17:75:8)
d	**Haematology**				
	• Haemophilia	1	2	3	Stability (75:25:0)
e	**Clinical medicine**				
	• Intensive care issues related to blood transfusion	1	2	3	Stability (58:42:0)
g	**Evidence-based medicine**				
	• Evidence behind appropriate transfusion	1	2	3	Stability (25:75:0)
	• Appropriate use of blood products	1	2	3	Stability (75:25:0)
i	**Blood conservation**				
	• Autologous transfusions	1	2	3	Stability (75:25:0)
	• Blood conservation methods	1	2	3	Stability (42:58:0)

	SECTION B **THE SCOPE OF PRACTICE OF THE CLINICIAN INVOLVED WITH BLOOD TRANSFUSION**				
	This section deals with the difference in the scope of practice between a full-time specialist in transfusion medicine and a clinician who deals with blood transfusion on an *ad hoc* basis. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
4.	**THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE**				
	The scope of practice of a full-time Specialist in Transfusion Medicine can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Clinical knowledge**				
	• Deals more with coagulation problems	1	2	3	Stability (75:25:0)
b	**Blood banking**				
	• Involved in the running of the blood bank	1	2	3	Stability (8:67:25)
	• Administrative aspects of blood banking, including tracking and retrieval of blood and computerisation	1	2	3	Stability (8:50:42)
	• Have a deeper understanding of the laboratory testing for transfusion-transmitted infections	1	2	3	Stability (67:25:8)
d	**Leadership and consultative roles**				
	• Coordinating role within the hospital	1	2	3	Stability (58:42:0)
	• Should have sufficient stature to be able to advise, help and lead new developments	1	2	3	Stability (75:25:0)
5.	**THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				
	The scope of practice of the clinician dealing with blood transfusion on an *ad hoc* basis can best be described as:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Clinical knowledge**				
	• Can be of practical assistance by the bedside	1	2	3	Stability (58:42:0)
	• More clinically orientated than specialist	1	2	3	Stability (58:33:8)
b	**Blood banking**				
	• Can do basic cross-matching, blood grouping, blood smear review and urine testing	1	2	3	Stability (0:67:33)
c	**Teaching and training**				
	• Can assist with transfusion medicine training of doctors, students, paramedical staff and nurses	1	2	3	Stability (8:75:18)
d	**Leadership and consultative**				
	• Can be consulted regarding transfusion in a big department	1	2	3	Stability (17:67:17)

	SECTION C **THE CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION**				
	This section deals with the current challenges faced by clinicians dealing with blood transfusion as well as the challenges anticipated in the next five years. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
7.	**CHALLENGES CURRENTLY FACED BY CLINICIANS**				
	The challenges currently faced by clinicians dealing with blood transfusion include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Quality and safety**				
	• Limiting transfusion-transmitted infections	1	2	3	Stability (50:50:0)
	• Quality of blood products	1	2	3	Stability (25:50:25)
	• West-Nile virus	1	2	3	Stability (0:75:25)
	• Patients requiring repeated blood transfusion	1	2	3	Stability (75:25:0)
	• Clerical errors	1	2	3	Stability (33:67:0)
b	**Lack of knowledge and training**				
	• Clinician knowledge on coagulation and anticoagulants	1	2	3	Stability (58:42:0)
	• Knowledge of the pre-analytical and analytical phase of blood sample processing	1	2	3	Stability (0:67:33)
	• Knowledge of practical issues relating to blood use, e.g. thawing, administration, irradiation	1	2	3	Stability (25:58:17)
	• Knowledge of the pathophysiology of transfusion-related complications	1	2	3	Stability (42:58:0)
c	**Access and availability**				
	• Finding enough platelet donors	1	2	3	Stability (17:75:8)
	• Restrictions on donors and increasing donor deferral	1	2	3	Stability (8:75:17)
	• Immigration of peoples into areas with an inadequate supply of blood for their blood groups, e.g. immigration Africans to Europe	1	2	3	Stability (8:25:67)
	• Increasing demand for blood in specialised medical care, e.g. leukaemia and cancer treatment	1	2	3	Stability (58:42:0)
	• Patients requiring repeated blood transfusion	1	2	3	Stability (75:25:0)
d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood transfusion	1	2	3	Stability (75:25:0)
	• Refusal of blood products for religious reasons	1	2	3	Stability (33:58:8)
	• Issues flowing from breach of anonymity between recipient and donor	1	2	3	Stability (17:42:42)
e	**Cultural perceptions and understanding**				
	• Cultural perceptions of blood transfusion	1	2	3	Stability (33:58:8)

9.	CHALLENGES CLINICIANS ARE EXPECTED TO BE FACED WITH IN THE NEXT FIVE YEARS				
	The challenges clinicians involved in blood transfusion are expected to be faced with in the next five years, include issues related to:				
		ESSENTIAL	USEFUL	UNNECESSARY	(%)
a	**Quality and safety**				
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, variant Creutzfeld-Jacob's disease (vCJD)	1	2	3	Stability (42:58:0)
	• Quality of blood products	1	2	3	Stability (50:50:0)
	• Increase in Graft-versus-host-disease (GVHD)	1	2	3	Stability (9:64:27)
b	**Lack of knowledge and training**				
	• Lack of academic input regarding use of blood in the private sector	1	2	3	Stability (33:58:8)
c	**Access and availability**				
	• Increased demand for blood due to HIV epidemic	1	2	3	Stability (50:42:8)
	• Shrinking donor pool due to HIV epidemic	1	2	3	Stability (42:58:0)
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	Stability (25:25:50)
d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood use	1	2	3	Stability (67:25:8)
	• Informed consent issues	1	2	3	Stability (67:33:0)
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	Stability (0:58:42)
e	**Cost-effective use**				
	• Cost-effective use of blood	1	2	3	Stability (75:25:0)
f	**Managing change**				
	• Keeping up with new developments	1	2	3	Stability (67:33:0)
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, vCJD	1	2	3	Stability (25:75:0)

	SECTION D **DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	This section deals with the deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
11	**DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	The deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products, include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
c	**Evidence-based practice**				
	• Non-adherence to guidelines and recommendations	1	2	3	Stability (67:33:0)
	• Cross-matching and keeping blood unnecessarily, esp. in surgery and anesthesiology	1	2	3	Stability (42:58:0)
	• Resistance of clinicians against changing behaviour despite being given guidelines	1	2	3	Stability (58:42:0)
d	**Human resources**				
	• Lack of time for participating in educational activities related to blood transfusion	1	2	3	Stability (50:50:0)
	• Lack of clinicians with an overview of all aspects of transfusion	1	2	3	Stability (75:25:0)
e	**Scarce resource management**				
	• Awareness of costs	1	2	3	Stability (50:50:0)
	• Lack of auditing systems	1	2	3	Stability (42:58:0)
f	**Attitude**				
	• Transfusion seen as an insignificant part of patient care	1	2	3	Stability (58:42:0)

	SECTION E PROGRAMME OUTCOMES				
	This section deals with the major outcomes of a Postgraduate Diploma in Transfusion Medicine. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
13	**THE MAJOR OUTCOMES OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
	The major outcomes for a clinician completing a postgraduate diploma should include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
b	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	Stability (67:33:0)
	• Should know how cross-match testing is performed	1	2	3	Stability (67:33:0)
	• Should know about blood processing	1	2	3	Stability (58:42:0)
	• Should know about donor selection and donor-related issues	1	2	3	Stability (50:50:0)
	• Understand antibody identification procedures	1	2	3	Stability (58:42:0)
	• Should know about blood collection and the different types of collection systems	1	2	3	Stability (67:33:0)
	• Should know about quality assurance in blood banking	1	2	3	Stability (67:33:0)
	• Should know about the new issues facing blood banking	1	2	3	Stability (58:42:0)
	• Should know about leukodepletion in laboratory and by bedside	1	2	3	Stability (75:25:0)
	• Should know how blood typing is done	1	2	3	Stability (67:33:0)
e	**Clinical medicine**				
	• The use of transfusions by a clinician doing the diploma should decrease	1	2	3	Stability (17:75:8)
f	**Blood conservation**				
	• Should know about cost-effectiveness in transfusion medicine	1	2	3	Stability (67:33:0)
h	**Social skills**				
	• Should have communication skills	1	2	3	Stability (42:58:0)
i	**Research**				
	• Should have an understanding of the need for clinical trials in transfusion medicine	1	2	3	Stability (58:42:0)

	SECTION F SUSTAINABILITY				
	This section deals with the major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
15	**THE MAJOR FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Academic staff**				
	• Expose students to a broad spectrum of lecturers from different backgrounds	1	2	3	Stability (75:25:0)
	• Use different lecturers at different times	1	2	3	Stability (33:58:8)
b	**Value creation**				
	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	Stability (67:33:0)
c	**Networking**				
	• Input needed from a variety of role players	1	2	3	Stability (50:50:0)
d	**Financial viability**				
	• There should be a revenue stream/funding	1	2	3	Stability (25:75:0)
e	**Structure and organisation**				
	• Course should not be too long or take too much time	1	2	3	Stability (58:25:17)
f	**Programme content and outcomes**				
	• The course should not be too specialised	1	2	3	Stability (17:67:17)
	• Course should not be too intensive	1	2	3	Stability (17:50:53)
	• There should be exposure to the actual blood bank	1	2	3	Stability (75:25:0)
g	**Assessment**				
	• There should be self-assessment programmes	1	2	3	Stability (33:67:0)
h	**Career-path creation**				
	• Job opportunities for research in transfusion medicine	1	2	3	Stability (33:58:0)
i	**Recognition programme**				
	• A regulatory framework that requires certification in transfusion medicine	1	2	3	Stability (33:42:25)
j	**Continuous improvement**				
	• One should diversify and broaden the interest in order to remain sustainable despite medical and technological advances, e.g. if artificial blood products are produced and the current educational needs in transfusion medicine change	1	2	3	Stability (42:58:0)

	SECTION G **ACADEMIC FACTORS**				
	This section deals with the factors from an academic point of view that could be taken into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
17	**THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Programme development**				
	• Objectives of course need to be tailored to the actual needs of the students, i.e. to the problems relevant to their settings	1	2	3	Stability (33:67:0)
	• Look at what other institutions are doing internationally and adapt what is useful to local circumstances	1	2	3	Stability (50:50:0)
	• People involved with project need to have academic standing to give prestige to the project and the content of the curriculum so that it will inspire confidence in the end product	1	2	3	Stability (50:50:0)
b	**Programme structure**				
	• The duration of each component should be set in great detail	1	2	3	Stability (33:58:8)
c	**Quality assurance**				
	• The certification needs to be limited in time, i.e. continuous professional development credits need to be obtained on an annual basis to maintain certification to ensure that those who qualify remain up-to-date	1	2	3	Stability (8:58:33)
	• Programme should be peer-reviewed according to accepted criteria, e.g. having a specific number of certified haematologists on staff	1	2	3	Stability (75:25:0)
	• Record should be kept of which students attend each session	1	2	3	Stability (75:25:0)
e	**Academic culture**				
	• There should be regular journal reviews and seminars related to transfusion medicine	1	2	3	Stability (50:50:0)
f	**Research**				
	• A research component should be included in the programme	1	2	3	Stability (67:33:0)
	• The staff should be involved in the research programme which will keep them up-to-date and current	1	2	3	Stability (67:33:0)
	• Research and education should go hand in hand	1	2	3	Stability (67:33:0)
	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	Stability (75:25:0)
	• Research done should be appropriate for the country	1	2	3	Stability (75:25:0)

	SECTION H **EDUCATIONAL FACTORS**				
	This section deals with major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
19	**THE MAJOR EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
b	**Educational material and resources**				
	• Students need good handouts or educational material to enable them to prepare in advance	1	2	3	Stability (50:50:0)
	• Students need to be taught how to use online study resources, e.g. PubMed	1	2	3	Stability (75:25:0)
	• There should be continuous guidance available to students with regards to use of resources, e.g. online resources	1	2	3	Stability (33:67:0)
	• Students should have a quick reference manual for each block	1	2	3	Stability (50:50:0)
c	**Learning as an experience**				
	• The content should be interesting	1	2	3	Stability (67:33:0)
d	**Assessment**				
	• Use a variety of teaching and assessment techniques, e.g. lectures, journal reviews, seminar presentations, examinations, etc.	1	2	3	Stability (67:33:0)
	• Assignments should be short	1	2	3	Stability (42:58:0)
	• There should be a final assessment to be able to judge whether course is working and force students to consolidate what they have learnt	1	2	3	Stability (42:50:8)
	• Core knowledge should be assessed in a final assessment	1	2	3	Stability (75:17:8)
	• Assessment should be authentic, i.e. applied to real-life situations	1	2	3	Stability (67:33:0)
f	**Contact time**				
	• Working in small groups is important, with less than ten people in a group	1	2	3	Stability (25:67:8)
	• Face-to-face communication or with small groups is very important	1	2	3	Stability (42:58:0)
	• Distance learning components should be built in	1	2	3	Stability (33:67:0)
g	**Forms of learning**				
	• Emphasis should be on the practical issues more than theoretical things unrelated to day-to-day practice, e.g. seeing cases, evaluating blood request forms critically, going to the blood bank laboratory, how to prescribe blood, administer blood, transporting of blood from laboratory to patient, doing a cross-match, Coombs or a blood group	1	2	3	Stability (33:58:8)

	• Some issues should be taught to give insight, but does not necessarily have to be assessed, e.g. processing of blood, politics and transfusion	1	2	3	Stability (50:50:0)
h	**Teacher**				
	• Lecturers should be people who are actively involved with blood transfusion every day (e.g. trauma surgeons, haematologists, intensivists)	1	2	3	Stability (25:75:0)
	• Avoid using lecturers who have high positions in transfusion medicine, but who "don't have their feet on the ground" and who can't bring the message across	1	2	3	Stability (42:50:8)
	• Having speakers from blood transfusion services may be good in terms of allowing the students to build networks with people in the field	1	2	3	Stability (50:50:0)
	• Lecturers who are local experts should be used in contact sessions	1	2	3	Stability (75:17:8)
	• Lecturers who are international experts should be used in contact sessions	1	2	3	Stability (33:58:8)
i	**The student as an adult learner**				
	• Learner's existing knowledge should be explored	1	2	3	Stability (50:50:0)
	• New knowledge should be tied to the learners' previous knowledge and experiences	1	2	3	Stability (33:58:8)
	• Course content should provide immediacy, i.e. be immediately relevant to the learner's current working environment	1	2	3	Stability (58:42:0)
	• Programme should utilise the adult learner's accumulated experience	1	2	3	Stability (25:67:8)
	• Create experiences that can enhance the construction of meaning (e.g. through role play, case studies, simulations or discussion)	1	2	3	Stability (75:25:0)
j	**Alignment**				
	• The content should be aligned with the needs of the students	1	2	3	Stability (25:67:8)

6.2.4 Summative discussion on the outcome of the Delphi survey

After Round One consensus was reached on 34.9% of the 387 statements, while after Round Two, this figure increased to 45.0% of the 387 statements (one statement removed because of duplication). After Round Three consensus was reached on 62.0% of the statements, while stability was declared on 35.1% of the statements.

The elements contained in the statements deemed *essential* through consensus as previously defined, are the ones that have to be included in a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State. Items considered through consensus to be *useful*, may aid or enhance such a model, but are not necessarily essential. Statements containing elements found through consensus to be unnecessary, should be excluded from the model.

Table 6.2 provides a detailed analysis of statements indicating where consensus was reached, including the percentages allocated by the participants to the respective options on the Likert scale in each case.

TABLE 6.2: OUTCOME OF THE DELPHI SURVEY

	SECTION A **THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING**				
	This section deals with the description of the main roles, including tasks and functions of the clinician dealing with blood transfusion in the clinical setting. It also deals with the description of the main areas of clinical knowledge, skills and competences required, as well as the deficiencies in the abilities of clinicians dealing with blood transfusion in the clinical setting. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
1.	**MAIN ROLES, TASKS AND FUNCTIONS**				
	The main roles, including tasks and functions of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**A supervisory function in which he/she should**				
	• Ensure that correct procedures are followed	1	2	3	Consensus R1 (100:0:0)
	• Ensure that there are no clerical errors	1	2	3	Consensus R3 (92:8:0)
	• Recognise the inappropriate use of blood	1	2	3	Consensus R1 (100:0:0)
	• Monitor clinical use of blood and blood products	1	2	3	Consensus R1 (83:17:0)
b	**Governance role which include**				
	• Developing policies for blood transfusion in consultation with relevant colleagues	1	2	3	Consensus R3 (92:8:0)
	• Conduct audits on the use of blood	1	2	3	Consensus R2 (17:83:0)
d	**A role in scarce resource management, which include**				
	• Using blood appropriately	1	2	3	Consensus R1 (92:8:0)
	• Limiting the use of blood	1	2	3	Consensus R3 (83:17:0)
	• Using appropriate alternatives to transfusion	1	2	3	Consensus R3 (83:17:0)
	• The cost-effective use of blood	1	2	3	Consensus R3 (92:8:0)
	• An awareness of the limitations of the blood supply	1	2	3	Consensus R3 (83:17:0)
	• Not to waste blood	1	2	3	Consensus R1 (83:17:0)
	• Using a scarce resource responsibly	1	2	3	Consensus R1 (83:17:0)
e	**A patient management role which include**				
	• Having adequate knowledge about indications for blood products	1	2	3	Consensus R1 (100:0:0)
	• Identify and evaluate need for transfusion	1	2	3	Consensus R1 (92:8:0)
	• Obtaining informed consent	1	2	3	Consensus R1 (92:8:0)
	• Logistical issues, e.g. transportation of blood	1	2	3	Consensus R3 (0:8:92)
	• Ensuring safe administration	1	2	3	Consensus R1 (92:8:0)
	• Post-transfusion follow-up	1	2	3	Consensus R1 (92:8:0)
	• Managing complications of transfusion	1	2	3	Consensus R1 (100:0:0)
f	**A role as researcher, which include**				
	• Support research aimed at better identifying the indications for blood transfusion	1	2	3	Consensus R2 (8:83:8)
	• Conduct audits on the use of blood	1	2	3	Consensus R1 (8:83:8)

2.	SKILLS AND COMPETENCES				
	The main skills and competences of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	USEFUL	UNNECESSARY	(%)
a	**Clinical**				
	• Clinical examination skills	1	2	3	Consensus R1 (100:0:0)
	• Skill in judging the need for a transfusion	1	2	3	Consensus R1 (100:0:0)
	• Competency in the management and follow-up of transfusion complications	1	2	3	Consensus R1 (100:0:0)
	• Resuscitation skills	1	2	3	Consensus R1 (100:0:0)
b	**Technical**				
	• Skills needed to use the different blood products	1	2	3	Consensus R1 (83:17:0)
	• Achieving venous access, including placement of central lines	1	2	3	Consensus R3 (83:8:8)
	• Competency in the administration of blood products	1	2	3	Consensus R1 (91:9:0)
	• Competency in doing a cross-match	1	2	3	Consensus R3 (0:17:83)
c	**Administrative**				
	• Administrative skills, including precise note-keeping	1	2	3	Consensus R2 (83:17:0)
d	**Social**				
	• Communication skills	1	2	3	Consensus R3 (83:17:0)
	• Interpersonal skills	1	2	3	Consensus R3 (83:17:0)
e	**Integration**				
	• Problem-solving skills	1	2	3	Consensus R1 (83:17:0)
	• Competency in appropriate blood transfusion	1	2	3	Consensus R1 (100:0:0)
f	**Education**				
	• Teaching and training skills	1	2	3	Consensus R1 (17:83:0)
g	**Research**				
	• Auditing skills	1	2	3	Consensus R2 (8:83:8)
	• Know how to interpret the literature on blood transfusion	1	2	3	Consensus R3 (92:8:0)
3.	**MAIN AREAS OF CLINICAL KNOWLEDGE**				
		ESSENTIAL	USEFUL	UNNECESSARY	(%)
	The main areas of clinical knowledge required by the clinician dealing with blood transfusion can be described as:				
a	**Physiology**				
	• Oxygen transfer	1	2	3	Consensus R1 (83:17:0)
	• Biological components of blood	1	2	3	Consensus R1 (92:8:0)
	• Fluid balance, electrolytes and fluid replacement	1	2	3	Consensus R1 (92:8:0)
	• Knowledge of the physiology of blood	1	2	3	Consensus R1 (83:17:0)
	• Knowledge of transfusion immunology	1	2	3	Consensus R3 (17:83:0)

b	**Pathophysiology**				
	• Pathophysiology of diseases where blood products may be indicated	1	2	3	Consensus R3 (92:8:0)
	• Pathophysiology related to blood loss and blood transfusion	1	2	3	Consensus R3 (92:8:0)
c	**Blood banking**				
	• Knowledge of aphaeresis	1	2	3	Consensus R1 (0:83:17)
	• Knowledge of when blood products can be returned to the blood bank if unused	1	2	3	Consensus R1 (83:17:0)
	• Knowledge of cross-matching	1	2	3	Consensus R3 (17:83:0)
d	**Haematology**				
	• Coagulation and anti-coagulant drugs	1	2	3	Consensus R2 (92:8:0)
	• Haematology knowledge relevant to blood transfusion	1	2	3	Consensus R1 (92:8:0)
	• Anaemia	1	2	3	Consensus R1 (92:8:0)
e	**Clinical medicine**				
	• Judging the need and indication for a transfusion	1	2	3	Consensus R1 (92:8:0)
	• Different blood products and their use	1	2	3	Consensus R1 (92:8:0)
	• Knowledge of appropriate transfusion practice	1	2	3	Consensus R1 (83:17:0)
	• Use of blood in renal failure	1	2	3	Consensus R1 (92:8:0)
	• Use of blood in surgery	1	2	3	Consensus R1 (83:17:0)
	• Knowledge of the relevance of co-morbid disease in patients that need a blood transfusion	1	2	3	Consensus R3 (92:8:0)
f	**Emergency Medicine**				
	• Resuscitation and the use of blood	1	2	3	Consensus R1 (92:8:0)
	• Using emergency blood	1	2	3	Consensus R1 (92:8:0)
	• Management of allergic reactions and anaphylaxis	1	2	3	Consensus R1 (92:8:0)
h	**Blood administration**				
	• Administration of blood products	1	2	3	Consensus R2 (83:17:0)
	• Deciding on amount of blood product that needs to be transfused	1	2	3	Consensus R2 (100:0:0)
i	**Blood conservation**				
	• Alternatives to blood transfusion	1	2	3	Consensus R1 (92:8:0)
j	**Blood safety**				
	• Knowledge of the complications of blood transfusion	1	2	3	Consensus R1 (100:0:0)
	• Contra-indications for blood transfusion	1	2	3	Consensus R1 (100:0:0)
	• Transfusion-transmissible infections	1	2	3	Consensus R2 (82:18:0)
	• Haemovigilance	1	2	3	Consensus R3 (83:17:0)
	• Allo-immunisation	1	2	3	Consensus R3 (83:17:0)

	SECTION B **THE SCOPE OF PRACTICE OF THE CLINICIAN INVOLVED WITH BLOOD TRANSFUSION**				
	This section deals with the difference in the scope of practice between a full-time specialist in transfusion medicine and a clinician who deals with blood transfusion on an *ad hoc* basis. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
4.	**THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE**				
	The scope of practice of a full-time Specialist in Transfusion Medicine can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Clinical knowledge**				
	• Deals with a much wider spectrum of patients	1	2	3	Consensus R1 (92:8:0)
	• Has a broader knowledge of disease related to transfusion medicine	1	2	3	Consensus R1 (92:8:0)
	• Knowledge about transfusion in transplantation medicine	1	2	3	Consensus R1 (100:0:0)
	• In-depth knowledge of a pre-transfusion interview	1	2	3	Consensus R1 (92:8:0)
	• Management of allo-immunisation	1	2	3	Consensus R1 (100:0:0)
	• Should have an interest in new developments	1	2	3	Consensus R1 (83:17:0)
b	**Blood banking**				
	• Covers the whole area of aphaeresis, including stem cell collection	1	2	3	Consensus R1 (83:17:0)
c	**Teaching and training**				
	• Functions as a tutor to his colleagues	1	2	3	Consensus R3 (83:8:8)
	• Support activities centered around appropriate use, reducing use and optimising use of blood and blood products	1	2	3	Consensus R1 (92:8:0)
d	**Leadership and consultative roles**				
	• Functions as a link between the clinical setting and the laboratory	1	2	3	Consensus R1 (83:17:0)
	Support colleagues across a range of specialties	1	2	3	Consensus R1 (83:17:0)
5.	**THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				
	The scope of practice of the clinician dealing with blood transfusion on an *ad hoc* basis can best be described as:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Clinical knowledge**				
	• Should apply knowledge in local setting	1	2	3	Consensus R2 (83:17:0)
	• Knowledge of transfusion basics, e.g. the indications for blood products	1	2	3	Consensus R2 (83:17:0)
b	**Blood banking**				
	• Able to run a small blood bank	1	2	3	Consensus R1 (0:17:83)
	• Should know the concepts and principles underlying aphaeresis	1	2	3	Consensus R3 (83:17:0)

	SECTION C THE CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION				
	This section deals with the current challenges faced by clinicians dealing with blood transfusion as well as the challenges anticipated in the next five years. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
7.	**CHALLENGES CURRENTLY FACED BY CLINICIANS**				
	The challenges currently faced by clinicians dealing with blood transfusion include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Quality and safety**				
	• Safety of blood products	1	2	3	Consensus R1 (92:8:0)
	• Effects of Human Immunodeficiency Virus (HIV) epidemic on transfusion medicine	1	2	3	Consensus R1 (92:8:0)
	• Management of side-effects blood transfusions	1	2	3	Consensus R1 (92:8:0)
	• Limiting unnecessary transfusions	1	2	3	Consensus R1 (83:17:0)
	• Sampling errors	1	2	3	Consensus R1 (83:17:0)
b	**Lack of knowledge and training**				
	• Appropriate use of blood	1	2	3	Consensus R1 (92:8:0)
	• Knowledge of indications for different blood products	1	2	3	Consensus R1 (100:0:0)
	• Lack of training in transfusion medicine on an undergraduate level	1	2	3	Consensus R3 (100:0:0)
	• Knowledge of the value of blood products	1	2	3	Consensus R3 (83:17:0)
	• Knowledge of the management of transfusion-related complications	1	2	3	Consensus R1 (100:0:0)
c	**Access and availability**				
	• Adequate blood supply	1	2	3	Consensus R3 (92:8:0)
	• Inappropriate use of blood	1	2	3	Consensus R1 (92:8:0)
	• Decreasing donor pool	1	2	3	Consensus R3 (17:83:0)
	• Access to blood	1	2	3	Consensus R1 (92:8:0)
	• Effects of HIV epidemic on transfusion medicine	1	2	3	Consensus R1 (92:8:0)
	• Lack of rare blood groups in the donor pool	1	2	3	Consensus R2 (8:83:8)
	• Development of anti-platelet antibodies and subsequent platelet refractoriness	1	2	3	Consensus R2 (9:91:0)
	• Increasing demand for blood due to novel medical techniques requiring blood, e.g. increasing need for exchange transfusion for patients with sickle cell anaemia immigrating to Europe	1	2	3	Consensus R3 (8:83:8)
d	**Ethical and medico-legal**				
	• Informed consent issues	1	2	3	Consensus R2 (83:17:0)
f	**Cost-effectiveness**				
	• Cost-effective use of blood	1	2	3	Consensus R3 (83:17:0)
	• Appropriate use of blood	1	2	3	Consensus R1 (100:0:0)
	• Limiting unnecessary transfusions	1	2	3	Consensus R1 (100:0:0)

9.	CHALLENGES CLINICIANS ARE EXPECTED TO BE FACED WITH IN THE NEXT FIVE YEARS				
	The challenges clinicians involved in blood transfusion are expected to be faced with in the next five years, include issues related to:				
		ESSENTIAL	USEFUL	UNNECESSARY	(%)
a	**Quality and safety**				
	• Safety of blood products	1	2	3	Consensus R1 (92:8:0)
	• Limiting transfusion-transmitted infections	1	2	3	Consensus R1 (92:8:0)
	• Effects of HIV epidemic on transfusion medicine	1	2	3	Consensus R2 (83:17:0)
c	**Access and availability**				
	• Supply of blood	1	2	3	Consensus R1 (92:8:0)
	• Access to blood	1	2	3	Consensus R1 (92:8:0)

	SECTION D **DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	This section deals with the deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
11	**DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	The deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products, include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Knowledge**				
	• Knowledge of the correct indications for transfusion	1	2	3	Consensus R2 (92:8:0)
	• Knowledge of transfusion triggers and their application	1	2	3	Consensus R1 (83:17:0)
	• Knowledge of transfusion in general	1	2	3	Consensus R2 (83:17:0)
	• Knowledge of available products	1	2	3	Consensus R2 (92:8:0)
	• Knowledge of complications of blood transfusion	1	2	3	Consensus R1 (83:17:0)
	• Knowledge of coagulation and haemostasis	1	2	3	Consensus R2 (83:17:0)
b	**Skills**				
	• Skills to correctly administer blood products	1	2	3	Consensus R3 (83:17:0)
	• Skills required to obtain venous access, including central line placement, e.g. in shocked patient	1	2	3	Consensus R3 (83:17:0)
	• Incorrect handling of the product	1	2	3	Consensus R1 (83:17:0)
c	**Evidence-based practice**				
	• Inappropriate use of blood and blood products	1	2	3	Consensus R3 (83:17:0)
	• Lack of guidelines on blood transfusion	1	2	3	Consensus R2 (83:17:0)
	• Inappropriate selection of blood products	1	2	3	Consensus R3 (83:17:0)
	• Transfusing patients unnecessarily	1	2	3	Consensus R3 (83:17:0)

	SECTION E PROGRAMME OUTCOMES				
	This section deals with the major outcomes of a Postgraduate Diploma in Transfusion Medicine. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
13	**THE MAJOR OUTCOMES OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
	The major outcomes for a clinician completing a postgraduate diploma should include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Basic sciences**				
	• Should have a proper knowledge of physiology related to blood transfusion	1	2	3	Consensus R1 (92:8:0)
	• Should have a basic knowledge of pathophysiology related to blood transfusion	1	2	3	Consensus R1 (83:17:0)
b	**Blood banking**				
	• Should know the different blood products and their component	1	2	3	Consensus R1 (92:8:0)
	• Should have an awareness of aphaeresis and its applications	1	2	3	Consensus R3 (83:17:0)
c	**Haematology**				
	• Knowledge of relevant aspects of haematology	1	2	3	Consensus R3 (92:8:0)
	• Knowledge of haemostasis in transfusion medicine	1	2	3	Consensus R1 (92:8:0)
e	**Clinical medicine**				
	• Should know the indications for blood products	1	2	3	Consensus R1 (100:0:0)
	• Should be able to apply knowledge practically in the clinical setting	1	2	3	Consensus R1 (100:0:0)
	• Understanding of transfusion in hemolytic anaemias	1	2	3	Consensus R1 (83:17:0)
	• Understand the management of the transfusion-refractory patient	1	2	3	Consensus R1 (83:17:0)
	• Should be able to use blood appropriately	1	2	3	Consensus R1 (100:0:0)
	• Should know how to administer blood	1	2	3	Consensus R1 (92:8:0)
	• The quality of the transfusions by a clinician doing the diploma should increase, e.g. less complications and wastage of blood products	1	2	3	Consensus R3 (92:8:0)
	• Should be able to discuss the indications for stem cell transplantation	1	2	3	Consensus R1 (8:83:8)
	• Should know about sampling of blood	1	2	3	Consensus R1 (83:17:0)
	• Should know the ethical aspects concerning the use of blood and blood products	1	2	3	Consensus R2 (92:8:0)
f	**Blood conservation**				
	• Should have an understanding of the context of the issues and problems with the blood supply	1	2	3	Consensus R1 (83:17:0)
	• Should know about transfusion alternatives and blood conservation procedures, e.g. cell saving, erythropoietin, etc.	1	2	3	Consensus R1 (92:8:0)

g	**Blood safety**				
	• Should know about blood safety	1	2	3	Consensus R1 (92:8:0)
	• Should know about TTIs	1	2	3	Consensus R1 (92:8:0)
	• Should know about GVHD	1	2	3	Consensus R3 (83:17:0)
	• Should be able to diagnose and manage complications of blood transfusion	1	2	3	Consensus R1 (92:8:0)
	• Should know the contra-indications for blood products	1	2	3	Consensus R1 (92:8:0)
	• Understand allo-immunisation and how to manage that	1	2	3	Consensus R1 (83:17:0)
	• Understand and be able to manage iron overload	1	2	3	Consensus R1 (83:17:0)
	• Should know about immunosuppression related to transfusion	1	2	3	Consensus R1 (92:8:0)
h	**Social skills**				
	• Should be able to explain to a patient what a transfusion or transfusion-related procedure entails	1	2	3	Consensus R1 (92:8:0)

	SECTION F SUSTAINABILITY				
	This section deals with the major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
15	**THE MAJOR FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Academic staff**				
	• Properly qualified staff that runs the Diploma	1	2	3	Consensus R1 (100:0:0)
	• Roles of team members need to be clearly defined	1	2	3	Consensus R3 (92:8:0)
	• There should be good guidance for the students	1	2	3	Consensus R1 (83:17:0)
	• Dedicated team needed	1	2	3	Consensus R1 (92:8:0)
	• Can use part-time staff to compensate for an insufficient number of full-time staff members	1	2	3	Consensus R3 (8:92:0)
b	**Value creation**				
	• Enough people should want to do it, i.e. there should be a need for the course	1	2	3	Consensus R1 (83:17:0)
	• The Diploma should have value to the person who does it	1	2	3	Consensus R1 (100:0:0)
	• There should be value in obtaining the qualification	1	2	3	Consensus R3 (83:17:0)
	• Malpractice insurance levies for doctors who practice transfusion medicine without the qualification may make it more attractive	1	2	3	Consensus R3 (0:17:83)
	• Doing the course should allow the students to do certain extra things not otherwise part of their job description	1	2	3	Consensus R1 (8:83:8)
	• There should be a follow-up programme after the Diploma, e.g. where students can come back annually for refresher courses	1	2	3	Consensus R1 (8:92:0)
	• Sponsor people to attend on a meritorial basis	1	2	3	Consensus R2 (8:83:8)
c	**Networking**				
	• Get buy-in from the private sector	1	2	3	Consensus R3 (8:92:0)
d	**Financial viability**				
	• Get sponsorship from the private sector, e.g. private laboratories	1	2	3	Consensus R3 (8:83:8)
e	**Structure and organisation**				
	• Should be a part-time programme, i.e. doctor should be able to do it from his/her practice	1	2	3	Consensus R3 (83:17:0)
	• You need dedicated administrative support, e.g. secretarial services, paper, printing	1	2	3	Consensus R1 (92:8:0)

	• Course can be short and full-time, but also reasonable to have a part-time course with intensive contact sessions	1	2	3	Consensus R3 (8:92:0)
	• Should have defined blocks of contact time	1	2	3	Consensus R3 (83:17:0)
	• Needs to be well organised	1	2	3	Consensus R1 (83:17:0)
	• There should be appropriate infrastructure/facilities for running the course	1	2	3	Consensus R2 (92:8:0)
	• Logistics to present course should be in place	1	2	3	Consensus R1 (83:17:0)
f	**Programme content and outcomes**				
	• The course should cover a broad spectrum of clinical issues	1	2	3	Consensus R1 (92:8:0)
	• The course should be relevant to clinical practice	1	2	3	Consensus R1 (100:0:0)
	• The course should be applied to clinical practice	1	2	3	Consensus R1 (100:0:0)
	• The individual topics need to be well-structured	1	2	3	Consensus R1 (92:8:0)
	• The curriculum needs to be clearly defined, e.g. with well defined start and end	1	2	3	Consensus R2 (92:8:0)
	• Should have practical sessions that are relevant	1	2	3	Consensus R2 (83:17:0)
	• Including a problem-based component in the curriculum using case studies where people can learn from mistakes	1	2	3	Consensus R2 (92:8:0)
	• The curriculum needs to be organised in and integrated way	1	2	3	Consensus R3 (100:0:0)
	• There should be good programme and educational material	1	2	3	Consensus R1 (83:17:0)
	• Outcomes need to be defined	1	2	3	Consensus R1 (92:8:0)
g	**Assessment**				
	• There should be deliverable assignments	1	2	3	Consensus R1 (92:8:0)
	• Evaluate the practice and knowledge of the students	1	2	3	Consensus R1 (92:8:0)
	• Need to give feedback to students on assignments	1	2	3	Consensus R2 (100:0:0)
h	**Career-path creation**				
	• Job possibilities need to be created, e.g. posts for doctors who take responsibility for clinical transfusion practice and the transfusion committee in a hospital	1	2	3	Consensus R2 (8:92:0)
i	**Recognition programme**				
	• The Diploma should be recognised by the relevant governing bodies	1	2	3	Consensus R2 (92:8:0)
	• Programmes should be certified according to certain criteria	1	2	3	Consensus R3 (83:17:0)
	• There should be a certifying agency	1	2	3	Consensus R3 (83:8:8)
	• Continuing professional development (CPD) accreditation of programme	1	2	3	Consensus R2 (92:8:0)
j	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	Consensus R3 (83:17:0)
	• Get feedback from the participants	1	2	3	Consensus R2 (83:17:0)

	SECTION G ACADEMIC FACTORS				
	This section deals with the factors from an academic point of view that could be taken into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
17	**THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Programme development**				
	• Research and define the actual skills and knowledge required	1	2	3	Consensus R1 (100:0:0)
	• Should go through the necessary channels of approval, e.g. university channels	1	2	3	Consensus R1 (92:8:0)
b	**Programme structure**				
	• Proper structure	1	2	3	Consensus R1 (92:8:0)
	• The duration of the diploma needs to be fixed in advance	1	2	3	Consensus R1 (92:8:0)
	• The duration should not be more than two years	1	2	3	Consensus R1 (83:8:8)
	• It should be done part-time if run over a period longer than 18 months	1	2	3	Consensus R3 (83:0:17)
	• Students will not complete the course if it is too long	1	2	3	Consensus R3 (17:83:0)
c	**Quality assurance**				
	• There should be an appropriate standard with internal and external moderation	1	2	3	Consensus R1 (83:17:0)
	• Final assessment should be externally moderated	1	2	3	Consensus R1 (83:8:8)
	• A recertification process, be it correspondence or attendance-based refresher courses will ensure that those who qualified stay up-to-date and it can be a source of revenue	1	2	3	Consensus R3 (8:83:8)
	• The training programme should be documented, e.g. which lectures are given	1	2	3	Consensus R1 (83:17:0)
	• The programme needs to be standardised	1	2	3	Consensus R1 (83:17:0)
d	**Admission criteria and recognition of prior learning**				
	• Applicants for Diploma should have a basic medical degree and do not need to be specialists	1	2	3	Consensus R2 (92:8:0)
e	**Academic culture**				
	• A spirit of inquisitiveness should be fostered	1	2	3	Consensus R3 (83:17:0)
	• A culture of critical thinking should be fostered, where questions are asked about the appropriateness of current practice	1	2	3	Consensus R1 (92:8:0)
	• There should be a culture of continuous learning and updating your knowledge	1	2	3	Consensus R1 (83:17:0)
g	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	Consensus R3 (92:8:0)

	SECTION H **EDUCATIONAL FACTORS**				
	This section deals with major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
19	**THE MAJOR EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	(%)
a	**Curriculum**				
	• You need a formal curriculum	1	2	3	Consensus R1 (92:8:0)
	• Curriculum needs to be well-defined	1	2	3	Consensus R1 (100:0:0)
	• The components of the training programme should be enunciated in great detail	1	2	3	Consensus R2 (92:8:0)
b	**Educational material and resources**				
	• Should make use of the internet	1	2	3	Consensus R2 (83:17:0)
	• Students need a good bibliography, i.e. good books and references to good articles	1	2	3	Consensus R3 (83:17:0)
	• Course content should be linked into other resources, e.g. one needs to ensure access to the library, including online, for non-resident students	1	2	3	Consensus R1 (92:8:0)
c	**Learning as an experience**				
	• Attendance should be an enriching experience	1	2	3	Consensus R3 (92:8:0)
	• Students should be inspired	1	2	3	Consensus R1 (83:17:0)
d	**Assessment**				
	• Assignments should be assessed	1	2	3	Consensus R1 (100:0:0)
	• There should be some form of assessment on a regular basis to ensure that outcomes have been achieved	1	2	3	Consensus R3 (83:17:0)
	• Should have deliverable assignments	1	2	3	Consensus R1 (100:0:0)
	• Feedback should be given on assignments	1	2	3	Consensus R1 (92:8:0)
	• Make use of peer assessment	1	2	3	Consensus R3 (17:83:0)
	• Logbooks will allow for auditing	1	2	3	Consensus R3 (0:83:17)
e	**Outcomes**				
	• Outcomes need to well-defined and clearly delineated	1	2	3	Consensus R1 (92:8:0)
	• Outcomes should be measurable	1	2	3	Consensus R1 (92:8:0)
f	**Contact time**				
	• Contact sessions are important	1	2	3	Consensus R1 (92:8:0)
	• Sessions with students should be interactive	1	2	3	Consensus R1 (92:8:0)

g	**Forms of learning**				
	• Make use of case studies and make it problem-based, e.g. learning from real-life mistakes	1	2	3	Consensus R1 (83:17:0)
	• Learning should be integrated	1	2	3	Consensus R3 (92:8:0)
	• Problem-based learning is important	1	2	3	Consensus R2 (83:17:0)
	• Self-directed learning is important	1	2	3	Consensus R2 (83:17:0)
h	**Teacher**				
	• Lecturers who are national experts should be used in contact sessions	1	2	3	Consensus R3 (83:8:8)
i	**The student as an adult learner**				
	• The course content should be relevant to the adult learner's work environment	1	2	3	Consensus R2 (83:8:8)
	• Students should know the benefits and rationale of what is being taught	1	2	3	Consensus R2 (83:17:0)
	• Facilitator should provide an environment within which the adult learner feel safe to cooperate and explore	1	2	3	Consensus R3 (83:17:0)
	• The individual learner's attributes, preferences and needs should be accommodated	1	2	3	Consensus R3 (8:83:8)
	• Should be given the opportunity to solve problems relevant to their real-life worlds	1	2	3	Consensus R2 (83:17:0)
	• Learning approach should promote adulthood (i.e. independence, responsibility, self-direction)	1	2	3	Consensus R3 (83:17:0)
	• A cooperative learning climate should be created	1	2	3	Consensus R3 (83:17:0)
	• Provide opportunities for interaction with co-learner's in small groups	1	2	3	Consensus R3 (83:8:8)
j	**Alignment**				
	• Assessment should be aligned with course outcomes	1	2	3	Consensus R1 (83:17:0)

6.2.5 Findings on consensus statements

The statements on which consensus were reached are shown in full (cf. Table 6.2). The percentage of participants choosing a particular point on the Likert scale is indicated in brackets in the far right-hand column of the page.

Column 1 = percentage of participants indicating a statement to be *essential* and thus warranting inclusion in the model

Column 2 = percentage of participants indicating a statement to be *useful* and meriting possible inclusion in the model

Column 3 = percentage of participants indicating a statement to be *unnecessary* and thus not deserving of inclusion in the model

Consensus was reached on 240 of the 387 statements in the questionnaire. This is an overall consensus of 62.0%. From these 387 statements, the following results were obtained:

- Consensus was reached on 210 selections for Option 1 (*essential*) on the Likert scale, in other words 54.3%.

- Consensus was reached on 27 selections for Option 2 (*useful*) on the Likert scale, in other words 7.0%.

- Consensus was reached on three selections for Option 3 (*unnecessary*) on the Likert scale, in other words 0.8%.

Only three statements regarding which consensus had been reached ranked as unnecessary for the proposed model. This implies that only these should specifically be excluded from the model. These statements read as follows:

- "The main roles, tasks and functions of a clinician dealing with blood transfusion, include a patient management role, which includes dealing with logistical issues, e.g. the transportation of blood" (cf. Table 6.2, Section A:1e); and

- "The skills and competences of a clinician dealing with blood transfusion, include a patient management role, which include technical skills, such as doing a cross-match" (cf. Table 6.2, Section A:2b); and

- "The scope of practice of the clinician dealing with blood transfusion on an *ad hoc* basis, includes being able to run a small blood bank" (cf. Table 6.2, Section B:5b).

6.2.6 Findings regarding statements on which consensus was not reached

The statements on which consensus was not formally reached at the end of Round Three, include a total of 147 out of the total of 387 statements, giving a percentage of 38.0%. Stability could be declared in 136 of the 147 statements, yielding 92.5% stability on all non-consensus statements. On 44 of the 147 statements nobody changed his/her mind; on 58 statements one person changed his/her choice; and, on 34 statements there were two participants who changed their choice. On nine statements, three participants opted for a different choice and on two statements four participants changed their choices. In these 11 statements (regarding which three or more participants changed their opinions), stability was thus not reached. There were no statements regarding which more than four participants changed their minds.

For these 147 statements, it was decided that all the statements for which 50% or more of the Delphi respondents had indicated a point 3 on the Likert

scale (indicating that the statement was unnecessary), would be excluded from the model. This was the case for only four statements, namely:

- "The main roles, tasks and functions of a clinician dealing with blood transfusion, include a patient management role, which includes taking personal responsibility for obtaining a cross-match sample from the patient" (cf. Table 6.2, Section A:1e); and

- "The skills and competences of a clinician dealing with blood transfusion, includes a patient management role, which include technical skills, such as having confidence in the thawing of blood products" (cf. Table 6.2, Section A:2b); and

- "The challenges currently faced by clinicians dealing with blood transfusion include issues related to access and availability, such as the emigration of peoples into areas with an inadequate supply of blood for their blood groups, e.g. emigration of Africans to Europe" (cf. Table 6.2, Section C:7c); and

- "The challenges with which clinicians involved in blood transfusion are expected to be confronted in the next five years, include issues related to access and availability, such as increasing disparity in terms of the availability of different products between state and private sector" (cf Table 6.2, Section C:9c).

It is interesting to note that in 129 of the 147 statements more than 80% of participants chose either Option 1 (*essential*) or option 2 (*useful*) on the Likert scale, indicating a strong preference towards usefulness for these statements. In a further 14 statements, between 51% and 79% of participants chose Option 1 or Option 2 on the Likert scale and in only four statements, did 50% or more choose Option 3 (*unnecessary*) on the scale.

Reaching of stability is further supported by the decrease in the number of comments made on non-consensus statements in Round Three in comparison with rounds One and Two. In Round One, 65 specific comments were made by six participants on statements regarding which consensus was not reached at the end of Round Three. In Round Two, 106 specific comments were made by nine participants on statements regarding which consensus was not reached at the end of Round Three. Note that three participants who did not make any comments in Round One, made their first comments in Round Two. These three were responsible for 64 of the 106 comments, which would explain the increase in comments during Round Two. In Round Three, only 13 specific comments were made by two participants on statements regarding which consensus was not reached at the end of Round Three. The number of general comments also decreased progressively over the three rounds: 56 general comments made by eight participants in Round One; 39 general comments made by seven participants in Round Two; and 17 general comments made by three participants in Round Three.

6.3 CONCLUSION

This chapter comprises the results of the Delphi survey and an exposition of the findings from the data. A response rate of 100% was obtained for all three rounds.

Out of a total of 387 statements in the Delphi questionnaire, consensus was reached on 240 statements after three rounds. Of these 240 statements, consensus was reached on 210 statements for Option 1 (deemed *essential* for inclusion in the model), on 27 statements for Option 2 (deemed *useful* for inclusion in the model), while three statements (Option 3), were deemed *unnecessary* for the model.

Stability (strictly defined as more than 80% of participants not changing their minds) was reached regarding a further 136 statements. Of these, only four statements were excluded, as more than 50% of the participants indicated that it was unnecessary to include them in the model.

The relatively high degree of consensus and stability, coupled with a very low number of statements considered unnecessary in a very diverse group of participants and the fact of a 100% response rate in all three rounds, all support the usefulness of conclusions drawn from the data.

As indicated by the title of the following chapter, ***A model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State,*** this chapter is devoted to the model being the final outcome of the study. This is accomplished by means of a synthesis of findings from the literature review, the semi-structured interviews and also the results from the Delphi survey.

CHAPTER 7

A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE IN THE SCHOOL OF MEDICINE AT THE UNIVERSITY OF THE FREE STATE

7.1 INTRODUCTION

Postgraduate programmes providing formal education and training in transfusion medicine to medical doctors are rare in many parts of the world and where available, usually have as their focus training in the more technical or laboratory aspects. Undergraduate medical teaching in transfusion medicine, especially in the South African context, is generally very limited, while Master's degrees or Doctorates are usually research based and focused on a particular aspect of a very broad field. Somewhere between the basic training of a medical student and the research needs of the Master's or Doctorate student, one finds that the needs of a medical doctor involved in the clinical aspects of transfusion medicine are not met. This study has been a formal attempt to address the absence of a scientifically sound model for the academic development and implementation of a postgraduate diploma in transfusion medicine. The methodology employed in developing this model included a literature review, semi-structured interviews and a Delphi survey in order to provide, in a structured and systematically researched manner, the foundations, content and criteria for such a model.

Chapter 1 served as an introduction and orientation to the study, in which the background to the study was provided, the problem was stated and the overall goal, aim and objectives provided. Furthermore, the scope of the

study was delineated, its value and significance in the field of transfusion medicine described and the research methods used introduced.

In Chapter 2, the current status of education in transfusion medicine was described and attention given to aspects such as global training needs, policies, and support for transfusion medicine training programmes. Many related issues were addressed, such as the problem of human error, the inappropriate use of blood and blood products, the lack of trained professionals, the image of the transfusion medicine profession, challenges in transfusion medicine, quality and standardisation of transfusion medicine education, diversity in the transfusion medicine workforce and the difficulty of retaining personnel in transfusion medicine.

Chapter 3 provided a theoretical basis and description of the research design and methodology. The development and use of the semi-structured interview and the Delphi process as data collection tools were described.

Chapter 4 provided an explication of the results, the data analysis and the findings of the semi-structured interviews.

Chapter 5 endeavoured to align the key findings of the semi-structured interviews with the literature, with a view to ensuring that a solid foundation would be established for the development of a list of criteria for the Delphi survey.

Chapter 6 described the results, data analysis and findings of the Delphi process.

In the present chapter, the development of the model will be discussed in detail. Apart from the premises, points of departure and the role players involved, there will be a discussion of the elements of the model and how

they interact and interface with one another. The different aspects or elements of the model will further be discussed and recommendations provided in respect of its implementation.

7.2 PREMISES FOR THE DEVELOPMENT OF A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE

Justification for the development of a useful model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine is found in a number of foundational premises shown in Figure 7.1.

The first premise is that of ***relevance***. There must be an established need for such a model and this need must be clearly delineated and addressed in a structured and systematic fashion. This was done by embarking on a systematic review of the literature, which attempted to show the needs and limitations of transfusion medicine education, including the lack of programmes addressing these needs worldwide.

The second premise entails that the model will be based on scientifically sound and valid ***research results*** obtained from the synthesis of findings from the national and international literature, semi-structured interviews with national and international experts in the field of transfusion medicine and education, and feedback from the Delphi participants who were all experienced in clinical transfusion medicine, health professions education or both. Results should be valid and reliable and triangulation of data gathered by means of the three described processes should ensure its trustworthiness. This will ensure a solid foundation on which medical schools can build when the model is implemented.

The third premise entails that a ***flexible approach*** should be followed in developing the model. All the different aspects that were studied should be

provided for, including issues related to the challenges, roles, skills, deficiencies, scopes of practice, curriculum outcomes, sustainability and also academic and educational factors of importance. This will allow medical schools to focus on specific areas of need or interest in establishing a programme based on this model but adapted to their local needs.

The fourth premise relates to ***transportability***. Although the model is developed for the needs of the University of the Free State, the absence of and need for such a model are not limited to the South African context. The key elements should therefore be useful and implementable – with minor changes – at most medical schools, irrespective of where they are in the world. This was ensured by drawing from a broad base of international literature, taking care to avoid bias towards literature from a single country or region and moreover making use of a large number of international experts from different countries and continents in the semi-structured interviews and the Delphi process.

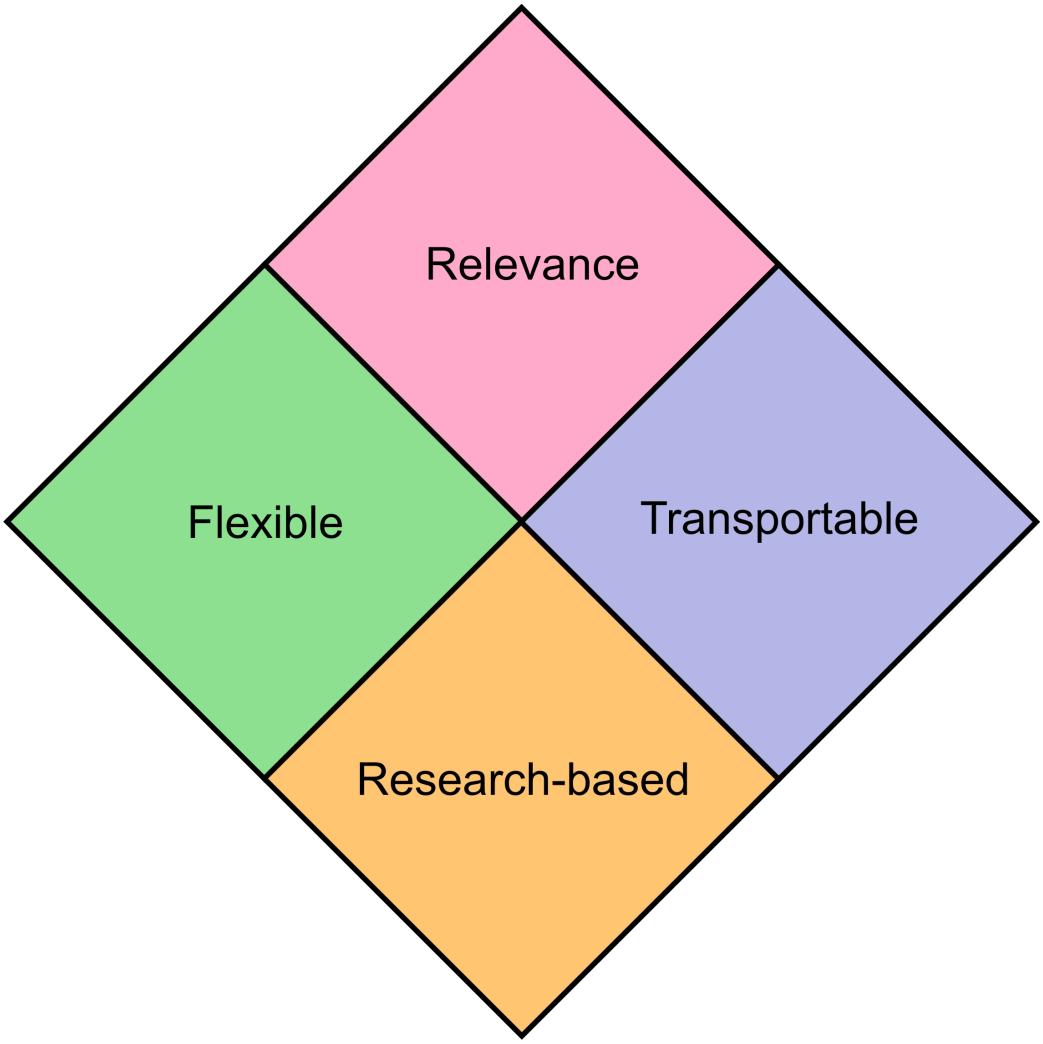

FIGURE 7.1: Premises for a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine

[This diagrammatic representation was compiled by the researcher, Louw (2010) as part of this Ph.D. research project.]

7.3 PRINCIPLES AND POINTS OF DEPARTURE

Utilising the model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine requires the acknowledgement of the issues listed below (based on the literature review and the findings of the semi-structured interviews and the Delphi survey), which serve as necessary principles and points of departure. These are summarised in Figure 7.2.

The model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine should:

- Take into account the legal and policy framework of the country in which it is used. In the South African context this includes the policy frameworks of SAQA, the HEQC, the DoE, the DoH and the HPCSA.
- Take cognisance of and be aligned with the vision, mission, policies, guidelines and needs of the institution in which it is implemented. In this case that is taken to mean the School of Medicine within the Faculty of Health Sciences at the University of the Free State.
- Provide a theoretical and philosophical basis for the development of a postgraduate diploma in transfusion medicine.
- Be based on the principle of equal opportunity and provide equitable access to students meeting the stated academic prerequisites from all levels of society and health care provision.
- Contain recommendations for what would constitute quality education for a professional undergoing training in such a diploma, including the principles of open-mindedness, critical thinking, scholarship and respect for the pluralism of cultures.
- Take into account the fact that the levels at which transfusion medicine is practised will vary according to the level of health care (i.e. primary, secondary or tertiary), the developmental status of a region or country, affordability, national and local health care policy, and cultural factors. All

these need to be considered when a model is provided as all students coming from whatever background should receive training that is relevant to their own particular contexts, while also being made aware of the practice of transfusion medicine in other contexts.

- Consider that ethical issues and challenges related to the education and training in transfusion medicine encompass a wide variety of concepts, principles, disciplines and theories and range from the global and more conceptual to the most personal and practical.
- Follow an outcomes-based approach, with clear recommendations on the required roles, skills, attitudes and knowledge of a trainee completing such a programme. This should correspond to the scope of practice required from such a professional and address the deficiencies present before the programme is completed while taking into account international standards of knowledge.
- Take into account the principles of adult learning and modern methods of teaching and education.
- Have as its focus the clinical practice of transfusion medicine and issues related to this supported by a theoretical basis in blood banking and laboratory medicine rather than the other way around.
- Not be too complicated, but relatively easy to understand, use and implement.
- Provide clear recommendations for the development and implementation of the model.

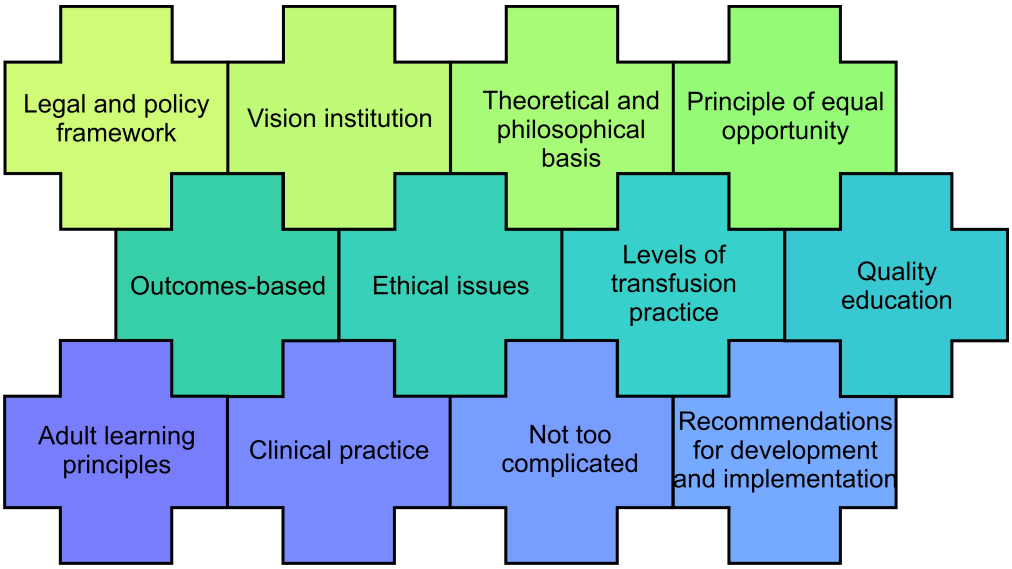

FIGURE 7.2: Points of departure for a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine

[This diagrammatic representation was compiled by the researcher, Louw (2010) as part of this Ph.D. research project.]

7.4 THE ROLE PLAYERS WHO MAY INFLUENCE THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE

The role players identified in the literature as influencing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine are indicated in Figure 7.3.

Implementing such a model successfully requires that these role players, including their needs and functions, be recognised. As far as possible, their input and involvement should be sought in the development, implementation and monitoring of a Postgraduate Diploma in Transfusion Medicine. In other instances, regulatory and policy frameworks require that certain procedures be followed and conditions met in order to obtain official recognition and accreditation for a new programme.

Role players who were considered relevant to a Postgraduate Diploma in Transfusion Medicine were divided into internal (from within the university) and external role players.

7.4.1 Internal role players

7.4.1.1 *University leadership and management (including its Planning Unit, Programmes Committee and the Council), for example, by:*

- Providing the vision and mission for the institution, which will assist in aligning the programme to suit institutional needs and purposes.
- Providing support in terms of programme planning.
- Facilitating the interaction and submissions to the CHE, HEQC and SAQA.
    - Providing policies and guidelines for the institutional requirements and processes relating to the approval, accreditation, registration, recording and termination of academic programmes.

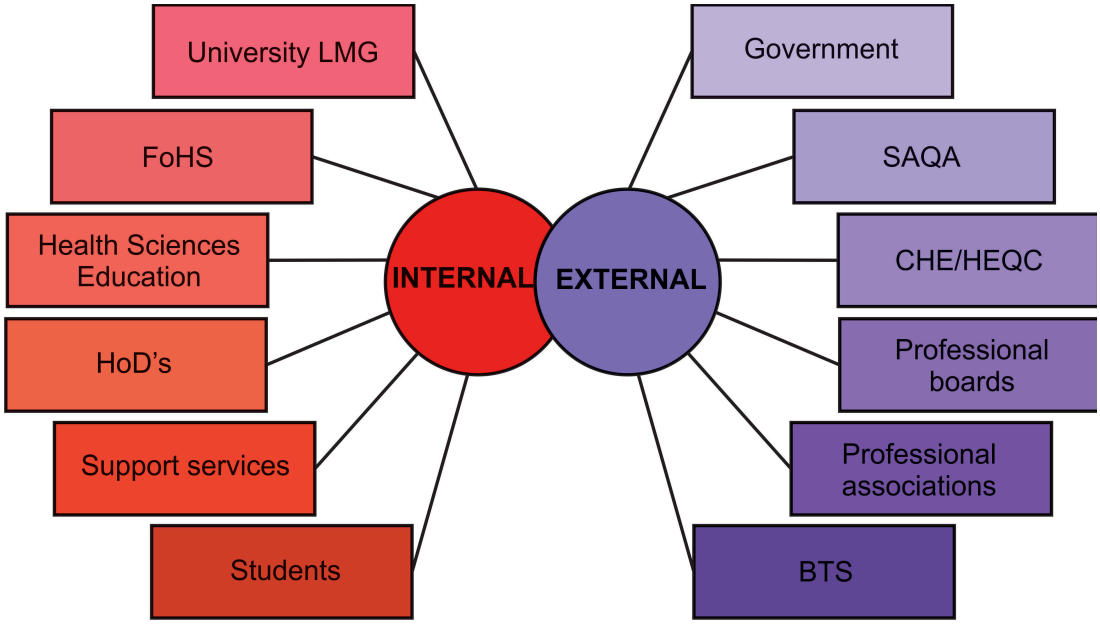

FIGURE 7.3: Potential internal and external role players in a Postgraduate Diploma in Transfusion Medicine

[This diagrammatic representation was compiled by the researcher, Louw (2010) as part of this Ph.D. research project.] LMG: Leadership and Management Group; FoHS: Faculty of Health Sciences; HODs: Heads of Departments; SAQA: South African Qualifications Authority; CHE: Council on Higher Education; HEQC: Higher Education Quality Committee; BTS: Blood Transfusion Services

7.4.1.2 *Faculty of Health Science leadership and management (including School of Medicine and its Heads of Departments), for example, by:*

- Providing a vision and mission for the Faculty and School in keeping with that of the University.
- Providing leadership and guidance.

- Providing infrastructural and administrative support and also the required teaching staff for the programme.
- Administering and allocating funding and subsidy payments to the programme.
- Providing guidance and support to the programme through its internal education and programme committees.
- Assisting with communication, networking and marketing relating to the programme.

7.4.1.3 *Health Sciences Education Division, for example, by:*

- Providing support and guidance regarding the process for the development of a programme, its structure, content and assessment.
- Providing support to students and academics.
- Providing opportunities for staff development and training, especially in the field of Health Sciences Education.
- Helping with communication and networking with regard to the programme registration and accreditation processes.

7.4.1.4 *Department responsible for developing and managing a Postgraduate Diploma in Transfusion Medicine, for example, by:*

- Preparing all the documentation for submission and approval to the relevant institutional committees, the DoE, HEQC of the CHE, SAQA, HPCSA, etc.
- Taking responsibility for organising the programme, which includes arranging contact sessions and speakers and making practical arrangements related to the training.
- Developing the programme curriculum, learning materials, handouts, study guides, etc.

- Providing leadership and management in respect of the running of the programme.
- Networking and establishing formal (as applicable) and informal working relationships with all the relevant role players.
- Sourcing internal and external funding for the programme, for instance from foundations such as the Foundation of the ISBT.
- Facilitating communication between all role players, both internal and external.

In summary, the Department will be responsible for the management of the diploma, which includes the following aspects of the programme: planning, developing, organising, implementing, liaising, coordinating, monitoring, evaluating and revising. It should be recognised that this responsibility constitutes an ongoing, cyclical process.

7.4.1.5 *Support services, for example, by:*

- Providing academic, research and administrative support to students.
- Provision of library services and access to information through the Internet in order to facilitate distance learning.
- Staff development and training related to research, teaching, education and management.
- Providing administrative support to the programme developers.

7.4.1.6 *Students, for example, by:*

- Providing academic, research and administrative support to students.
- Provision of library services and access to information through the Internet in order to facilitate distance learning.
- Staff development and training related to research, teaching, education and management.
- Providing administrative support to the programme developers.

7.4.2 External role players

7.4.2.1 *Government (including the DoE, the DoH, and parastatals, such as the MRC, NRF, etc.), for example, by:*

- Providing the legal and regulatory frameworks and policies and executing these as they relate to education and health care.
- Ensuring that institutional plans for programme development are consistent both with national policy and goals and with institutional missions and capacity.
- Providing public funding in the form of subsidies to higher education.
- Supporting efforts towards ensuring equity and access to higher education for those who are academically able yet disadvantaged.
- The provision of infrastructure and clinical staff.
- Providing research funding and support.

7.4.2.2 *SAQA, for example, by:*

- Developing and implementing policies and criteria for the development, registration and publication of qualifications.
- Developing policies and criteria for assessment, recognition of prior learning, and credit accumulation and transfer.
- Playing its role in advancing the objectives of and overseeing the further development of the NQF and coordinating the sub-frameworks.

7.4.2.3 *The CHE and HEQC, for example, by:*

- Providing advice to the Minister of Education on policy matters related to higher education.
- Reviewing the structure and duration of postgraduate diplomas, as well as assessing the programme curriculum in terms of content, relevance, design and delivery.

- Taking responsibility for quality assurance and promotion in higher education, including programme accreditation, auditing, programme evaluation and capacity building.
- Contributing to higher education development by providing guidance, providing publications, organising conferences and conducting research on the challenges of higher education.
- Monitoring and evaluating whether the objectives, vision and policy goals of higher education are being realised.

7.4.2.4 *Professional boards, such as the HPCSA, for example, by:*

- Regulating the health professions through registration of qualifications, education, training, and continuing professional development.
- Serving as a regulator of professional conduct and ethical behaviour.
- Developing and ensuring compliance with health care standards.
- Fulfilling its role as an Education and Training Quality Assurer (ETQA) for the health professions through the provision of quality-assurance systems.

7.4.2.5 *Professional associations and societies (including ISBT, SASH, etc.) for example, by:*

- Providing input regarding members' educational needs.
- Providing support to such a programme in the form of funding, bursaries and capacity building.
- Communicating the benefits of such a programme to its members and the public.
- Providing infrastructure for communication, to a broad member basis, of information pertaining to the programme.

7.4.2.6 *Blood Transfusion Services and related organisations (including SANBS, the WPBTS, the NBI, etc.), for example, by:*

- Providing input regarding the deficiencies in transfusion medicine practice and education.
- Providing support to such a programme in the form of funding, bursaries and staff able to assist in teaching on an *ad hoc* basis.
- Communicating the benefits of such a programme to its personnel and the public.
- Providing infrastructure for communication of information pertaining to the programme to a broad member basis.
- Assisting in networking with international transfusion organisations, funders and experts through their existing infrastructure and databases.
- Building working relationships and positive collaboration between them and the institution.
- Assisting in the development of a career path within their services for students who complete the Postgraduate Diploma in Transfusion Medicine.
- Providing opportunities for collaborative research.

Close cooperation with other relevant departments – such as the Division Health Sciences Education, the University Planning Unit with its sub-division Programme Planning and university committees dealing with programme development and implementation – is needed from an early stage of programme development. Also, having formal agreements, or at least a memorandum of understanding, between the department developing the diploma and the blood transfusion services, may greatly facilitate the success of such a programme.

Other advantages of networking and cooperation would be the sharing of resources, ideas, innovation, human resources, incorporating both the

theoretical and practical aspects of blood transfusion medicine into the programme, improved marketing, workload sharing and subsequent cost savings. Getting buy-in and involvement from all stakeholders through consultation would increase the chances of having a single, high-quality programme, rather than having duplication with many small, fragmented and ineffective programmes within a single country. This is in line with the vision of the South African DoE on limiting duplication of niche programmes, especially where the numbers of potential trainees are relatively small (RSA DoE 2008:49).

Networking may also expand the strength of all stakeholders both individually and jointly. An effective network is based on relationships and these are key to working together towards reaching a common goal and meeting the unmet needs in the field. Furthermore, networks need to be maintained by keeping communication lines open between role players, especially during periods of change.

It is thus critical to identify role players and stakeholders early and find areas of mutual interest and potential cooperation. The roles that each will play should be negotiated and documented. In determining these, the major perspectives and needs of both the programme provider and stakeholders should be borne in mind. Also, the relationship among the different role players needs to be considered strategically to ensure smooth collaboration.

7.5 AN INTRODUCTION AND ORIENTATION TO A PROPOSED MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE

From the results of the literature review, the semi-structured interviews and the Delphi process, a number of key elements have been identified that may be useful for inclusion in the model. In line with the premise of flexibility, the degree to which each of these elements is emphasised may differ from one context to another.

Recommendations are formulated under the ten areas that may be included in the model (cf. 7.5.1 and 7.5.2; Semi-structured interview guide, Appendix A3; Delphi survey layout, Appendix C2).

7.5.1 The KEY elements and aspects that should be included and addressed in the model:

- The main roles, tasks and functions of a clinician dealing with blood transfusion in the clinical setting. [=R]
- The main skills and competences of a clinician dealing with blood transfusion in the clinical setting. [=S]
- The main areas of clinical knowledge required by the clinician dealing with blood transfusion. [=K]
- The scope of practice of the clinician dealing with blood transfusion. [=P]
- The current challenges faced by clinicians dealing with blood transfusion, as well as those expected to confront them in the next five years. [=C]
- The deficiencies in respect of the abilities of clinicians dealing with the transfusion of blood and blood products. [=D]
- The major outcomes for a clinician completing a postgraduate diploma. [=O]

- The major factors that would render a Postgraduate Diploma in Transfusion Medicine sustainable. [=F]
- The factors that should be taken into account with regard to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. [=A]
- The major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. [=E]

Recommendations were derived from the findings of the Delphi survey and categorised according to the weight given to the statements by the respondents. Thus, a statement considered essential by the majority (80% or more) is marked in bold. Statements considered essential or useful by 50% or more, but less than 80% of respondents, are also included in the model, but are not marked in bold. Recommendations are, where appropriate, listed in order of importance, except in cases where the context might be lost if this is done.

For the complete list of aspects included in the model, see Appendix F.

7.5.2 An orientation to the model

Figure 7.4 provides a schematic overview of the proposed model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State.

The model consists of a number of interrelated elements. Figure 7.4A represents the average clinician involved with the transfusion of blood and blood products, with his/her limitations, challenges and deficiencies as these relate to the clinician's knowledge, roles, skills, attitudes, competences, functions, abilities and tasks. All of these influence and limits the clinician's

scope of practice and emphasise the need for further training and education in transfusion medicine. The line around Figure 7.4A symbolises the limitations within which the clinician practices.

Figure 7.4B resembles the Postgraduate Diploma with at its core an outcomes-based approach. It shows that there are academic, educational and implementation-related factors that are required for a successful programme and thus 'propels' it forward. These factors cannot be disengaged from contextual considerations, which include factors related to the institution, management, policies, procedures, human resources and infrastructure. To make this programme sustainable, the factors related to sustainability also need to be taken into account.

After having completed the Postgraduate Diploma in Transfusion Medicine, it is hoped that the clinician represented in Figure 7.4A, will now resemble the clinician represented in Figure 7.4C, where his/her scope of practice has been enhanced by overcoming the identified challenges, having addressed the noted deficiencies and having expanded the clinician's knowledge, roles, skills, attitudes, competences, functions, abilities and tasks. The broken line symbolises an increasing scope of practice that through an ongoing process of life-long learning and continuing professional development, keeps expanding.

The above process is underpinned by the involvement of all the internal and external role players in a considered manner (Figure 7.4D) and by taking into account the premises (Figure 7.4E) and points of departure identified for the model (Figure 7.4F).

Finally, it should be noted that the longterm sustainability of a Postgraduate Diploma in Transfusion Medicine 'rides' on the assumption that a process of continuous improvement ('the track') is taking place.

In the following section, section 7.6, these aspects will be elucidated in more detail.

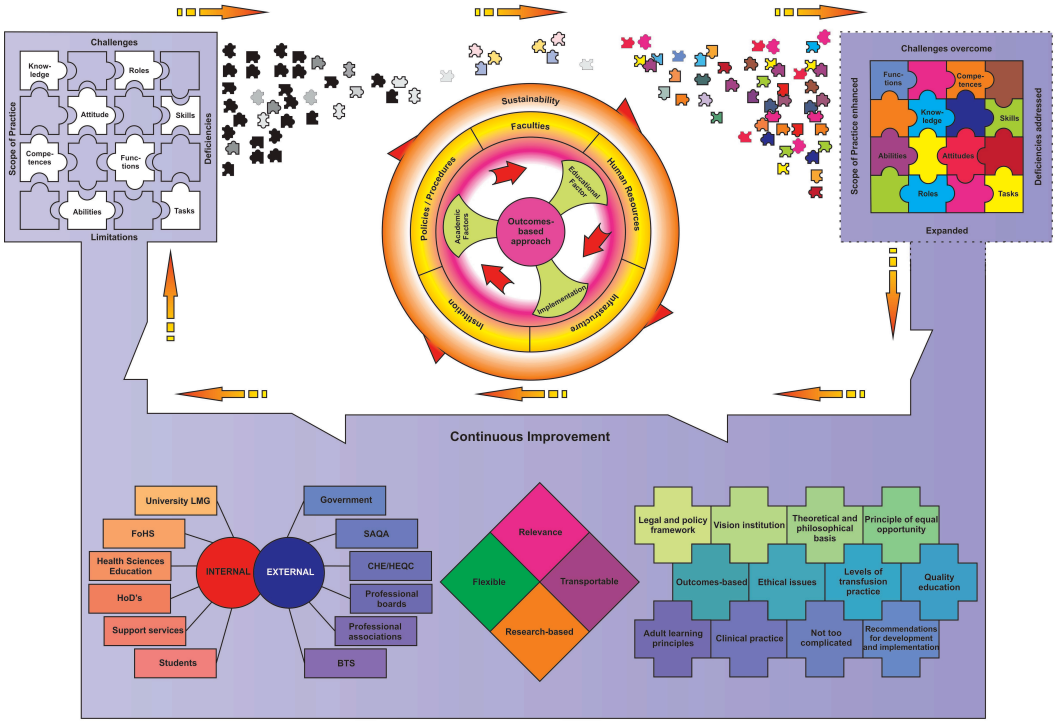

FIGURE 7.4: A schematic illustration of the model for the academic development and implementation of a postgraduate diploma in transfusion medicine
[This diagrammatic representation was compiled by the researcher, Louw (2010) as part of this PhD research project.]

FIGURE 7.4: A schematic illustration of the model for the academic development and implementation of a postgraduate diploma in transfusion medicine

7.6 PERSPECTIVES ON THE PROPOSED MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE

The limited amount of formal undergraduate training, as well as the total absence of a postgraduate, clinically-focused, formal university training programme in transfusion medicine, was the major impetus behind this research, which endeavoured to bridge the gap between the need for training medical doctors in transfusion medicine by developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

Noting the virtual absence of similar programmes internationally, particularly in terms of a clinical, rather than a laboratory or blood-banking focus, this required 'mapping the gap' in order to design a model that would be appropriate and complete in meeting the needs of all the role players. This required establishing and documenting the perspectives, needs and requirements of role players, while also evaluating both the current and potential future challenges of clinicians dealing with blood transfusions. This provided a platform from which one could start planning.

It was also simultaneously necessary to study and reflect on the ideal profile of the final *product*, with the term *product* here referring to the clinician who has graduated from a Postgraduate Diploma in Transfusion Medicine. This entailed considering the roles, functions, tasks, skills, attitudes, competences and areas of knowledge that would be considered appropriate and relevant to the graduate's scope of practice. This was done by making use of the OBE principle of 'designing backwards' and first determining what the outcomes should be and then designing curriculum and content (cf. 3.3.7 for a more comprehensive discussion on OBE).

As doctors could potentially enter such a programme from a variety of settings, sometimes as far removed from one another as a general practitioner in a rural setting to a paediatric cardiothoracic surgeon, specialising in congenital cardiac abnormalities, it became clear that the eventual scope of practice would decidedly not be uniform. This variability can never be fully accounted for in a training programme limited by the constraints of time and human resources. Therefore, it is considered more realistic to provide a set of outcomes that would be useful in most scenarios, while equipping students, as adult learners, with the tools for advancing their learning and professional development in their own time.

Furthermore, the researcher had to consider what the relevant academic and educational factors were that would be required effectively to implement the process of 'building the bridge' (i.e. develop the model) in order to achieve the envisaged goals. Also, factors that would ensure the sustainability of such a programme in the longer term had to be included.

Beyond the issues mentioned, the researcher had to take into account the contextual differences that would impact on programme development. These include differences in policies, procedures, requirements, standards, resources and expectations that may vary widely between institutions or from one country to another. Despite this, the modular aspects of the model should allow course developers in other institutions or countries to take the information provided in this study and apply it – with modification – to their own, unique circumstances.

The overall goal of this study was to develop a model for the academic development and implementation of a sustainable Postgraduate Diploma in Transfusion Medicine, specific to the South African context with a view to contributing to safer and more cost-effective transfusion practice by clinicians.

This section provides a summary of factors foundational to the model (the premises), the prerequisites and assumptions for implementation (or points of departure) and the role players that need to be taken into account when implementing the model. I next turn to a discussion of the key aspects of the model while also providing a perspective on the implementation of the model.

7.6.1 Factors foundational to the model

A working, implementable model requires a solid foundation underpinned by the factors or premises previously mentioned and discussed (section 7.2). Contextual relevance, a scientifically sound basis with conclusions drawn from valid and trustworthy research results, flexibility and transportability are compulsory elements that will make the model useful in a variety of settings.

7.6.2 The prerequisites and assumptions for the implementation of the model

The prerequisites and assumptions (or points of departure) for the development and implementation of the model include taking into account the legal and policy framework of the country in which it is used, as well as the vision, mission, policies, guidelines and needs of the institution at which it will be implemented. Providing a theoretical and philosophical basis for the development of the said model will assist in affirming the necessity and relevance for its implementation. Recommendations for quality, outcomes-based education on an equitable basis, while taking into account the principles of adult learning, should be included. Respect for the principle of equal opportunity and equitable access and taking into account the levels at which transfusion medicine is practised should be included. Cognisance should also be taken of the ethical issues and challenges, the role players to be considered and the academic and educational factors to be taken into

account during implementation. Although the model should be easy enough to understand – which will obviously increase its transferability – one should not lose sight of factors that could compromise its sustainability.

7.6.3 The role players that influence the development and implementation of the model

The internal and external role players that should be involved and taken into account during the development and implementation phases include the University of the Free State, the Faculty of Health Sciences, School of Medicine (including its departments and divisions), support services, students, government agencies (e.g. the DoE, DoH), blood transfusion services, the Professional Board and professional associations and societies. Wherever possible, one should obtain the input and participation of these role players, take note of their needs and provide feedback in order to ensure sustainable collaborative networks.

7.6.4 The different aspects addressed in the model

The model further comprises a number of key aspects that were addressed, namely:

7.6.4.1 *The roles, tasks and functions of a clinician dealing with transfusion in the clinical setting*

Transfusion medicine practice is, to some extent, directly or indirectly part and parcel of the daily practice of medicine of most clinicians. In some cases, clinicians may only be indirectly involved in that they refer a patient for transfusion to another doctor or institution, after which they themselves may look after the patient post-transfusion during the follow-up phase. In many other instances, clinicians play a more active role in assessing the patient regarding the need for transfusion, choosing an appropriate product, obtaining informed consent, taking responsibility for the ordering and

handling of the product before administering (or supervising) the transfusion, while also monitoring the patient peri- and post-transfusion for the development of an adverse event. In the case of an adverse event, the clinician may be required to report on the adverse event, do further testing for diagnostic, prognostic and therapeutic purposes and manage the patient appropriately.

In some instances, depending on the scope of practice, experience and setting in which the said clinicians function, they may be required to have an even broader spectrum of responsibilities, each of which would require a different set of skills and competences and also different levels of knowledge. All of these facts need to be considered when one thinks both about the development of a Postgraduate Diploma in Transfusion Medicine and its implementation.

A description of the main roles, tasks and functions of a transfusion medicine clinician can be found in Appendix F (cf. R1.1–R1.2). A supervisory function and roles in governance, training, scarce-resource management, patient management and research are included.

Identifying the main roles, tasks and functions of a clinician involved in transfusion medicine in the clinical rather than the laboratory setting is key to planning a Postgraduate Diploma in Transfusion Medicine. Knowing what these roles, tasks and functions are to be, provides guidance to the team planning the programme in terms of structure, alignment with content, curriculum development, assessment, expertise required from teaching staff, and also outcomes.

Some of these roles, tasks and functions require knowledge, skills and competences – to be discussed in the next sections – that are not necessarily

generic or part of the scope of practice of every doctor. It is therefore critical that these should be aligned and included in the programme.

Considering the aforementioned roles, tasks and functions, there should be means to impart and assess these exit-level outcomes:

- Clinicians should have supervisory competence. This includes the ability to create and enforce procedures that minimise the frequency and seriousness of human errors, whether clerical or judgmental.
- Transfusion clinicians should be able to demonstrate that they are able to play their defined roles in scarce-resource management, patient management and care, governance, training, and research. According to the responses in the semi-structured interviews (Chapter 4) and the Delphi survey (Chapter 6), the transfusion clinician's roles in scarce-resource management, governance and patient management were very important, while the other roles, though also important, were less emphasised.
- Transfusion clinicians should be able to demonstrate that they are able to fulfil a complex combination of roles.
- Transfusion clinicians should be able to demonstrate that they are able to execute tasks and functions in the fields of management, teaching and training, direct patient care and in research environments.
- Transfusion clinicians should be able to demonstrate that they are able to communicate effectively with role players in the different fields mentioned above.
- Transfusion clinicians should be able to demonstrate that they have the required competencies and skills to fulfil the different roles, tasks and functions described. These will be discussed further in Section 7.6.4.2, which deals with skills and competencies, and in Section 7.6.4.7, which deals with the major outcomes for a clinician completing a postgraduate diploma in transfusion medicine.

7.6.4.2 *The main skills and competencies of a clinician dealing with transfusion in the clinical setting*

Six different categories of skill and competency that a transfusion clinician should possess have been identified. These pertain to clinical, technical, administrative, integrative, social and research skills and competencies, which were considered essential by the Delphi panel. In some instances however, such as skills and competencies in respect of integration and research, some elements were considered very important, while others were considered to be useful rather than essential.

The transfusion clinician should be able to demonstrate that the above-mentioned skills and competencies have been adequately mastered.

In terms of clinical skills, these comprise clinical examination skills, skills in judging the need for a transfusion, competency in the management and follow-up of transfusion complications, and resuscitation skills. Technical skills and competencies regarding administering blood products, the skills needed to use the different blood products, achieving venous access – including placement of central lines – should be acquired. Furthermore, administrative skills, such as that of note keeping and social skills, such as communication and interpersonal skills are required. The students should have the skills and competencies required for the integration of complex tasks and functions, such as competency in appropriate blood transfusion, problem-solving, interpreting blood bank activities or being able to practise transfusion medicine in a resource-limited setting, for example in rural areas. Finally, research skills are deemed necessary skills and include being able to interpret the blood transfusion literature and auditing skills.

From the above it should be clear that both 'soft skills' (for example social skills) and 'harder skills' (for example technical and clinical) are required in

the extremely varied settings in which transfusion medicine is practised. Learning and practising the above skills will contribute to the adequate preparation of transfusion clinicians for a variety of contexts within which they may be required to practise.

7.6.4.3 *The main areas of clinical knowledge required by a transfusion clinician*

Describing the extent of knowledge required by a clinician in transfusion medicine is more complex than may be immediately apgi. Because of the varied backgrounds of the participants in both the semi-structured interviews and the Delphi survey, and also the distinctly different contexts within which transfusion medicine is practised, ideas on what is and what is not essential in terms of knowledge are often conflicting. Nevertheless, a number of main areas were identified regarding which the participants were found to have reached consensus (cf. Appendix F, K1.1).

These included areas of knowledge related to physiology, pathophysiology, blood banking, haematology, clinical medicine, emergency medicine, EBM, blood administration, blood conservation and blood safety. The specific elements related to each are listed in Appendix F (cf. K1.1). These should not only inform the curriculum development process, but should also be translated into assessable outcomes. Together with the outcomes related to the skills, roles, tasks, functions and competencies described before (cf. 7.6.4.1 and 7.6.4.2), the exit-level outcomes should be aligned with eventual assessment. A solid knowledge base would be foundational to acquiring the more practical skills and competencies.

7.6.4.4 *The scope of practice of a clinician involved in the practice of transfusion medicine*

From the introductory remarks in Section 7.6.4.1 regarding the variable degrees to which a clinician may be involved in the practice of transfusion medicine, it should be clear that the exact scope of practice could not be delineated with any precision. Depending on the contexts of individual learners, their experience, knowledge and needs, one may have to be flexible in terms of ensuring that the course content is aligned with these. Nevertheless, a number of elements have been identified covering the spectrum from the clinician doing transfusion medicine on an *ad hoc* basis to the transfusion specialist.

As it is not the aim of a Postgraduate Diploma in Transfusion Medicine to make transfusion medicine specialists out of clinicians, the true scope of practice of the clinician completing a Postgraduate Diploma in Transfusion Medicine will be found somewhere between the two. This part of the research (cf. Appendix F, P1.1 and P1.2) provides some guidance regarding the minimum and maximum boundaries of scope of practice and should serve to inform course organisers and presenters in terms of ensuring that course content is both relevant and appropriate for the target audience.

The focus here is on clinical knowledge, blood banking, teaching and training, leadership and consultative roles. It is clear from the research that adequate clinical knowledge is key both to the clinician who practices transfusion medicine on an *ad hoc* basis and also the transfusion medicine specialist; blood banking, teaching and training, leadership and consultation, however, are areas that apply more to the specialist. Still, elements from all these areas may be applicable to both.

7.6.4.5 *The challenges faced by a clinician involved in the practice of transfusion medicine*

Planning a Postgraduate Diploma in Transfusion Medicine requires a solid understanding of the challenges with which clinicians are faced in the practice of transfusion medicine. Here one should not only consider the current challenges, but also the anticipated future challenges. This will allow for appropriate planning of the course content, curriculum development, outcomes, course structure and of the teaching expertise required. Taking cognisance of anticipated challenges and providing for these in the course planning should ensure that students are equipped to deal with such challenges far beyond the actual period of training.

This should ensure that their training remains relevant while also enhancing the sustainability of the course. It should be recognised though that this is an area of continuous change, as the challenges will not remain static and thus provision should be made for appropriate adaptation of the course to the needs of role players and society. This is one of the reasons why the course should foremost be premised on flexibility. A static model will simply not be sustainable.

The major challenges identified as current include those related to quality and safety, lack of knowledge and training, access and availability of blood and blood products, ethical and medico-legal issues, cultural perceptions and understanding, and cost-effectiveness. Anticipated future challenges at this stage include those related to quality and safety, lack of knowledge and training, access and availability of blood and blood products, ethical and medico-legal issues, cost-effectiveness and those related to change management. Details of the elements contained in each of these areas can be found in Appendix F (cf. C1.1 and C1.2).

7.6.4.6 *The deficiencies that need to be addressed in clinicians dealing with the transfusion of blood and blood products*

In order to ensure that a more complete picture of the required skills, competencies, knowledge, roles, tasks, functions and challenges would be elicited from participants in both the semi-structured interviews and the Delphi survey, a question relating to the above was posed from a different or opposing angle in the semi-structured interviews. Identifying deficiencies implies that these should be rectified and the responses to this particular question provided some new insights into what would be required of a transfusion clinician. A further advantage was that some of the elements identified in the other questions were confirmed, which in turn enhanced the trustworthiness and validity of the acquired data.

Current deficiencies that need to be addressed in a training programme include those in respect of knowledge, skills, evidence-based medicine, human resources, scarce-resource management and attitude. Deficiencies considered to be most important related to clinical knowledge, skills and to evidence-based practice of medicine. The specific deficiencies identified in each of these areas are detailed in Appendix F (cf. D1.1).

In terms of outcomes, clinicians completing the Postgraduate Diploma in Transfusion Medicine should be able to demonstrate that these deficiencies have been overcome and that they are confident in dealing with them. Overcoming these deficiencies should remove their limiting effect on clinicians and enhance clinicians' scope of practice.

7.6.4.7 *The major outcomes of a Postgraduate Diploma in Transfusion Medicine*

As mentioned before, developing outcomes for a Postgraduate Diploma in Transfusion Medicine can be likened to reverse-engineering the future. A specified outcome should be determined, based on an in-depth study of the needs, challenges (current and anticipated), roles, skills, competencies, deficiencies, attitudes, tasks and functions required of clinicians practising transfusion medicine, while at the same time taking into account the varying realities and environments within which different clinicians practise.

Starting with this predetermined end in mind, the developers of a Postgraduate Diploma in Transfusion Medicine can carefully plan the curriculum, programme content, the practical implementation thereof and the management of such a course, with a clear focus on the final goal that needs to be achieved. Similarly, students participating in such a programme will know what the intended outcome result is, for example what knowledge, skills and attitudes would be required of them. This should enable them to focus their studies and allow them systematically to plan how they will bridge the gap between their initial knowledge, skills and attitudes and that which will be required at the end.

The major outcomes identified were categorised as outcomes in basic sciences, blood banking, haematology, clinical medicine, blood conservation, blood safety, social skills and research. Of these, the blood banking and research fields were considered less important by the Delphi participants, while all the others were considered very important. One needs to recognise that the elements listed within these categories (cf. Appendix F, O1.1), do not form a complete list, and will have to be systematically combined with non-overlapping elements discussed in sections 7.6.4.1–7.6.4.6 related to roles, tasks, functions, skills, competences, knowledge, scope of practice,

challenges and deficiencies. Putting all these together will allow for the development of a comprehensive set of outcomes, one that encompasses all the necessary elements. Having such a set of outcomes will form a key component of the documents to be submitted not only to the university and the faculty bodies that deal with programme development, but also to those required by the regulatory authorities, such as SAQA, the HEQC and the DoE.

Finally, clear outcomes will form the basis of assessment planning, which needs to be aligned as closely as possible with the outcomes that were set.

7.6.4.8 *Sustainability of a Postgraduate Diploma in Transfusion Medicine*

Ten major categories have been identified (cf. Appendix F, F1.1) that directly relate to programme sustainability, namely those related to academic staff, value creation, networking, financial viability, structure and organisation, programme content and outcomes, assessment, career-path creation, programme recognition and continuous improvement.

Sustainability is one of the central aspects considered to be key to the success of a Postgraduate Diploma in Transfusion Medicine. Having a properly qualified, highly motivated team who drives and manages all the processes – from development to implementation – is the starting point. Combining this with a well-structured programme in an institution possessing not only the required infrastructure but also efficient management will greatly increase the odds that the programme will have a long shelf life. Participants in the Delphi survey also emphasised the importance of a number of factors related to programme content and outcomes, such as relevance, applicability to clinical practice, defined outcomes, among many others. Recognition of the programme and the qualification by the relevant authorities, combined with the creation of a currently non-existing career-path in the field, will greatly add to this.

Finally, identifying factors that make a programme sustainable, is not a once-off exercise, but should form part of the programme's processes of continuous improvement. Feedback from students and role players should be fed back into the programme so that the necessary adjustments can be made to ensure not only that the programme remains sustainable, but also that the premises of relevance and flexibility remain uncompromised.

7.6.4.9 *The major academic factors that need to be taken into consideration with regard to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine*

Academic factors considered important in developing a Postgraduate Diploma in Transfusion Medicine include those related to the programme-development process, programme structure, quality assurance, admission criteria and recognition of prior learning, academic culture, research and continuous improvement. It is interesting to note the degree of overlap between factors found here and those discussed in the section on sustainability (cf. 7.6.4.7). Clearly these are closely related and part of an integrated, logical whole with the one not reasonably being able to exist without the other.

Participants considered most of the above factors to be very important, except, that is, for research, which was not deemed very important at the level of a Postgraduate Diploma in Transfusion Medicine. Also, recognition of prior learning and strict admission criteria, though not essential, were considered to be useful.

During the planning and implementation phases of the programme, cognisance should be taken of the details within the categories (cf. Appendix F, A1.1).

7.6.4.10 *The major educational factors that need to be taken into consideration with regard to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine*

Many overlapping features also exist between educational and academic factors and thus, to some extent, the distinction could be regarded to be artificial in that these two areas are so integrally related. Nevertheless, a number of factors were identified that relate less to institutional issues – such as infrastructure and administration – and more to the actual programme and its content.

In this regard, a large number of elements were identified in the semi-structured interviews, virtually all of them having been considered useful, and many even as essential (cf. Appendix F, E1.1). These could be categorised in ten larger categories, including those related to the programme curriculum, educational material and resources, learning as an experience, assessment, outcomes, contact time, forms of learning, teacher-related factors, the student as an adult learner, and alignment.

Many of these factors are directly related to the sustainability, relevance and flexibility of the programme and will be foundational to its implementation. Programme organisers and academic staff should be aware of changes and advances in educational approaches and methods and then adapt their practices accordingly when appropriate.

7.6.5 Procedural considerations and implementation of the model

Implementing the model requires a stepwise approach that is dynamic in nature and may require adaptation and change depending on the role

players involved and the context within which it is implemented. The process relevant to a programme being developed at the UFS within the South African context is summarised in Figure 7.5.

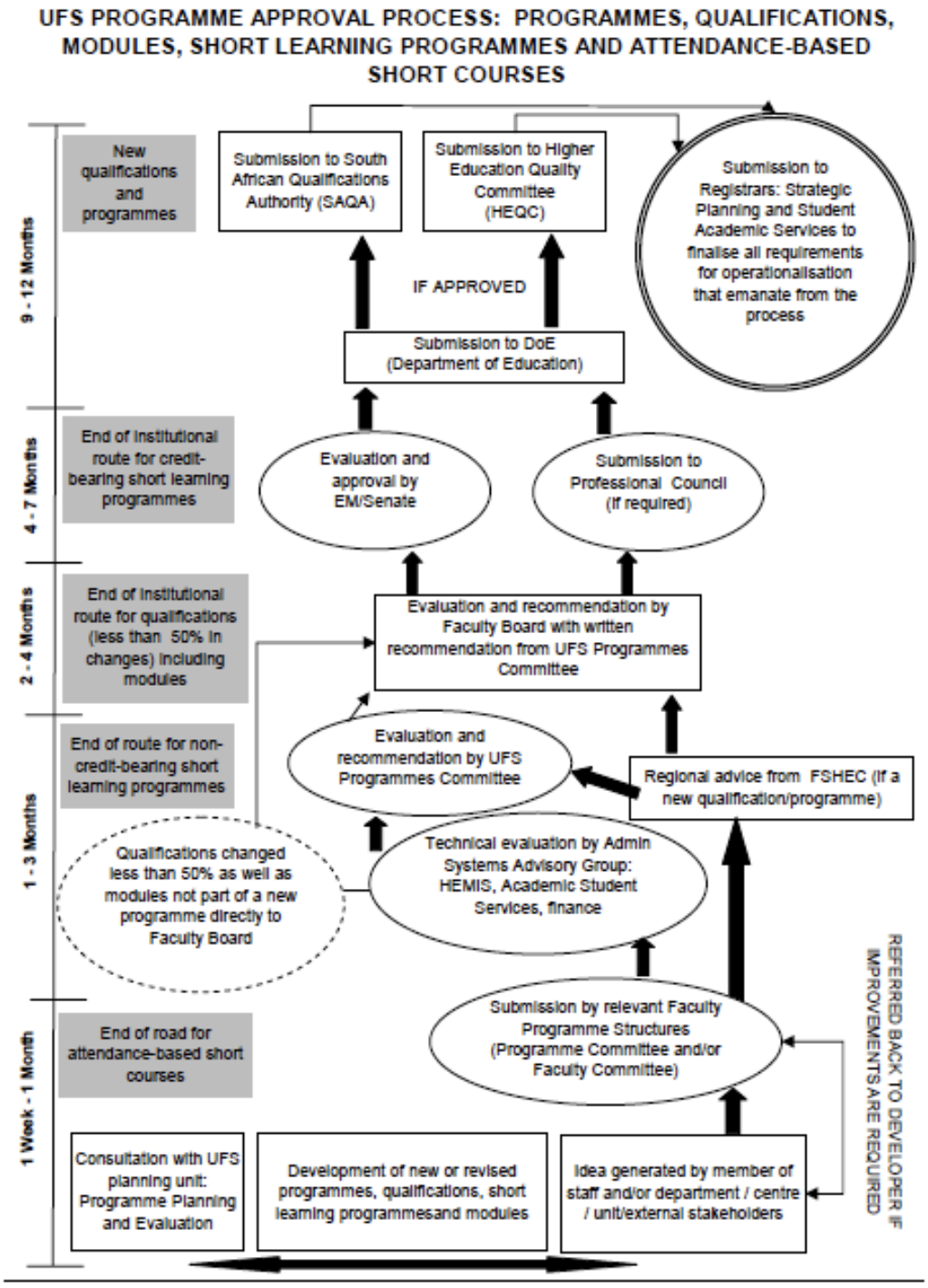

FIGURE 7.5: UFS Programme approval process
(University of the Free State 2006:9)

Before anything else, a situational analysis should be carried out, which comprises identifying the needs, deficiencies and challenges related to transfusion medicine practice and education. Doing this would allow the team involved to set priorities and provide a focus for the programme. This can only be done through the engagement of all the relevant role players and after researching scientifically what would be required of such a programme. Role players may have particular interests and needs that should be taken into account. Involving role players from the start will ensure that they take co-ownership of the programme and enhance its relevance and sustainability.

The next step would entail having a detailed understanding of the educational and academic factors relevant to programme development. This may require the input and involvement of experts in the field of medical education and programme planning and involving the institutional planning unit from an early stage to ensure that the correct procedures are followed within the required timelines. Here, the processes to be followed are usually very rigid and sufficient time should be set aside to meet the needs in terms of content development and documentation requirements. Having a motivated and qualified team who maintains momentum through this preparatory phase is very important.

Concurrently with the procedural process, the programme team can start working on resource development, establishing administrative support systems and developing the processes for managing the programme. Each member of the team should be assigned well-defined complementary roles ideally aligned to their individual strengths, weaknesses and areas of expertise. In terms of resource development, all the available resources should be considered and evaluated in order to ensure that they are used most effectively. Using all of the available resources as responsibly as

possible, always bearing the end in mind so as to ensure that they are used appropriately, will guarantee that wastage is limited and sustainability assured.

Programme management and a management plan can be divided into a number of areas, including the management of human resources, tasks, finances and risk. Management of human resources includes considering issues such as the size of the personnel complement required (full-time or part-time, paid or volunteering). Having a larger group would require considerable leadership and management abilities, but may, on the other hand, also result in a greater impact and better workload sharing.

Task management encompasses the processes involved in executing everything that is planned. This may include, for example, administrative tasks, meetings, proposal development, adhering to deadlines, managing logistics, interacting with students, developing assignments, assessment, feedback, and educational activities.

Financial management is vital, both in terms of making adequate provision for the requirements of the programme and in terms of accountability, following institutional procedures and guidelines, feedback to funders by means of regular reports, and having both a budget and a business plan that are strictly adhered to.

Managing risk is also important, not only in terms of ensuring the sustainability of a programme by taking note of competing programmes, changing needs and other factors as discussed before (cf. 7.6.4.8), but also in terms of providing safe environments for students and staff, for example when so-called wet practicals are performed in which students are required to do laboratory tests with human blood. The need for insurance for

volunteers and students should be considered within the framework and context within which the programme is implemented.

Once the programme content, structure, time frame, target audience and funding streams have been identified and the appropriate approvals for the programme obtained, the programme should be marketed. Marketing is a means of creating awareness of the programme, its scope and the organisation that will be providing it. Making use of the role players for internal marketing, while large doctors' associations do mass-marketing will ensure that the maximum number of potential candidates for the course are reached. Cooperation and networking with all role players through continuous dialogue will allow for the linkage of resources and lay the foundation for long-term collaborative relationships. This can be done on a number of levels that may differ from one role player to another and may vary from very informal and flexible associations to formal collaborations and partnerships through mutually prepared memoranda of understanding or contracts.

Finally, continuous feedback from role players, including students is required to determine whether goals have been achieved, and, if not, to use this as the basis for continuous improvement.

7.7 CONCLUSION

In this chapter the model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine was expounded as were the premises, the points of departure and the role players involved. Recommendations regarding the more detailed aspects were made, while endeavouring to show how the different components fit together and influence one another. Finally, an implementation plan was provided. In the following chapter, final conclusions will be drawn, which will include a discussion of the limitations of the study and final recommendations.

CHAPTER 8

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS OF THE STUDY

8.1 INTRODUCTION

In this chapter the main findings are revisited and challenges highlighted, the limitations of the study are discussed and final conclusions are drawn. The chapter ends with recommendations for implementation and further research.

8.2 AN OVERVIEW OF AIMS AND OBJECTIVES ACHIEVED

Bearing in mind the detailed discussions of findings in previous chapters, a number of issues regarding the study are worth accentuating:

- It is the opinion of the researcher that the overall goals, aims and objectives of the study were achieved. The methods used during the research process are considered to have been appropriate for their intended purpose and to have provided useful data.
- The problem statement (cf. 1.2) made mention of the absence of a model for the academic development and implementation of a postgraduate diploma in transfusion medicine. This model has now been developed and is presented here.
- The final product of the research, which was also the overall goal of the study (cf.1.3), namely the development of a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine could thus be compiled by making use of scientific methods based on sound principles.

- The aim of the study (cf. 1.4), namely that of developing a model for the academic development and implementation of a sustainable Postgraduate Diploma in Transfusion Medicine specifically in the School of Medicine at the University of the Free State, was achieved.
- Each of the objectives of the study as set out in Chapter 1 (cf.1.5) was achieved. These included:
    - Gaining a deeper insight into the current status of transfusion medicine education with an in-depth discussion of the relevant issues, questions, challenges, constraints and needs that affect it with reference to the changing arena of transfusion medicine. Reasons were provided for the further education of clinicians in transfusion medicine and provided the necessary context to the study.
    - Providing a perspective from the literature on some of the major issues that are relevant in the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.
    - Determining the envisaged role and competences of the clinician in transfusion medicine relevant to the changing arena of transfusion medicine.
    - Identifying a set of criteria required for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine and determining their relevance, importance and practical application.
    - Developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine with an emphasis on the alignment with learner assessment and outcomes of the described roles and competences.
- The researcher neither intended nor attempted to report on all the available literature on the broader fields of programme development, on the one hand, or transfusion medicine on the other. Rather, the focus in

selecting appropriate literature fell on publications encompassing both fields and then using supportive literature from either field on its own where this was deemed appropriate.

- Although findings were reported in detail and in-depth recommendations were provided, these are not to be viewed as prescriptive, but rather as being relevant in a particular context. In the case of this study, the context is that of the University of the Free State within the larger framework of South African policies and procedures. This does not, however, imply that the model is relevant to the above-mentioned environment only; it is hoped that many aspects of the model would be useful in other situations and educational institutions – after the appropriate adaptations have been made.
- The recommendations are aligned with the current policies and procedures of the University of the Free State, the DoE, the DoH and the HPCSA. Recommendations have further been made after consideration of the relevant role players and how they interact with the programme.
- One of the main emphases of the study was the fact that a Postgraduate Diploma in Transfusion Medicine for the clinician should not have blood banking and transfusion laboratory medicine as their primary foci. Rather, the interaction between patient and doctor and between clinician and colleagues, as this relates to transfusion medicine, should be of prime concern.
- Transfusion medicine practice encompasses more than simply theoretical knowledge of the subject. Provision is made for this in the model in that emphasis is placed on the many and varied skills, roles, tasks, functions, attitudes and competences that were derived from the research findings.
- Scope of practice was another key issue that was found to be important in informing the scope of the curriculum. Clinicians active in transfusion medicine practise in a variety of spheres in which they have various levels of responsibility. Considering this is key to ensuring that each learner derives maximum benefit from the programme.

- The use of participants from many different countries and continents for the semi-structured interviews provided a considerable reservoir of statements from which criteria could be derived for the Delphi survey. The fact that the Delphi participants added very little new information that had not already been mentioned by the participants in the interviews makes it likely that most of the important elements were eventually included in the model.
- A 100% response rate from the Delphi survey for each of the three rounds was deemed highly satisfactory and can be considered to have contributed to the reliability and validity of the results.
- This study makes a unique contribution to transfusion medicine education by providing the first formal, research-based model for a Postgraduate Diploma in Transfusion Medicine aimed at clinical transfusion medicine rather than at blood banking.

8.3 LIMITATIONS OF THE STUDY

- Despite the clear demarcation of the study, one of the difficulties encountered was the impact of the varied background of the participants in the Delphi survey, which led to less consensus than one would have expected if a more uniform group had been used. Despite this, it was considered more authentic to look at clinical transfusion medicine from the perspectives of doctors working in the varied circumstances of real-life practice. Transfusion medicine encompasses a wide variety of medical fields. Obtaining inputs from as many of these fields as possible, certainly provided a more balanced outcome. Also, despite a lower than anticipated degree of consensus, most of the criteria in the Delphi survey were considered to be at least useful by most respondents.
- Finally, the amount of data generated limited the researcher's ability to discuss all aspects in full. Specific elements that may have been briefly discussed here can be expanded upon and considered in detail in publications following from this research.

8.4 FINAL RECOMMENDATIONS

In order to convert the theoretical foundation provided by the study into a practical reality, the researcher recommends the following:

- That the findings of the study be submitted to the Executive Management of the researcher's School of Medicine for consideration and implementation.
- That the programme be developed in full and implemented and managed according to the principles and recommendations provided.
- That the model be used in other institutions and in other countries, taking into account local needs and requirements, either as a basis for the development of novel educational programmes in transfusion medicine or to inform and improve existing programmes.
- That the research results be presented at local, national and international congresses and that articles on the research results be published in respected peer-reviewed journals.
- That the researcher uses the research to introduce the model to other interested institutions in the form of workshops or in a consultative capacity.
- That further research be done on the impact of the model's implementation on clinical practice.
- That the implementation of such a model be used as a starting point for an educational and career path in clinical transfusion medicine by, for example, developing Master's and Doctoral programmes in transfusion medicine for students who have completed a postgraduate diploma.

8.5 CONCLUSION

Oliver Wendell Holmes made a profound statement that finds its application both in the research performed and in the implementation of the model when he said the following: "I wouldn't give a fig for the simplicity on this side of complexity, but I would give my life for the simplicity on the other side of complexity" (Allen, D 2007:141).

This study originated from the recognition and acknowledgment that a gap exists in the education of medical doctors with regards to transfusion medicine. The effects thereof have widespread implications, not only for patient care and safety directly, but also for policy making, health economics and medical professionals' career path development. In an attempt to find a way to adequately bridge this gap, this research looked at a specific programme within a particular context, namely a postgraduate diploma in transfusion medicine at the School of Medicine at the University of the Free State as a means to address the challenges faced by medical doctors in the area of transfusion medicine practise and to better delineate what should be expected from clinicians.

In order to achieve these aims, a combination of qualitative and semi-quantitative methods in the form of a literature review, semi-structured interviews and a Delphi survey, were chosen as the tools to describe this gap. These methods proved to be useful and adequate, not only to answer the research questions as set out initially, but also generated sufficient data to analyse and interpret these to the point of forming a coherent whole. Furthermore, the extensive amount of data allowed detailed description of the factual aspects that informs the final model.

On a broader, conceptual level, it became evident that the curricular aspects of such a training programme would not be sufficient to constitute such an initiative, but that other critical areas should be taken into account, thus the emphasis on academic and educational aspects included in the final model. It was further realised that programme context has certain specific procedural implications for programme implementation and that due consideration should be given to these areas. Finally it was noted that the best intentions and hard work of a motivated team is needed, but not sufficient to sustain such a programme and that careful attention to the detail of factors that may enhance sustainability may ensure that a postgraduate diploma in transfusion medicine makes a lasting contribution to safe and adequate health care practise and education.

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APPENDIX A1

Letter of request for the semi-structured interview

APPENDIX A1

Dear Participant,

Request to participate in a PhD study titled: A model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State (ETOVS number: 156/07).

I am currently occupying the position of Head: Division Clinical Haematology in the Department of Internal Medicine in the School of Medicine in the Faculty of Health Sciences at the University of the Free State. I am mainly responsible for under- and postgraduate teaching, clinical care, administration, research and management within the Clinical Haematology Division.

I am in the process of writing a thesis to obtain the Ph.D. degree in Health Professions Education in the Faculty of Health Sciences at the University of the Free State (Student number: 2005175779). The title of my research is: ***A model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State.***

My promoters are:

Prof. M.M. Nel
Head: Health Professions Education
Faculty of Health Sciences
University of the Free State
Bloemfontein, South Africa

Co-promoterr:

Prof. J. Hay
Head: Programme planning and review
Planning Unit
Office of the Registrar: Strategic Planning
University of the Free State
Bloemfontein, South Africa

As indicated by the title, it is the **purpose** of my study to establish a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State. The choice of subject was a natural outflow from the fact that we are in the process of developing a Postgraduate Diploma in Transfusion Medicine at this University.

The word **model** needs some explanation as it can be defined in many different ways and is used in a large number of contexts, be they science, molecular biology, business or engineering. At the most basic level, a model can be defined as a simplified representation used to explain the workings of a real world system or event (Wiktionary 2007). A model can also be seen as a pattern, plan, representation, or description designed to show the structure or workings of an object, system, or concept (Wikipedia 2007). A definition taken from the world of enterprise is worth noting as it may have some components of use in the context of this diploma. In enterprise architecture, a model has been defined as "a representation of a set of components of a process, system, or subject area, generally developed for understanding, analysis, improvement, and/or replacement of the process or a representation of information, activities, relationships, and constraints (Treasury Enterprise Architecture Framework 2000).

Academic programme development usually encompasses a series of processes which include development, review, approval and accreditation. It also relates to changes to existing programmes, as well as changes to policies and procedures affecting graduate programmes. This includes a number of established administrative processes with set guidelines. These guidelines can be seen as a framework or guide that serves as a useful point of departure in academic programme development. Nevertheless, this needs to be transformed into a fully working model, applicable and properly interfaced with current trends in education and advances in transfusion medicine, community and customer (student) needs, good management principles as well as continuous process improvement systems, in order to create a model that is as complete as possible, sustainable and transferable between similar institutions and settings.

The **problem** that will be addressed is the absence of a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Currently, as far as could be ascertained, no such model exists in the world. Furthermore, the South African context with the unique challenges of a resource-limited environment, together with a shortened medical curriculum with severe constraints on the time available for teaching and training in transfusion medicine, emphasises the

need for just such a programme at a time when the transfusion arena in general is undergoing great change.

The overall **goal** of the study is to develop a model for the academic development and implementation of a sustainable Postgraduate Diploma in Transfusion Medicine, specific to the South African context, with the view to contribute to the provision of a safer and more cost-effective transfusion service to the community.

The **aim** of the study is to establish and develop a model for the academic development and implementation of a sustainable Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State.

To achieve this aim, the following **objectives** will be pursued:

i) To gain a deeper insight into the current status of transfusion medicine education with an in-depth discussion of the relevant issues, questions, challenges, constraints and needs that affect it with reference to the changing arena of transfusion medicine. It will be endeavoured in this objective to give reasons for the further education of clinicians in transfusion medicine. This will provide the necessary context to the study and will be done through a literature review.

ii) To provide a factual description of the processes involved in the approval, accreditation, registration, recording and termination of a medical postgraduate diploma as well as the higher educational requirements at the University of the Free State and nationally in South Africa and show how each of these aspects practically apply to a Postgraduate Diploma in Transfusion Medicine. This will also be done through a literature review.

iii) To determine the role and competences of the clinician in transfusion medicine relevant to the changing arena of transfusion medicine as discussed in (i) for a clinician doing a Postgraduate Diploma in Transfusion Medicine and to determine the outcomes for a clinician completing a Postgraduate Diploma in Transfusion Medicine that will enable them to practice transfusion medicine as part of their day-to-day practice in both a resource-limited as well as a resource-rich setting. This will be achieved through semi-structured interviews based on an in-depth literature survey.

iv) To establish a draft set of criteria needed for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State and determine their relevance, importance and practical application. These will be tested through a Delphi

survey that will be developed from the findings of the semi-structured interviews and literature surveys.

v) Using the results from (i) to (iv), provide a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine with an emphasis on the alignment of the described roles and competences with learner assessment and outcomes. Although it is not the objective of this study to provide a management model, the academic model will form the basis from where a management framework for a Postgraduate Diploma in Transfusion Medicine can be developed.

The methods that will be utilised in this study include, in the first place, a comprehensive literature survey that will address many of the issues mentioned before. Secondly, interviews with role players in the field, based on the literature findings, will follow in order to design a draft set of criteria. These criteria will be used to compile a questionnaire that will be pre-tested in a pilot study, before being presented to the members of the Delphi panel.

The semi-structured interview can be defined as a data-collection instrument which is used to collect data, either by telephone or face-to-face. The researcher asks the same questions of numerous individuals in a precise manner, offering each individual the same set of possible responses. In an unstructured interview, there are many open-ended questions that are asked, but not in a precise, structured way.

The **value** of this research will be that it will lay the foundation for the implementation of a specific Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State, that will take into account the important influencing factors and policies unique to the University and South African context. On a larger scale, it may be used as a model for the development of similar programmes in other institutions in Africa and the rest of the world.

You have been selected, according to predetermined criteria, as having expert knowledge and experience in the fields of transfusion medicine and higher education. I would, therefore, respectfully request your expert cooperation in completing this project. I will try to take as little of your time as possible. Completion of the interview will take approximately 45 minutes.

Should you have any specific questions, my contact details are as follows:

Telephone number:	051-4053043
Cellular phone:	072 7689 024
Email address:	louwvj.md@ufs.ac.za
Postal address:	PO Box 339(G2)
	Dept. Haematology and Cell Biology
	Faculty of Health Sciences
	University of the Free State
	Bloemfontein 9300
	South Africa

The interviews are scheduled to take place during the period between 20 November 2007 and 15 January 2008. Should you be willing to participate, please fill in the accompanying consent form and return it to me by fax or email as soon as possible.

Thank you for taking the time to read this communication and I sincerely hope that you will be willing to contribute to this project.

Sincerely yours,

Prof. Vernon J Louw

Faculty of Health Sciences

University of the Free State

Bloemfontein

APPENDIX A2

CONSENT FORM SEMI-STRUCTURED INTERVIEW

APPENDIX A2

CONSENT FORM SEMI-STRUCTURED INTERVIEW

Title: A model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State (ETOVS number: 156/07).

Hereby I, the undersigned, consent to participate in the interview, which is scheduled to take place from 20 November 2007 to 15 January 2008. My full particulars are as follows:

Title:.....

Surname:.....

Full names:.....

Postal address:.....

.....

Email address:.....

Telephone number: .....

Cellular number:.....

Fax number:.....

....

Signature **Date**

Please return this form on or before 10 November 2007 by fax, email or post.

My full contact details are as follows:

Telephone number:	051-4053043
Cellular phone:	072 7689 024
Email address:	louwvj.md@ufs.ac.za
Postal address:	PO Box 339(G2) Dept. Haematology and Cell Biology Faculty of Health Sciences University of the Free State Bloemfontein, 9300 South Africa

I wish to assure you that the information will be treated in a highly confidential manner and that there will be no references to any names. Thank you in advance for your kind cooperation. Please take note that the results coming from this doctoral study will be published. Thank you for your kind cooperation.

Sincerely yours,

Prof. Vernon Louw

APPENDIX A3

Guide for semi-structured interviews

APPENDIX A3

Interview guide

A model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State.

Purpose of the interview:

The purpose of the research is to identify the key factors that need to be taken into account in establishing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State, particularly in the context of a continually changing arena of transfusion medicine and transfusion medicine education. In addition, the purpose is to gain insight into the roles, competencies and knowledge that a graduate from such a diploma would be expected to comply with.

Questions

1. **In your opinion, what are the greatest challenges faced by clinicians (e.g. paediatrician, physician or general practitioner) dealing with the transfusion of blood or blood products in the clinical setting currently, as well as over the next five years? Please motivate your answer.**

……
……
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2. **What, in your opinion, are the main roles, including tasks and functions of a clinician dealing with the transfusion of blood and blood products in the clinical setting? Please motivate your answer.**

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3. What, in your opinion, are the main <u>skills and competences</u> of a <u>clinician</u> dealing with the transfusion of blood and blood products in the clinical setting? Please motivate your answer.

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4. What, in your opinion, are the main areas of <u>clinical knowledge</u> that a clinician requires in dealing with the transfusion of blood and blood products as part of their day-to-day practice? Please motivate your answer.

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5. In your opinion, what are the greatest <u>deficiencies</u> in the abilities of clinicians (e.g. paediatrician, physician or general practitioner) dealing with the transfusion of blood or blood products in the clinical setting? Please motivate your answer.

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6. How, in your opinion, will the <u>scope of practice</u> of a full-time specialist in transfusion medicine differ from that of a clinician that deals with the transfusion of blood and blood products on *an ad* hoc basis? Please motivate your answer.

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7. What are the major <u>outcomes</u> that you would like to see included in the curriculum for a Postgraduate Diploma in Transfusion Medicine that is focused at clinicians that want to improve their knowledge, skills and competences in the transfusion of blood and blood products? Please motivate your answer.

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8. What are the three major factors that should be taken into account in making a Postgraduate Diploma in Transfusion Medicine a <u>sustainable</u> programme? Please motivate your answer.

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9. In your opinion, what are the most important <u>factors from an academic point of view</u> to take into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine? Please motivate your answer.

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10. In your opinion, what are the major <u>educational factors</u> that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine? Please motivate your answer.

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THANK YOU FOR YOUR PARTICIPATION!

APPENDIX A4

Tabulated results from semi-structured interviews

APPENDIX A4

Table 5.1: Challenges faced by clinicians dealing with blood transfusion in the clinical setting

Current challenges	Challenges anticipated in next 5 years
1. Quality and safety • Safety of blood products (S1, S3, F1, F2, F3, F4) • Limiting transfusion-transmitted infections (S1, S2, S3, F1) • Quality of blood products (S1) • Effects of HIV epidemic on transfusion medicine (S2) • Management of side-effects blood transfusion (S2) • Restrictions on donors and increasing donor deferral (F1) • West-Nile virus (F1) • Patients requiring repeated blood transfusion (F2) • Clerical errors (F3) • Sampling errors (F3) **2. Lack of knowledge and training** • Appropriate use of blood (S2, S3, F3, F4, F5) • Knowledge of indications for different blood products (S2, S3, F3, F4) • Lack of training in transfusion medicine on an undergraduate level (F3) • Clinician knowledge on coagulation and anticoagulants (F3) • Knowledge of the value of blood products (S2) • Knowledge of the pre-analytical and analytical phase of blood sample processing (F3) • Knowledge of the individual blood products, their methods of preparation, storage life and their contents (S3, F3) • Knowledge of practical issues relating to blood use, e.g. thawing, administration, irradiation (F3) • Knowledge of the management of transfusion-related complications (F3) • Knowledge of the pathophysiology of transfusion-related complications (F3)	**1. Quality and safety** • Safety of blood products (S1, F3) • Limiting transfusion-transmitted infections (S1, F3) • Effects of HIV epidemic on transfusion medicine (S1, S3) • Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, vCJD (F3, F4) • Quality of blood products (S1) • Increase in GVHD (F3) **2. Lack of knowledge and training** • Lack of academic input regarding use of blood in the private sector (S3) **3. Access and availability** • Supply of blood (S3, F1, F2, F4) • Increased demand for blood due to HIV epidemic (S3) • Shrinking donor pool due to HIV epidemic (S3) • Access to blood (S1) • Increasing disparity in terms of the availability of different products between state and private sector (S3) **4. Ethical and medico-legal** • Ethical issues pertaining to blood use (S1) • Informed consent issues (S1) • Increasing disparity in terms of the availability of different products between state and private sector (S3) **5. Cost-effective use** • Cost-effective use of blood (S1) **6. Managing change** • Keeping up with new developments (S3, F3) • Managing change in the field of blood transfusion (S3, F3) • Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, vCJD (F3, F4)

3. Access and availability • Adequate blood supply (S2, S3, F1, F2, F4) • Inappropriate use of blood (S2, S3, F3, F4, F5) • Decreasing donor pool (F1, F2) • Finding enough platelet donors (F2) • Access to blood (S1) • Effects of HIV epidemic on transfusion medicine (S2) • Restrictions on donors and increasing donor deferral (F1) • Lack of rare blood groups in the donor pool (F1) • Development of anti-platelet antibodies and subsequent platelet refractoriness (F2) • Immigration of peoples into areas with an inadequate supply of blood for their blood groups, e.g. immigration Africans to Europe (F1) • Increasing demand for blood in specialised medical care, e.g. leukaemia and cancer treatment (F2) • Increasing demand for blood due to novel medical techniques requiring blood, e.g. increasing need for exchange transfusion for patients with sickle cell anaemia immigrating to Europe (F1) • Patients requiring repeated blood transfusion (F2) **4. Ethical and medico-legal** • Ethical issues pertaining to blood transfusion (S1) • Informed consent issues (S1) • Physician responsibility for a product delivered to him/her by a third party (S2) • Refusal of blood products for religious reasons (S2) • Issues flowing from breach of anonymity between recipient and donor as donor's name is on blood product (S2) **5. Cultural perceptions and understanding** • Cultural perceptions of blood transfusion (S2, F2) • Public fear of the blood supply, e.g. risk of contracting HIV (F2) **6. Cost-effectiveness** • Cost-effective use of blood (S1, S2, S3, F4) • Appropriate use of blood (S2, S3, F3, F4, F5) • Limiting unnecessary transfusions (S3)	

Table 5.2: The main roles, including tasks and functions of the clinician dealing with blood transfusion in the clinical setting

Roles, tasks and functions
1. Supervisory function • Should ensure that correct procedures are followed (S1, S2, S3, F1, F2, F3) • Ensuring that there are no clerical errors (S2) • Recognising inappropriate use of blood (F2) • Monitor clinical use of blood and blood products (S1, F5) **2. Governance** • Developing policies for blood transfusion in consultation with relevant colleagues (S1, F5) • Give feedback to hospital management on utilisation of blood products in the hospital (S1) • Conduct audits on the use of blood (S1, F4) **3. Training role** • Training of nursing and laboratory personnel as well as medical students and specialists-in-training (F1, F5) **4. Scarce resource management** • Using blood appropriately (S1, S3, F1, F2, F3, F4) • Limiting the use of blood (F1, F2) • Using appropriate alternatives to transfusion (S3) • Cost-effective use of blood (S1) • Awareness of the limitations of the blood supply (F2) • Not to waste blood (S1) • Using a scarce resource responsibly (F2) **5. Patient management** • Clinician should have adequate knowledge about indications for blood products (S1, S3, F2, F3) • Ensuring safe administration (S3, F1, F3, F4) • Managing complications of transfusion (S3, F1, F2, F4) • Taking personal responsibility for obtaining cross-match sample from patient (S2) • Obtaining informed consent (S2) • Identifying and evaluating the need for a transfusion (S3, F1, F2) • Post-transfusion follow-up (F1) • Logistical issues, e.g. transportation of blood (F3) **6. Research** • Support research aimed at better identifying the indications for blood transfusion (S1, F4) • Conduct audits on the use of blood (S1, F4) • Interpret the literature on blood transfusion (F4)

Table 5.3: The main skills and competences of a clinician dealing with blood and blood products in the clinical setting.

Skills and competences	Not necessary to be able to have:
1. Clinical • Clinical examination skills (S3, F1) • Skill in judging the need for a transfusion (F1, F2) • Competency in the management and/or follow-up of transfusion complications (F2, F5) • Resuscitation skills (S3) **2. Technical** • Skills needed to use the different blood products (S1, F2, F3) • Achieving venous access, including placement of central lines (S2, S3) • Competence in thawing of blood products, e.g. FFP (S3, F3) • Competency in the administration of blood products (F3) • Competency in cold chain maintenance relating to blood products (F3) • Competency in doing a cross-match (F4) **3. Administrative** • Administrative skills, including precise note-keeping (F3, F5) **4. Social** • Communication skills (S2, F1, F4) • Interpersonal skills (F1) **5. Integration** • Problem-solving skills (F1) • Competency in appropriate blood transfusion (F5) • Practicing transfusion medicine in rural areas (S2) • Competency in interpreting activities in the blood bank (F4) **6. Education** • Teaching and training skills (F1, F4) **7. Research** • Auditing skills (F1) • Know how to interpret the literature on blood transfusion (F4)	• Competence in thawing of blood products, e.g. FFP (F4)

Table 5.4: The main areas of clinical knowledge that a clinician requires in dealing with blood and blood products as part of their day to day practice.

Main areas of clinical knowledge	Should not know much about:
1. Physiology • Oxygen transfer (F1, F2) • Biological components of blood (F2) • Fluid balance, electrolytes and fluid replacement (S1) • Blood groups (F5) • Knowledge of the physiology of blood (S1) • Knowledge of transfusion immunology (F1) **2. Pathophysiology** • Pathophysiology of diseases where blood products may be indicated (S1, S2, S3, F1) • Pathophysiology related to blood loss and blood transfusion (S1, S2, F1, F2) **3. Blood banking** • Knowledge of laboratory aspects of transfusion medicine (F1, F4) • Knowledge of apheresis (F1, F2) • Knowledge of blood grouping (S1) • Thawing of blood products (S3) • Knowledge of when blood products can be returned to the blood bank if unused (F3) • Knowledge of the principles underlying the issuing of blood (F4) • Knowledge of cross-matching (F4) **4. Haematology** • Coagulation and anti-coagulant drugs (S3, F1, F2) • Haematology knowledge relevant to blood transfusion (F1, F5) • Anaemia (S1, S2) • Haemophilia (S1, F2) **5. Clinical medicine** • Judging the need and indication for a transfusion (S1,S3,F2) • Different blood products and their use (S3) • Knowledge of appropriate transfusion practice (F3) • Use of blood in renal failure (S1) • Intensive care issues related to blood transfusion (F1) • Use of blood in surgery (S1) • Knowledge of the relevance of co-morbid disease in patients that need a blood transfusion (S3) **6. Emergency Medicine** • Resuscitation and the use of blood (S1, F1) • Using emergency blood (S2) • Management of allergic reactions and anaphylaxis (S2)	• Transfusion immunology – should only have a basic concept of HLA and allo-immunisation (S3, F4; F2 not sure)

7. Evidence-based medicine • Evidence behind appropriate transfusion (F4) • Appropriate use of blood products (S3, F4) • Allo-immunisation (F4) **8. Blood administration** • Administration of blood products (S3) • Deciding on amount of blood product that needs to be transfused (F2) **9. Blood conservation** • Alternatives to blood transfusion (S3, F1, F5) • Autologous transfusions (S2) • Blood conservation methods (F1) • Platelet-refractoriness (S3) **10. Blood safety** • Knowledge of the complications of blood transfusion (S2, F1, F5) • Contra-indications for blood transfusion (S1) • Transfusion-transmissible infections (F5) • Haemovigilance (F4)	

Table 5.5: The greatest deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products.

Deficiencies
1. Knowledge • Knowledge of the correct indications for transfusion (S2, F1, F2, F5) • Knowledge of transfusion triggers and their application (S2, S3, F1, F2) • Knowledge of transfusion in general (F5) • Knowledge of available products (S1, S3) • Knowledge of complications of blood transfusion (S1, F2) • Knowledge of coagulation and haemostasis (S3) **2. Skills** • Skills to correctly administer blood products (S1, S3) • Skills required to obtain venous access, including central line placement, e.g. in shocked patient (S1) • Incorrect handling of the product (S3) • Application of clinical skills - clinicians too focused on laboratory values and not enough by the bedside (F1) **3. Evidence-based practice** • Inappropriate use of blood and blood products (S2, S3, F1, F2) • Lack of guidelines on blood transfusion (S2) • Inappropriate selection of blood products (S3) • Non-adherence to guidelines and recommendations (F5) • Transfusing patients unnecessarily (S2, F2, F5) • Cross-matching and keeping blood unnecessarily, esp. in surgery and anesthesiology (F5) • Resistance of clinicians against changing behaviour despite being given guidelines (F5) **4. Human resources** • Lack of time for participating in educational activities related to blood transfusion (F4) • Lack of clinicians with an overview of all aspects of transfusion (F1) **5. Scarce resource management** • Awareness of costs (F2) • Lack of auditing systems (F5) **6. Attitude** • Transfusion seen as an insignificant part of patient care (F4)

Table 5.6: The difference in scope of practice between a between a full-time specialist in transfusion medicine and a clinician who deals with blood transfusion on an *ad hoc* basis.

Full-time specialist	**Clinician dealing with transfusion on an *ad hoc* basis**
1. Clinical knowledge • Deals with a much wider spectrum of patients (S3, F1, F4) • Has a broader knowledge of disease related to transfusion medicine (S3) • Knowledge about transfusion in transplantation medicine (S3) • Deals more with coagulation problems (S3) • In-depth knowledge of a pre-transfusion interview (F3) • Management of allo-immunisation (F5) • Must have an interest in new developments (F4) **2. Blood banking** • Covers the whole area of apheresis, including stem cell collection (S3, F3, F5) • Dealing with blood donors (S3, F2) • Involved with quality control in blood bank (F2, F3) • Involved in the running of the blood bank (F2, F3) • Administrative aspects of blood banking, including tracking and retrieval of blood and computerisation (F3) • Have a deeper understanding of the laboratory testing for TTIs (F3) **3. Teaching and training** • Functions as a tutor to his colleagues (F1) • Support activities centered around appropriate use, reducing use and optimizing use of blood and blood products (F4) **4. Leadership and consultative roles** • Coordinating role within the hospital (F1, F4) • Functions as a link between the clinical setting and the laboratory (F1) • Must have sufficient stature to be able to advise, help and lead new developments (F4) • Support colleagues across a range of specialities (F4)	**1. Clinical knowledge** • Can be of practical assistance by the bedside (S2, F4) • Should apply knowledge in local setting (S1) • More clinically orientated than specialist (S2) • Knowledge of transfusion basics, e.g. the indications for blood products (F5) • Limited knowledge of more specialised issues, e.g. managing about massive transfusion (S3) **2. Blood banking** • Can do basic cross-matching, blood grouping, blood smear review and urine testing (F3, F5) • Able to run a small blood bank (F3) • Should only know the concepts and principles underlying apheresis (S3) **3. Teaching and training** • Can assist with transfusion medicine training of doctors, students, paramedical staff and nurses (S1, S2) **4. Leadership and consultative** • Can be consulted regarding transfusion in a big department (S1, S2)

Table 5.7: The major outcomes of a curriculum for a Postgraduate Diploma in Transfusion Medicine.

The major outcomes
1. Basic sciences • Should have a proper knowledge of physiology related to blood transfusion (S2, S3) • Should have a basic knowledge of pathophysiology related to blood transfusion (S1, S3) **2. Blood banking** • Knowledge of laboratory aspects of transfusion medicine (S2, S3, F2, F3) • Must know how cross-match testing is performed (S2, S3, F2, F3) • Must know about blood processing (S2, S3, F2, F3) • Must know about donor selection and donor-related issues (S3, F4, F5) • Must know the different blood products and their component (S1, F2, F3, F4) • Must have an awareness of apheresis and its applications (S3, F2) • Understand antibody identification procedures (S3) • Should know about blood collection and the different types of collection systems (F3) • Should know about quality assurance in blood banking (F3) • Should know about the new issues facing blood banking (F3) • Should know about leukodepletion in laboratory and by bedside (F3) • Must know how blood typing is done (F2) **3. Haematology** • Knowledge of relevant aspects of haematology (S2) • Knowledge of hemostasis in transfusion medicine (F3) **4. Clinical medicine** • Must know the indications for blood products (S1, S3, F2) • Must be able to apply knowledge practically in the clinical setting (S1) • Understanding of transfusion in hemolytic anemias (S3) • Understand the management of the transfusion-refractory patient (S3) • Should be able to use blood appropriately (F5) • Must know how to administer blood (F2, F3) • The use of transfusions by a clinician doing the diploma should decrease (F1) • The quality of the transfusions by a clinician doing the diploma should increase, e.g. less complications and wastage of blood products (F1) • Must be able to discuss the indications for stem cell transplantation (F2) • Should know about sampling of blood (F3) • Must know the ethical aspects concerning the use of blood and blood products (S1) **5. Blood conservation** • Must have an understanding of the context of the issues and problems with the blood supply (S3, F3) • Must know about transfusion alternatives and blood conservation procedures, e.g. cell saving, erythropoietins, etc. (S2, S3, F1) • Should know about cost-effectiveness in transfusion medicine (F3, F4)

6. Blood safety

- Must know about blood safety (S1, S3, F2, F3, F5)
- Should know about TTIs (F3)
- Should know about GVHD (F3)
- Must be able to diagnose and manage complications of blood transfusion (S1, S3, F2, F3, F5)
- Must know the contra-indications for blood products (S1)
- Understand allo-immunisation and how to manage that (S3)
- Understand and be able to manage iron overload (S3)
- Should know about immunosuppression related to transfusion (F3)

7. Social skills

- Must have communication skills (S2)
- Must be able to explain to a patient what a transfusion or transfusion-related procedure entails (S2)

8. Research

- Should be able to participate in clinical research related to transfusion medicine (F4)
- Should have an understanding of the need for clinical trials in transfusion medicine (F4)

Table 5.8: The major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme.

Major factors that ensure sustainability
1. Faculty • Properly qualified team/faculty that runs the Diploma (S1, F2) • Roles of team members need to be clearly defined (S3) • Expose students to a broad spectrum of lecturers from different backgrounds (S2) • Use different lecturers at different times (S2) • There must be good guidance for the students (S3) • Dedicated team needed (F2) • Can use part-time faculty to compensate for an insufficient number of full-time faculty members (F2) **2. Value creation (and meeting of needs?)** • Enough people must want to do it, i.e. there must be a need for the course (S3, F1, F2) • The Diploma must have value to the person who does it (F2) • The course must empower the students to go back and research relevant issues in their clinical environment (F4) • There must be value in obtaining the qualification (F2) • Malpractice insurance levies for doctors who practice transfusion medicine without the qualification may make it more attractive (F2) • Doing the course should allow the students to do certain extra things not otherwise part of their job description (F2) • Blood banks should require that their doctors have a formal qualification/certification in transfusion medicine (F3) • There must be a follow-up programme after the Diploma, e.g. where students can come back annually for refresher courses (S3) • Sponsor people to attend on a meritorial basis (S1) **3. Networking** • Input needed from a variety of role players (S1, S2) • Get buy-in from the private sector (S1) **4. Financial viability** • There must be a revenue stream/funding (S1, F2) • Get sponsorship from the private sector, e.g. private laboratories (S1) **5. Structure and organisation** • Must be a part-time programme, i.e. doctor must be able to do it from his/her practice (S2, S3, F3) • You need dedicated administrative support, e.g. secretarial services, paper, printing (S1, F2) • Course can be short and full-time, but also reasonable to have a part-time course with intensive contact sessions (F5) • Course must not be too long or take too much time (S3) • Must have defined blocks of contact time (S3) • Needs to be well organised (S3) • There should be appropriate infrastructure/facilities for running the course (F2) • Logistics to present course should be in place (S1)

6. Programme content and outcomes

- The course must cover a broad spectrum of clinical issues (S2, S3)
- The course must be relevant to clinical practice (S2, S3, F4)
- The course must be applied to clinical practice (S2, S3)
- The course must not be too specialised (S2, S3)
- The individual topics need to be well-structured (S3)
- Course must not be too intensive (S3)
- The curriculum needs to be clearly defined, e.g. with well defined start and end (S3, F4)
- Must have practical sessions that are relevant (S3, F5)
- Including a problem-based component in the curriculum using case studies where people can learn from mistakes (F5)
- There must be exposure to the actual blood bank (F5)
- The curriculum needs to be organised in and integrated way (S3)
- There should be good programme and educational material (F2)
- Outcomes need to be defined (S3, F4)

7. Assessment

- There must be deliverable assignments (S3)
- Evaluate the practice and knowledge of the students (F5)
- There must be self-assessment programmes (F5)
- Need to give feedback to students on assignments (S3)

8. Career-path creation

- Job possibilities need to be created, e.g. posts for doctors who take responsibility for clinical transfusion practice and the transfusion committee in a hospital (F1, F3)
- Job opportunities for research in transfusion medicine (F3)

9. Recognition programme

- The Diploma must be recognised by the relevant governing bodies (F2)
- A regulatory framework that requires certification in transfusion medicine (F3)
- Programmes should be certified according to certain criteria (F2)
- There should be a certifying agency (F2)
- CPD accreditation (S1)

10. Continuous improvement

- The outcomes and new developments achieved by the students who have qualified should be fed back into the course (F4)
- Get feedback from the participants (F5)
- One should diversify and broaden the interest in order to remain sustainable despite medical and technological advances, e.g. if artificial blood products are produced and the current educational needs in transfusion medicine change (F2)

Table 5.9: The most important factors from an academic point of view that must be taken into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

Important factors from an academic point of view
1. Programme development • Research and define the actual skills and knowledge required (F3, F5) • Objectives of course need to be tailored to the actual needs of the students, i.e. to the problems relevant to their settings (F5) • Look at what other institutions are doing internationally and adapt what is useful to local circumstances (F3) • Should go through the necessary channels of approval, e.g. university channels (S1, F5) • People involved with project need to have academic standing to give prestige to the project and the content of the curriculum so that it will inspire confidence in the end product (S1) **2. Programme structure** • Proper structure (S1) • The duration of the diploma needs to be fixed in advance (S2) • The duration should not be more than two years (S2) • It should be done part-time if run over a period longer than 18 months (S2) • Students will not complete the course if it is too long (S2) • The duration of each component should be set in great detail (F3) **3. Quality control** • There should be an appropriate standard with internal and external moderation (S3) • Final assessment should be externally moderated (S3) • The certification needs to be limited in time, i.e. continuous professional development credits need to be obtained on an annual basis to maintain certification to ensure that those who qualify remain up-to-date (F1, F2) • A recertification process, be it correspondence or attendance-based refresher courses will ensure that those who qualified stay up-to-date and it can be a source of revenue (F2) • Programme must be peer-reviewed according to accepted criteria, e.g. having a specific number of certified haematologists on faculty (F2) • The training programme must be documented, e.g. which lectures are given (F2) • The programme needs to be standardised (F2) • Record must be kept of which students attend each session (F2) **4. Admission criteria and recognition of prior learning** • Applicants for Diploma should have a basic medical degree and do not need to be specialists (F1) **5. Academic culture** • A spirit of inquisitiveness must be fostered (F2) • A culture of critical thinking should be fostered, where questions are asked about the appropriateness of current practice (F3) • There must be a culture of continuous learning and updating your knowledge (F2) • There should be regular journal reviews and seminars related to transfusion medicine (F3)

6. Research

- A research component must be included in the programme (F2, F3)
- The faculty must be involved in the research programme which will keep them up-to-date and current (F2)
- Research and education must go hand in hand (F2)
- The course must empower the students to go back and research relevant issues in their clinical environment (F4)
- Research done should be appropriate for the country (F3)

7. Continuous improvement

- The outcomes and new developments achieved by the students who have qualified should be fed back into the course (F4)

Table 5.10: The major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

Educational factors
1. Curriculum • You need a formal curriculum (F2) • Curriculum needs to be well-defined (S2, S3, F3) • The components of the training programme should be enunciated in great detail (F3) **2. Educational material and resources** • Students need good handouts or educational material to enable them to prepare in advance (S1, S2) • Should make use of the internet (S2) • Students need a good bibliography, i.e. good books and references to good articles (S2) • Course content must be linked into other resources, e.g. one needs to ensure access to the library, including online, for non-resident students (S3) • Students need to be taught how to use online study resources, e.g. PubMed (S3) • There must be continuous guidance available to students with regards to use of resources, e.g. online resources (S3) • Students should have a quick reference manual for each block (S3) **3. Learning as an experience** • The content must be interesting (S1, F4) • Attendance must be an enriching experience (S1) • Students must be inspired (F4) **4. Assessment** • Assignments must be assessed (S1, S3, F3) • Use a variety of teaching and assessment techniques, e.g. lectures, journal reviews, seminar presentations, examinations, etc. (F3, F4, F5) • There must be some form of assessment on a regular basis to ensure that outcomes have been achieved (S1, F3) • Should have deliverable assignments (S3) • Feedback must be given on assignments (S3) • Assignments should be short (S1) • There should be a final assessment to be able to judge whether course is working and force students to consolidate what they have learnt (S3) • Core knowledge should be assessed in a final assessment (S3) • Make use of peer assessment (F3) • Competence must be proven, e.g. keeping a logbook and being signed off for certain procedures or skills attained (F2, F3) • Logbooks will allow for auditing (F2) **5. Outcomes** • Outcomes need to well-defined and clearly delineated (S2, F2, F3) • Outcomes must be measurable (S1, F2)

6. Contact time

- Contact sessions are important (S2)
- Working in small groups is important, with less than ten people in a group (S1, S3, F5)
- Sessions with students must be interactive (S3)
- One on one communication or with small groups is very important (S3)
- Distance learning components built in (S2)

7. Forms of learning

- Emphasis should be on the practical issues more than theoretical things unrelated to day-to-day practice, e.g. seeing cases, evaluating blood request forms critically, going to the blood bank laboratory, how to prescribe blood, administer blood, transporting of blood from laboratory to patient, doing a cross-match, Coombs or a blood group (S3, F1, F2, F3, F4)
- Make use of case studies and make it problem-based, e.g. learning from real-life mistakes (S1, S3, F5)
- Learning must be integrated (S3)
- Some issues should be taught to give insight, but does not necessarily have to be assessed, e.g. processing of blood, politics and transfusion (S3)
- Problem-based learning is important (F5)
- Self-directed learning is important (S3, F3)

8. Teacher

- Lecturers should be people who are actively involved with blood transfusion every day, e.g. trauma surgeons, haematologists, intensivists (S3)
- Avoid using lecturers who have high positions in transfusion medicine, but who "don't have their feet on the ground" and who can't bring the message across (S3)
- Having speakers from blood transfusion services may be good in terms of allowing the students to build networks with people in the field (S3)

9. Alignment

- The content should be aligned with the needs of the students (F4)

APPENDIX B1

Letter of request and consent form for the participants in the Delphi survey.

APPENDIX B1

Letter of request and consent form for the participants in the Delphi survey.

Dear Participant,

Request to participate in a PhD study titled: A model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State.

I am currently occupying the position of Head: Division Clinical Haematology in the Department of Internal Medicine in the School of Medicine in the Faculty of Health Sciences at the University of the Free State. I am mainly responsible for under- and postgraduate teaching, clinical care, administration, research and management within the Clinical Haematology Division.

I am in the process of writing a thesis to obtain the Ph.D. degree in Health Professions Education in the Faculty of Health Sciences at the University of the Free State (Student number: 2005175779). The title of my research is: ***A model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State.***

My promoters are:
Prof. M.M. Nel
Head: Health Professions Education
Faculty of Health Sciences
University of the Free State
Bloemfontein, South Africa

Co-promoter:
Prof. J. Hay
Head: Programme planning and review
Planning Unit
Office of the Registrar: Strategic Planning
University of the Free State
Bloemfontein, South Africa

As indicated by the title, it is the **purpose** of my study to establish a model for the academic development and implementation of a postgraduate diploma in transfusion medicine in the School of Medicine at the University of the Free State. The choice of subject was a natural outflow from the fact that we are in the process of establishing a postgraduate diploma in transfusion medicine at this University.

The word **model** needs some explanation as it can be defined in many different ways and is used in a large number of contexts, be they science, molecular biology, business or engineering. At the most basic level, a model can be defined as a simplified representation used to explain the workings of a real world system or event (Wiktionary 2007). A model can also be seen as a pattern, plan, representation, or description designed to show the structure or workings of an object, system, or concept (Wikipedia 2007). A definition taken from the world of enterprise is worth noting as it may have some components of use in the context of this diploma. In enterprise architecture, a model has been defined as "a representation of a set of components of a process, system, or subject area, generally developed for understanding, analysis, improvement, and/or replacement of the process or a representation of information, activities, relationships, and constraints (Treasury Enterprise Architecture Framework 2000).

Academic programme development usually encompasses a series of processes that include development, review, approval and accreditation. It also relates to changes to existing programmes, as well as changes to policies and procedures affecting graduate programmes. This includes a number of established administrative processes with set guidelines. These guidelines can be seen as a framework or guide that serves as a useful point of departure in academic programme development. Nevertheless, this needs to be transformed into a fully working model, applicable and properly interfaced with current trends in education and advances in transfusion medicine, community and customer (student) needs, good management principles as well as continuous process improvement systems, in order to create a model that is as complete as possible, sustainable and transferable between similar institutions and settings.

The **problem** that will be addressed is the absence of a model for the academic development and implementation of a postgraduate diploma in transfusion medicine. Currently, as far as could be ascertained, no such model exists in the world. Furthermore, the South African context with the unique challenges of a resource-limited environment, together with a shortened medical curriculum with severe constraints on the time available for teaching and training in transfusion medicine, emphasizes the need for just such a programme at a time when the transfusion arena in general is undergoing great change.

The overall **goal** of the study is to develop a model for the academic development and implementation of a sustainable postgraduate diploma in transfusion medicine, specific to the South African context, with the view to contribute to the provision of a safer and more cost-effective transfusion service to the community.

The **aim** of the study is to establish and develop a model for the academic development and implementation of a sustainable postgraduate diploma in transfusion medicine in the School of Medicine at the University of the Free State.

To achieve this aim, the following **objectives** will be pursued:

i) To gain a deeper insight into the current status of transfusion medicine education with an in-depth discussion of the relevant issues, questions, challenges, constraints and needs that affect it with reference to the changing arena of transfusion medicine. It will be endeavoured in this objective to give reasons for the further education of clinicians in transfusion medicine. This will provide the necessary context to the study and will be done through a literature review.

ii) To provide a factual description of the processes involved in the approval, accreditation, registration, recording and termination of a medical postgraduate diploma as well as the higher educational requirements at the University of the Free State and nationally in South Africa and show how each of these aspects practically apply to a postgraduate diploma in transfusion medicine. This will also be done through a literature review.

iii) To determine the role and competences of the clinician in transfusion medicine relevant to the changing arena of transfusion medicine as discussed in (i) for a clinician doing a postgraduate diploma in transfusion medicine and to determine the outcomes for a clinician completing a postgraduate diploma in transfusion medicine that will enable them to practice transfusion medicine as part of their day-to-day practice in both a resource-limited as well as a resource-rich setting. This will be achieved through semi-structured interviews based on an in-depth literature survey.

iv) To establish a draft set of criteria needed for the academic development and implementation of a postgraduate diploma in transfusion medicine in the School of Medicine at the University of the Free State and determine their relevance, importance and practical application. These will be tested through a Delphi survey

that will be developed from the findings of the semi-structured interviews and literature surveys.

v) Using the results from (i) to (iv), provide a model for the academic development and implementation of a postgraduate diploma in transfusion medicine with an emphasis on the alignment of the described roles and competences with learner assessment and outcomes. Although it is not the objective of this study to provide a management model, the academic model will form the basis from where a management framework for a postgraduate diploma in transfusion medicine can be developed.

The methods that will be utilised in this study include, in the first place, a comprehensive literature survey that will address many of the issues mentioned before. Secondly, interviews with role players in the field, based on the literature findings, will follow in order to design a draft set of criteria. These criteria will be used to compile a questionnaire that will be pre-tested in a pilot study, before being presented to the members of the Delphi panel.

The semi-structured interview can be defined as a data-collection instrument which is used to collect data, either by telephone or face-to-face. The researcher asks the same questions of numerous individuals in a precise manner, offering each individual the same set of possible responses. In an unstructured interview, there are many open-ended questions that are asked, but not in a precise, structured way.

The **value** of this research will be that it will lay the foundation for the implementation of a specific postgraduate diploma in transfusion medicine in the School of Medicine at the University of the Free State, that will take into account the important influencing factors and policies unique to the University and South African context. On a larger scale, it may be used as a model for the development of similar programmes in other institutions in Africa and the rest of the world.

You have been selected, according to predetermined criteria, as having expert knowledge and experience in the fields of transfusion medicine and higher education. I would, therefore, respectfully request your expert cooperation in completing this project. I will try to take as little of your time as possible. Completion of the Delphi survey will take approximately 1-2 hours (Round 1), one hour (Round 2), and less than 30 minutes for any subsequent rounds. The Delphi survey, as well as any relevant information or inquiries which you might have, will be e-mailed to you. Should you have any specific questions, my contact details are as follows:

Telephone number:	051-4053043
Fax number:	051-4441036
Cellular phone:	072 7689 024
Email address:	louwvj@ufs.ac.za
Postal address:	PO Box 339(G2) Dept. Haematology and Cell Biology Faculty of Health Sciences University of the Free State Bloemfontein 9300 South Africa

The different rounds of the Delphi survey are scheduled to take place during the period between April 2010 and May 2010. Should you be willing to participate, please fill in the accompanying consent form and return it to me by fax or email as soon as possible.

Thank you for taking the time to read this communication and I sincerely hope that you will be willing to contribute to this project.

Sincerely yours,

Prof. Vernon J Louw

Faculty of Health Sciences
University of the Free State
Bloemfontein
(ETOVS number: 156/07)

APPENDIX B2

CONSENT FORM DELPHI SURVEY

APPENDIX B2

CONSENT FORM DELPHI SURVEY

Title: A model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine in the School of Medicine at the University of the Free State (ETOVS number: 156/07).

Hereby I, the undersigned, consent to participate in the Delphi survey, which is scheduled to take place between 1 April 2010 and 31 May 2010. My full particulars are as follows:

Title:.....
Surname:.....
Full names:.....
Postal address:.....
.....
Years associated with an academic institution and/or involved with student teaching:.....
Years of clinical experience since qualification as a medical doctor:.....
Email address:.....
Telephone number:.....
Cellular number:.....
Fax number:.....

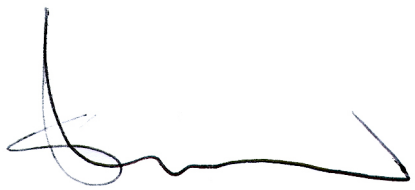
....
Signature participant **Date**

Please return this form on or before January 31, 2010 by fax or email. My full contact details are as follows:

Telephone number: 051-4053043
Fax number: 051-4441036
Cellular phone: 072 7689 024
Email address: louwvj.md@ufs.ac.za

I wish to assure you that the information will be treated in a highly confidential manner and that there will be no references to any names. Thank you in advance for your kind cooperation. Please take note that the results coming from this doctoral study will be published. Thank you for your kind cooperation.

Sincerely yours,



Prof. Vernon Louw
Clinical Haematology
Faculty of Health Sciences
University of the Free State
Bloemfontein
9301
South Africa

APPENDIX C1

LETTER TO DELPHI PANEL ROUND ONE

APPENDIX C1

A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE IN THE SCHOOL OF MEDICINE AT THE UNIVERSITY OF THE FREE STATE

Dear colleague,

Thank you for agreeing to participate in this Delphi survey. Attached you will find the first round questionnaire for the Delphi process. I appreciate your willingness and time to assist with this research.

STRUCTURE OF THE QUESTIONNAIRE

The questionnaire was developed after conducting a thorough literature survey and semi-structured interviews with medical doctors experienced in blood transfusion. From these, a large number of criteria were identified and listed under various subheadings in the Delphi questionnaire. These criteria are envisaged to form the basis of a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine at the University of the Free State. The statements in the questionnaire provide you with the opportunity of offering an opinion on their relative importance. The questionnaire is subdivided into eight sections from A through to H.

PROCEDURE OF THE DELPHI PROCESS

Your opinion as a participant is sought on the relative importance of each criterion listed in the survey. All information provided and opinions offered will be treated as strictly confidential. Please note that no respondent will know the identity of any other respondent. Only the researcher and his supervisors will have this knowledge. Please ensure that you keep all information pertaining to this research and questionnaire strictly confidential, both in this and subsequent rounds of the Delphi process, as the research process may be thus contaminated. After each round feedback will be provided to the participants.

PLEASE ANSWER ALL QUESTIONS IN ALL SECTIONS

PLEASE COMPLETE THE QUESTIONNAIRE AS FOLLOWS:

Each statement must be evaluated in respect of its importance as an aspect or criterion that must be included in a model for a Postgraduate Diploma in Transfusion Medicine aimed at qualified medical doctors at the University of the Free State. Please indicate your opinion on the three-point Likert scale provided. These points are as follows:

1 = Essential (This criterion must **DEFINITELY BE INCLUDED** in the model)

2 = Useful (This criterion **CAN BE INCLUDED** in the model)

3 = Unnecessary (This criterion must **DEFINITELY BE EXCLUDED** from the model)

If possible, please complete the questionnaire in its electronic form. If, however, you prefer to print it out and complete it in paper format, please feel free to do so. In both cases please answer all the points by placing an **X** over or next to the specific number of your choice in the scale provided with each statement. Space is also provided for additional suggestions and comments.

The questionnaire in this round should take approximately 1-2 hours of your time. Please contact me if you have any questions or uncertainties.

Please return the filled-out questionnaires by the **10th of March 2010**. The analysis can only be done once all questionnaires are received back, so your cooperation with regards to the deadline is greatly appreciated.

Thank you for your assistance.

Prof VJ Louw (Researcher)
MBChB, MMed (Int. Med.)(Stell.)
Student number: 2005175779
HPE Programme
Associate Professor and Head: Clinical Haematology
Faculty of Health Sciences
University of the Free State
Bloemfontein, 9301
(ETOVS number: 156/07)

Promoter:

Prof MM Nel

Head: Department of Health Professions Education

Faculty of Health Sciences

University of the Free State

Bloemfontein, South Africa

Co-promoter:

Prof JF Hay

Head: Department of Psychology of Education

Faculty of Education

University of the Free State

Bloemfontein, South Africa

PLEASE NOTE:

Save the attached Delphi questionnaire as a Word document on your computer before completing it. Send the completed questionnaire back to us as an attachment to an email message (louwvj@ufs.ac.za or vernon.louw@gmail.com) or fax it back to 051-4441036 before or on the **10th of March 2010**.

APPENDIX C2

QUESTIONNAIRE FOR DELPHI PANEL ROUND ONE

APPENDIX C2

	SECTION A **THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING**				
	This section deals with the description of the main roles, including tasks and functions of the clinician dealing with blood transfusion in the clinical setting. It also deals with the description of the main areas of clinical knowledge, skills and competences required, as well as the deficiencies in the abilities of clinicians dealing with blood transfusion in the clinical setting. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
1.	**MAIN ROLES, TASKS AND FUNCTIONS**				
	The main roles, including tasks and functions of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**A supervisory function in which he/she should**				
	• Ensure that correct procedures are followed	1	2	3	
	• Ensure that there are no clerical errors	1	2	3	
	• Recognise the inappropriate use of blood	1	2	3	
	• Monitor clinical use of blood and blood products	1	2	3	

b	**Governance role which include**				
	• Developing policies for blood transfusion in consultation with relevant colleagues	1	2	3	
	• Give feedback to hospital management on utilisation of blood products in the hospital	1	2	3	
	• Conduct audits on the use of blood	1	2	3	
c	**A training role, which include**				
	• clinical undergraduate teaching	1	2	3	
	• postgraduate teaching	1	2	3	
	• Training of nursing and laboratory personnel as well as medical students and specialists-in-training	1	2	3	
d	**A role in scarce resource management, which include**				
	• Using blood appropriately	1	2	3	
	• Limiting the use of blood	1	2	3	
	• Using appropriate alternatives to transfusion	1	2	3	
	• The cost-effective use of blood	1	2	3	
	• An awareness of the limitations of the blood supply	1	2	3	
	• Not to waste blood	1	2	3	
	• Using a scarce resource responsibly	1	2	3	
e	**A patient management role which include**				
	• Having adequate knowledge about indications for blood products	1	2	3	
	• Identify and evaluate need for transfusion	1	2	3	
	• Obtaining informed consent	1	2	3	
	• Taking personal responsibility for obtaining cross-match sample from patient	1	2	3	
	• Logistical issues, e.g. transportation of blood	1	2	3	
	• Ensuring safe administration	1	2	3	
	• Post-transfusion follow-up	1	2	3	
	• Managing complications of transfusion	1	2	3	

f	**A role as researcher, which include**				
	• Support research aimed at better identifying the indications for blood transfusion	1	2	3	
	• Conduct audits on the use of blood	1	2	3	
	• Interpret the literature on blood transfusion	1	2	3	
2.	**SKILLS AND COMPETENCES**				
	The main skills and competences of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical**				
	• Clinical examination skills	1	2	3	
	• Skill in judging the need for a transfusion	1	2	3	
	• Competency in the management and follow-up of transfusion complications	1	2	3	
	• Resuscitation skills	1	2	3	
b	**Technical**				
	• Skills needed to use the different blood products	1	2	3	
	• Achieving venous access, including placement of central lines	1	2	3	
	• Competence in thawing of blood products, e.g. fresh frozen plasma	1	2	3	
	• Competency in the administration of blood products	1	2	3	
	• Competency in cold chain maintenance relating to blood products	1	2	3	
	• Competency in doing a cross-match	1	2	3	
c	**Administrative**				
	• Administrative skills, including precise note-keeping	1	2	3	

d	**Social**				
	• Communication skills	1	2	3	
	• Interpersonal skills	1	2	3	
e	**Integration**				
	• Problem-solving skills	1	2	3	
	• Competency in appropriate blood transfusion	1	2	3	
	• Practicing transfusion medicine in rural areas	1	2	3	
	• Competency in interpreting activities in the blood bank	1	2	3	
f	**Education**				
	• Teaching and training skills	1	2	3	
g	**Research**				
	• Auditing skills	1	2	3	
	• Know how to interpret the literature on blood transfusion	1	2	3	
3.	**MAIN AREAS OF CLINICAL KNOWLEDGE**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
	The main areas of clinical knowledge required by the clinician dealing with blood transfusion can be described as:				
a	**Physiology**				
	• Oxygen transfer	1	2	3	
	• Biological components of blood	1	2	3	
	• Fluid balance, electrolytes and fluid replacement	1	2	3	
	• Blood groups	1	2	3	
	• Knowledge of the physiology of blood	1	2	3	
	• Knowledge of transfusion immunology	1	2	3	

b	**Pathophysiology**				
	• Pathophysiology of diseases where blood products may be indicated	1	2	3	
	• Pathophysiology related to blood loss and blood transfusion	1	2	3	
c	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	
	• Knowledge of aphaeresis	1	2	3	
	• Knowledge of blood grouping	1	2	3	
	• Thawing of blood products	1	2	3	
	• Knowledge of when blood products can be returned to the blood bank if unused	1	2	3	
	• Knowledge of the principles underlying the issuing of blood	1	2	3	
	• Knowledge of cross-matching	1	2	3	
d	**Haematology**				
	• Coagulation and anti-coagulant drugs	1	2	3	
	• Haematology knowledge relevant to blood transfusion	1	2	3	
	• Anaemia	1	2	3	
	• Haemophilia	1	2	3	
e	**Clinical medicine**				
	• Judging the need and indication for a transfusion	1	2	3	
	• Different blood products and their use	1	2	3	
	• Knowledge of appropriate transfusion practice	1	2	3	
	• Use of blood in renal failure	1	2	3	
	• Intensive care issues related to blood transfusion	1	2	3	
	• Use of blood in surgery	1	2	3	
	• Knowledge of the relevance of co-morbid disease in patients that need a blood transfusion	1	2	3	
f	**Emergency Medicine**				
	• Resuscitation and the use of blood	1	2	3	

	• Using emergency blood	1	2	3	
	• Management of allergic reactions and anaphylaxis	1	2	3	
g	**Evidence-based medicine**				
	• Evidence behind appropriate transfusion	1	2	3	
	• Appropriate use of blood products	1	2	3	
h	**Blood administration**				
	• Administration of blood products	1	2	3	
	• Deciding on amount of blood product that needs to be transfused	1	2	3	
i	**Blood conservation**				
	• Alternatives to blood transfusion	1	2	3	
	• Autologous transfusions	1	2	3	
	• Blood conservation methods	1	2	3	
	• Platelet-refractoriness	1	2	3	
j	**Blood safety**				
	• Knowledge of the complications of blood transfusion	1	2	3	
	• Contra-indications for blood transfusion	1	2	3	
	• Transfusion-transmissible infections	1	2	3	
	• Haemovigilance	1	2	3	
	• Allo-immunisation	1	2	3	
	ANY FURTHER COMMENTS ON THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING				

	SECTION B **THE SCOPE OF PRACTICE OF THE CLINICIAN INVOLVED WITH BLOOD TRANSFUSION**				
	This section deals with the difference in the scope of practice between a between a full-time specialist in transfusion medicine and a clinician who deals with blood transfusion on an *ad hoc* basis. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
4.	**THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE**				
	The scope of practice of a full-time Specialist in Transfusion Medicine can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical knowledge**				
	• Deals with a much wider spectrum of patients	1	2	3	
	• Has a broader knowledge of disease related to transfusion medicine	1	2	3	
	• Knowledge about transfusion in transplantation medicine	1	2	3	
	• Deals more with coagulation problems	1	2	3	
	• In-depth knowledge of a pre-transfusion interview	1	2	3	
	• Management of alloimmunisation	1	2	3	
	• Should have an interest in new developments	1	2	3	
b	**Blood banking**				
	• Covers the whole area of aphaeresis, including stem cell collection	1	2	3	

	• Dealing with blood donors	1	2	3	
	• Involved with quality control in blood bank	1	2	3	
	• Involved in the running of the blood bank	1	2	3	
	• Administrative aspects of blood banking, including tracking and retrieval of blood and computerisation	1	2	3	
	• Have a deeper understanding of the laboratory testing for transfusion-transmitted infections	1	2	3	
c	**Teaching and training**				
	• Functions as a tutor to his colleagues	1	2	3	
	• Support activities centered around appropriate use, reducing use and optimising use of blood and blood products	1	2	3	
d	**Leadership and consultative roles**				
	• Coordinating role within the hospital	1	2	3	
	• Functions as a link between the clinical setting and the laboratory	1	2	3	
	• Should have sufficient stature to be able to advise, help and lead new developments	1	2	3	
	• Support colleagues across a range of specialties	1	2	3	
	ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE				

5.	**THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				
	The scope of practice of the clinician dealing with blood transfusion on an *ad hoc* basis can best be described as:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical knowledge**				
	• Can be of practical assistance by the bedside	1	2	3	
	• Should apply knowledge in local setting	1	2	3	
	• More clinically orientated than specialist	1	2	3	
	• Knowledge of transfusion basics, e.g. the indications for blood products	1	2	3	
	• Limited knowledge of more specialised issues, e.g. managing about massive transfusion	1	2	3	
b	**Blood banking**				
	• Can do basic cross-matching, blood grouping, blood smear review and urine testing	1	2	3	
	• Able to run a small blood bank	1	2	3	
	• Should know the concepts and principles underlying aphaeresis	1	2	3	
c	**Teaching and training**				
	• Can assist with transfusion medicine training of doctors, students, paramedical staff and nurses	1	2	3	
d	**Leadership and consultative**				
	• Can be consulted regarding transfusion in a big department	1	2	3	
6.	**ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				

	SECTION C **THE CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION**				
	This section deals with the current challenges faced by clinicians dealing with blood transfusion as well as the challenges anticipated in the next five years. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
7.	**CHALLENGES CURRENTLY FACED BY CLINICIANS**				
	The challenges currently faced by clinicians dealing with blood transfusion include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Quality and safety**				
	• Safety of blood products	1	2	3	
	• Limiting transfusion-transmitted infections	1	2	3	
	• Quality of blood products	1	2	3	
	• Effects of Human Immunodeficiency Virus (HIV) epidemic on transfusion medicine	1	2	3	
	• Management of side-effects blood transfusions	1	2	3	
	• Limiting unnecessary transfusions	1	2	3	
	• Restrictions on donors and increasing donor deferral	1	2	3	
	• West-Nile virus	1	2	3	
	• Patients requiring repeated blood transfusion	1	2	3	
	• Clerical errors	1	2	3	

	• Sampling errors	1	2	3	
b	**Lack of knowledge and training**				
	• Appropriate use of blood	1	2	3	
	• Knowledge of indications for different blood products	1	2	3	
	• Lack of training in transfusion medicine on an undergraduate level	1	2	3	
	• Clinician knowledge on coagulation and anticoagulants	1	2	3	
	• Knowledge of the value of blood products	1	2	3	
	• Knowledge of the pre-analytical and analytical phase of blood sample processing	1	2	3	
	• Knowledge of the individual blood products, their methods of preparation, storage life and their contents	1	2	3	
	• Knowledge of practical issues relating to blood use, e.g. thawing, administration, irradiation	1	2	3	
	• Knowledge of the management of transfusion-related complications	1	2	3	
	• Knowledge of the pathophysiology of transfusion-related complications	1	2	3	
c	**Access and availability**				
	• Adequate blood supply	1	2	3	
	• Inappropriate use of blood	1	2	3	
	• Decreasing donor pool	1	2	3	
	• Finding enough platelet donors	1	2	3	
	• Access to blood	1	2	3	
	• Effects of HIV epidemic on transfusion medicine	1	2	3	
	• Restrictions on donors and increasing donor deferral	1	2	3	
	• Lack of rare blood groups in the donor pool	1	2	3	
	• Development of anti-platelet antibodies and subsequent platelet refractoriness	1	2	3	
	• Immigration of peoples into areas with an inadequate supply of blood for their blood groups, e.g. immigration Africans to Europe	1	2	3	

	• Increasing demand for blood due to novel medical techniques requiring blood, e.g. increasing need for exchange transfusion for patients with sickle cell anaemia immigrating to Europe	1	2	3	
	• Increasing demand for blood in specialised medical care, e.g. leukaemia and cancer treatment	1	2	3	
	• Patients requiring repeated blood transfusion	1	2	3	
d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood transfusion	1	2	3	
	• Informed consent issues	1	2	3	
	• Physician responsibility for a product delivered to him/her by a third party	1	2	3	
	• Refusal of blood products for religious reasons	1	2	3	
	• Issues flowing from breach of anonymity between recipient and donor as donor's name is on blood product	1	2	3	
e	**Cultural perceptions and understanding**				
	• Cultural perceptions of blood transfusion	1	2	3	
	• Public fear of the blood supply, e.g. risk of contracting HIV	1	2	3	
f	**Cost-effectiveness**				
	• Cost-effective use of blood	1	2	3	
	• Appropriate use of blood	1	2	3	
	• Limiting unnecessary transfusions	1	2	3	
8.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				

9.	**CHALLENGES CLINICIANS ARE EXPECTED TO BE FACED WITH IN THE NEXT FIVE YEARS**				
	The challenges clinicians involved in blood transfusion are expected to be faced with in the next five years, include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Quality and safety**				
	• Safety of blood products	1	2	3	
	• Limiting transfusion-transmitted infections	1	2	3	
	• Effects of HIV epidemic on transfusion medicine	1	2	3	
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, variant Creutzfeld-Jacob's disease (vCJD)	1	2	3	
	• Quality of blood products	1	2	3	
	• Increase in Graft-versus-host-disease (GVHD)	1	2	3	
b	**Lack of knowledge and training**				
	• Lack of academic input regarding use of blood in the private sector	1	2	3	
c	**Access and availability**				
	• Supply of blood	1	2	3	
	• Increased demand for blood due to HIV epidemic	1	2	3	
	• Shrinking donor pool due to HIV epidemic	1	2	3	
	• Access to blood	1	2	3	
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	
d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood use	1	2	3	
	• Informed consent issues	1	2	3	
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	
e	**Cost-effective use**				
	• Cost-effective use of blood	1	2	3	
f	**Managing change**				
	• Keeping up with new developments	1	2	3	

	• Managing change in the field of blood transfusion	1	2	3	
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, vCJD	1	2	3	
10.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				

	SECTION D **DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	This section deals with the deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
11	**DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	The deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products, include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Knowledge**				
	• Knowledge of the correct indications for transfusion	1	2	3	
	• Knowledge of transfusion triggers and their application	1	2	3	
	• Knowledge of transfusion in general	1	2	3	
	• Knowledge of available products	1	2	3	
	• Knowledge of complications of blood transfusion	1	2	3	
	• Knowledge of coagulation and haemostasis	1	2	3	
b	**Skills**				
	• Skills to correctly administer blood products	1	2	3	

	• Skills required to obtain venous access, including central line placement, e.g. in shocked patient	1	2	3	
	• Incorrect handling of the product	1	2	3	
	• Application of clinical skills - clinicians too focused on laboratory values and not enough by the bedside	1	2	3	
c	**Evidence-based practice**				
	• Inappropriate use of blood and blood products	1	2	3	
	• Lack of guidelines on blood transfusion	1	2	3	
	• Inappropriate selection of blood products	1	2	3	
	• Non-adherence to guidelines and recommendations	1	2	3	
	• Transfusing patients unnecessarily	1	2	3	
	• Cross-matching and keeping blood unnecessarily, esp. in surgery and anesthesiology	1	2	3	
	• Resistance of clinicians against changing behaviour despite being given guidelines	1	2	3	
d	**Human resources**				
	• Lack of time for participating in educational activities related to blood transfusion	1	2	3	
	• Lack of clinicians with an overview of all aspects of transfusion	1	2	3	
e	**Scarce resource management**				
	• Awareness of costs	1	2	3	
	• Lack of auditing systems	1	2	3	
f	**Attitude**				
	• Transfusion seen as an insignificant part of patient care	1	2	3	
12	**ANY FURTHER COMMENTS ON THE DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS?**				

	SECTION E **PROGRAMME OUTCOMES**				
	This section deals with the major outcomes of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
13	**THE MAJOR OUTCOMES OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
	The major outcomes for a clinician completing a postgraduate diploma should include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Basic sciences**				
	• Should have a proper knowledge of physiology related to blood transfusion	1	2	3	
	• Should have a basic knowledge of pathophysiology related to blood transfusion	1	2	3	
b	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	
	• Should know how cross-match testing is performed	1	2	3	
	• Should know about blood processing	1	2	3	
	• Should know about donor selection and donor-related issues	1	2	3	
	• Should know the different blood products and their component	1	2	3	
	• Should have an awareness of aphaeresis and its applications	1	2	3	
	• Understand antibody identification procedures	1	2	3	

	• Should know about blood collection and the different types of collection systems	1	2	3	
	• Should know about quality assurance in blood banking	1	2	3	
	• Should know about the new issues facing blood banking	1	2	3	
	• Should know about leukodepletion in laboratory and by bedside	1	2	3	
	• Should know how blood typing is done	1	2	3	
c	**Haematology**				
	• Knowledge of relevant aspects of haematology	1	2	3	
	• Knowledge of haemostasis in transfusion medicine	1	2	3	
d	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	
	• Should know how cross-match testing is performed	1	2	3	
	• Should know about blood processing	1	2	3	
	• Should know about donor selection and donor-related issues	1	2	3	
	• Should know the different blood products and their component	1	2	3	
e	**Clinical medicine**				
	• Should know the indications for blood products	1	2	3	
	• Should be able to apply knowledge practically in the clinical setting	1	2	3	
	• Understanding of transfusion in hemolytic anaemias	1	2	3	
	• Understand the management of the transfusion-refractory patient	1	2	3	
	• Should be able to use blood appropriately	1	2	3	
	• Should know how to administer blood	1	2	3	
	• The use of transfusions by a clinician doing the diploma should decrease	1	2	3	
	• The quality of the transfusions by a clinician doing the diploma should increase, e.g. less complications and wastage of blood products	1	2	3	
	• Should be able to discuss the indications for stem cell transplantation	1	2	3	
	• Should know about sampling of blood	1	2	3	
	• Should know the ethical aspects concerning the use of blood and blood products	1	2	3	

f	**Blood conservation**				
	• Should have an understanding of the context of the issues and problems with the blood supply	1	2	3	
	• Should know about transfusion alternatives and blood conservation procedures, e.g. cell saving, erythropoietin, etc.	1	2	3	
	• Should know about cost-effectiveness in transfusion medicine	1	2	3	
g	**Blood safety**				
	• Should know about blood safety	1	2	3	
	• Should know about TTIs	1	2	3	
	• Should know about GVHD	1	2	3	
	• Should be able to diagnose and manage complications of blood transfusion	1	2	3	
	• Should know the contra-indications for blood products	1	2	3	
	• Understand allo-immunisation and how to manage that	1	2	3	
	• Understand and be able to manage iron overload	1	2	3	
	• Should know about immunosuppression related to transfusion	1	2	3	
h	**Social skills**				
	• Should have communication skills	1	2	3	
	• Should be able to explain to a patient what a transfusion or transfusion-related procedure entails	1	2	3	
i	**Research**				
	• Should be able to participate in clinical research related to transfusion medicine	1	2	3	
	• Should have an understanding of the need for clinical trials in transfusion medicine	1	2	3	
14	**ANY FURTHER COMMENTS ON THE THE MAJOR OUTCOMES OF A CURRICULUM OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				

	SECTION F **SUSTAINABILITY**				
	This section deals with the major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
15	**THE MAJOR FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Academic staff**				
	• Properly qualified staff that runs the Diploma	1	2	3	
	• Roles of team members need to be clearly defined	1	2	3	
	• Expose students to a broad spectrum of lecturers from different backgrounds	1	2	3	
	• Use different lecturers at different times	1	2	3	
	• There should be good guidance for the students	1	2	3	
	• Dedicated team needed	1	2	3	
	• Can use part-time staff to compensate for an insufficient number of full-time staff members	1	2	3	
b	**Value creation**				
	• Enough people should want to do it, i.e. there should be a need for the course	1	2	3	
	• The Diploma should have value to the person who does it	1	2	3	
	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	

	• There should be value in obtaining the qualification	1	2	3	
	• Malpractice insurance levies for doctors who practice transfusion medicine without the qualification may make it more attractive	1	2	3	
	• Doing the course should allow the students to do certain extra things not otherwise part of their job description	1	2	3	
	• Blood banks should require that their doctors have a formal qualification in transfusion medicine	1	2	3	
	• There should be a follow-up programme after the Diploma, e.g. where students can come back annually for refresher courses	1	2	3	
	• Sponsor people to attend on a meritorial basis	1	2	3	
c	**Networking**				
	• Input needed from a variety of role players	1	2	3	
	• Get buy-in from the private sector	1	2	3	
d	**Financial viability**				
	• There should be a revenue stream/funding	1	2	3	
	• Get sponsorship from the private sector, e.g. private laboratories	1	2	3	
e	**Structure and organisation**				
	• Should be a part-time programme, i.e. doctor should be able to do it from his/her practice	1	2	3	
	• You need dedicated administrative support, e.g. secretarial services, paper, printing	1	2	3	
	• Course can be short and full-time, but also reasonable to have a part-time course with intensive contact sessions	1	2	3	
	• Course should not be too long or take too much time	1	2	3	
	• Should have defined blocks of contact time	1	2	3	
	• Needs to be well organised	1	2	3	
	• There should be appropriate infrastructure/facilities for running the course	1	2	3	
	• Logistics to present course should be in place	1	2	3	

f	**Programme content and outcomes**				
	• The course should cover a broad spectrum of clinical issues	1	2	3	
	• The course should be relevant to clinical practice	1	2	3	
	• The course should be applied to clinical practice	1	2	3	
	• The course should not be too specialised	1	2	3	
	• The individual topics need to be well-structured	1	2	3	
	• Course should not be too intensive	1	2	3	
	• The curriculum needs to be clearly defined, e.g. with well defined start and end	1	2	3	
	• Should have practical sessions that are relevant	1	2	3	
	• Including a problem-based component in the curriculum using case studies where people can learn from mistakes	1	2	3	
	• There should be exposure to the actual blood bank	1	2	3	
	• The curriculum needs to be organised in and integrated way	1	2	3	
	• There should be good programme and educational material	1	2	3	
	• Outcomes need to be defined	1	2	3	
g	**Assessment**				
	• There should be deliverable assignments	1	2	3	
	• Evaluate the practice and knowledge of the students	1	2	3	
	• There should be self-assessment programmes	1	2	3	
	• Need to give feedback to students on assignments	1	2	3	
h	**Career-path creation**				
	• Job possibilities need to be created, e.g. posts for doctors who take responsibility for clinical transfusion practice and the transfusion committee in a hospital	1	2	3	
	• Job opportunities for research in transfusion medicine	1	2	3	
i	**Recognition programme**				
	• The Diploma should be recognised by the relevant governing bodies	1	2	3	

	• A regulatory framework that requires certification in transfusion medicine	1	2	3	
	• Programmes should be certified according to certain criteria	1	2	3	
	• There should be a certifying agency	1	2	3	
	• Continuous professional development (CPD) accreditation of programme	1	2	3	
j	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	
	• Get feedback from the participants	1	2	3	
	• One should diversify and broaden the interest in order to remain sustainable despite medical and technological advances, e.g. if artificial blood products are produced and the current educational needs in transfusion medicine change	1	2	3	
16	**ANY FURTHER COMMENTS ON THE FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME?**				

	SECTION G **ACADEMIC FACTORS**				
	This section deals with the factors from an academic point of view that could be taken into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
17	**THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Programme development**				
	• Research and define the actual skills and knowledge required	1	2	3	
	• Objectives of course need to be tailored to the actual needs of the students, i.e. to the problems relevant to their settings	1	2	3	
	• Look at what other institutions are doing internationally and adapt what is useful to local circumstances	1	2	3	
	• Should go through the necessary channels of approval, e.g. university channels	1	2	3	
	• People involved with project need to have academic standing to give prestige to the project and the content of the curriculum so that it will inspire confidence in the end product	1	2	3	
b	**Programme structure**				
	• Proper structure	1	2	3	
	• The duration of the diploma needs to be fixed in advance	1	2	3	
	• The duration should not be more than two years	1	2	3	

	• It should be done part-time if run over a period longer than 18 months	1	2	3	
	• Students will not complete the course if it is too long	1	2	3	
	• The duration of each component should be set in great detail	1	2	3	
c	**Quality assurance**				
	• There should be an appropriate standard with internal and external moderation	1	2	3	
	• Final assessment should be externally moderated	1	2	3	
	• The certification needs to be limited in time, i.e. continuous professional development credits need to be obtained on an annual basis to maintain certification to ensure that those who qualify remain up-to-date	1	2	3	
	• A recertification process, be it correspondence or attendance-based refresher courses will ensure that those who qualified stay up-to-date and it can be a source of revenue	1	2	3	
	• Programme should be peer-reviewed according to accepted criteria, e.g. having a specific number of certified haematologists on staff	1	2	3	
	• The training programme should be documented, e.g. which lectures are given	1	2	3	
	• The programme needs to be standardised	1	2	3	
	• Record should be kept of which students attend each session	1	2	3	
d	**Admission criteria and recognition of prior learning**				
	• Applicants for Diploma should have a basic medical degree and do not need to be specialists	1	2	3	
e	**Academic culture**				
	• A spirit of inquisitiveness should be fostered	1	2	3	
	• A culture of critical thinking should be fostered, where questions are asked about the appropriateness of current practice	1	2	3	
	• There should be a culture of continuous learning and updating your knowledge	1	2	3	
	• There should be regular journal reviews and seminars related to transfusion medicine	1	2	3	
f	**Research**				
	• A research component should be included in the programme	1	2	3	
	• The staff should be involved in the research programme which will keep them up-to-date and current	1	2	3	

	• Research and education should go hand in hand	1	2	3	
	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	
	• Research done should be appropriate for the country	1	2	3	
g	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	
18	**ANY FURTHER COMMENTS ON THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				

	SECTION H **EDUCATIONAL FACTORS**				
	This section deals with major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one option.				
19	**THE MAJOR EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Curriculum**				
	• You need a formal curriculum	1	2	3	
	• Curriculum needs to be well-defined	1	2	3	
	• The components of the training programme should be enunciated in great detail	1	2	3	
b	**Educational material and resources**				
	• Students need good handouts or educational material to enable them to prepare in advance	1	2	3	
	• Should make use of the internet	1	2	3	
	• Students need a good bibliography, i.e. good books and references to good articles	1	2	3	
	• Course content should be linked into other resources, e.g. one needs to ensure access to the library, including online, for non-resident students	1	2	3	
	• Students need to be taught how to use online study resources, e.g. PubMed	1	2	3	

	• There should be continuous guidance available to students with regards to use of resources, e.g. online resources	1	2	3	
	• Students should have a quick reference manual for each block	1	2	3	
c	**Learning as an experience**				
	• The content should be interesting	1	2	3	
	• Attendance should be an enriching experience	1	2	3	
	• Students should be inspired	1	2	3	
d	**Assessment**				
	• Assignments should be assessed	1	2	3	
	• Use a variety of teaching and assessment techniques, e.g. lectures, journal reviews, seminar presentations, examinations, etc.	1	2	3	
	• There should be some form of assessment on a regular basis to ensure that outcomes have been achieved	1	2	3	
	• Should have deliverable assignments	1	2	3	
	• Feedback should be given on assignments	1	2	3	
	• Assignments should be short	1	2	3	
	• There should be a final assessment to be able to judge whether course is working and force students to consolidate what they have learnt	1	2	3	
	• Core knowledge should be assessed in a final assessment	1	2	3	
	• Make use of peer assessment	1	2	3	
	• Competence should be proven, e.g. keeping a logbook and being signed off for certain procedures or skills attained	1	2	3	
	• Logbooks will allow for auditing	1	2	3	
	• Assessment should be authentic, i.e. applied to real-life situations	1	2	3	
e	**Outcomes**				
	• Outcomes need to well-defined and clearly delineated	1	2	3	
	• Outcomes should be measurable	1	2	3	
f	**Contact time**				
	• Contact sessions are important	1	2	3	
	• Working in small groups is important, with less than ten people in a group	1	2	3	

	• Sessions with students should be interactive	1	2	3	
	• One on one communication or with small groups is very important	1	2	3	
	• Distance learning components should be built in	1	2	3	
g	**Forms of learning**				
	• Emphasis should be on the practical issues more than theoretical things unrelated to day-to-day practice, e.g. seeing cases, evaluating blood request forms critically, going to the blood bank laboratory, how to prescribe blood, administer blood, transporting of blood from laboratory to patient, doing a cross-match, Coombs or a blood group	1	2	3	
	• Make use of case studies and make it problem-based, e.g. learning from real-life mistakes	1	2	3	
	• Learning should be integrated	1	2	3	
	• Some issues should be taught to give insight, but does not necessarily have to be assessed, e.g. processing of blood, politics and transfusion	1	2	3	
	• Problem-based learning is important	1	2	3	
	• Self-directed learning is important	1	2	3	
h	**Teacher**				
	• Lecturers should be people who are actively involved with blood transfusion every day (e.g. trauma surgeons, haematologists, intensivists)	1	2	3	
	• Avoid using lecturers who have high positions in transfusion medicine, but who "don't have their feet on the ground" and who can't bring the message across	1	2	3	
	• Having speakers from blood transfusion services may be good in terms of allowing the students to build networks with people in the field	1	2	3	
	• Lecturers who are local experts should be used in contact sessions	1	2	3	
	• Lecturers who are national experts should be used in contact sessions	1	2	3	
	• Lecturers who are international experts should be used in contact sessions	1	2	3	

i	**The student as an adult learner**				
	• The course content should be relevant to the adult learner's work environment	1	2	3	
	• Learner's existing knowledge should be explored	1	2	3	
	• Students should know the benefits and rationale of what is being taught	1	2	3	
	• Facilitators should provide an environment wthin which the adult learner feel safe to cooperate and explore	1	2	3	
	• The individual learner's attributes, preferences and needs should be accommodated	1	2	3	
	• New knowledge should be tied to the learners' previous knowledge and experiences	1	2	3	
	• Should be given the opportunity to solve problems relevant to their real-life worlds	1	2	3	
	• Course content should provide immediacy, i.e. be immediately relevant to the learner's current working environment	1	2	3	
	• Learning approach should promote adulthood (i.e. independence, responsibility, self-direction)	1	2	3	
	• A cooperatve learning climate should be created	1	2	3	
	• Programme should utilise the adult learner's accumulated experience	1	2	3	
	• Provide opportunities for linteraction with co-learner's in small groups	1	2	3	
	• Create experiences that can enhance the construction of meaning (e.g. through role play, case studies, simulations or discussion)	1	2	3	
j	**Alignment**				
	• The content should be aligned with the needs of the students	1	2	3	
	• Assessment should be aligned with course outcomes	1	2	3	
20	**ANY FURTHER COMMENTS ON THE EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				
21	**PLEASE INDICATE BELOW IF THERE ARE ANY OTHER COMPONENTS THAT YOU WOULD LIKE TO SEE INCLUDED IN A MODEL FOR A POSTGRADUATE DIPLOMA FOR TRANSFUSION MEDICINE THAT WAS NOT DEALT WITH OR CONSIDERED IN THIS SURVEY.**				

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APPENDIX C3a

FEEDBACK ON DELPHI ROUND ONE

APPENDIX C3a

FEEDBACK ON DELPHI ROUND ONE

A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE IN THE SCHOOL OF MEDICINE AT THE UNIVERSITY OF THE FREE STATE

Dear colleague,

Thank you once again for agreeing to participate in the Delphi process. Attached you will find the results of the first round of the Delphi process. I am sending you this feedback with the sole purpose of providing you with the results and information regarding the first round. **You do not need to do anything with it.**

According to Larson and Wissman consensus is reached where 80% of the participants indicate a similar value (to a specific item) as their choice. In Round One of this Delphi process, out of 387 statements, consensus was reached on 136 (34.9%) of these. These 136 statements will be removed from Round Two, and only the remaining statements will be left for your consideration.

In the attached feedback you will note that all the statements on which consensus had been reached have been shaded and comments from participants are included. In a number of instances, I have made comments to help clarify some of the issues raised by participants. These are indicated below the participant's comment as "Comment VJ Louw" in bold. Thanks to the degree of consensus reached, Round Two, which will reach you soon, will be much shorter.

Kind regards,

Vernon Louw

APPENDIX C3b

FEEDBACK DELPHI ROUND ONE

APPENDIX C3b

FEEDBACK DELPHI ROUND ONE

	SECTION A **THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING**				
	This section deals with the description of the main roles, including tasks and functions of the clinician dealing with blood transfusion in the clinical setting. It also deals with the description of the main areas of clinical knowledge, skills and competences required, as well as the deficiencies in the abilities of clinicians dealing with blood transfusion in the clinical setting. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
1.	**MAIN ROLES, TASKS AND FUNCTIONS**				
	The main roles, including tasks and functions of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**A supervisory function in which he/she should**				
	• Ensure that correct procedures are followed	1	2	3	

	• Ensure that there are no clerical errors	1	2	3	The doctor prescribing a blood transfusion needs to ensure *inter alia* that procedures are in place to satisfy all clinical and legal requirements however, a Phlebotomist is often responsible for drawing the blood specimen for compatibility testing (and a Professional Nurse for initiating the transfusion at the bedside). It is therefore unreasonable to expect the clinician to 'ensure that there are no clerical errors' in every case.
	• Recognise the inappropriate use of blood	1	2	3	
	• Monitor clinical use of blood and blood products	1	2	3	
b	**Governance role which include**				
	• Developing policies for blood transfusion in consultation with relevant colleagues	1	2	3	Developing policies for the specific Hospital.
	• Give feedback to hospital management on utilisation of blood products in the hospital	1	2	3	
	• Conduct audits on the use of blood	1	2	3	
c	**A training role, which include**				
	• Clinical undergraduate teaching	1	2	3	Not an option for non-academic doctors. If his post is in teaching setting with teaching responsibilities, then it's essential, otherwise it would be a useful role. Medical students? **Answer VJ Louw: yes**
	• Postgraduate teaching	1	2	3	
	• Training of nursing and laboratory personnel as well as medical students and specialists-in-training	1	2	3	No lab personnel in ward. **Comment VJ Louw: The statement considers any training not just ward-based. See 4 below.**

d	**A role in scarce resource management, which include**				
	• Using blood appropriately	1	2	3	
	• Limiting the use of blood	1	2	3	This question should possibly be rephrased. Blood must be used appropriately. If there is an appropriate indication then the transfusion should not be 'limited'.
	• Using appropriate alternatives to transfusion	1	2	3	No alternatives. Comment **VJ Louw: Alternatives can include erythropoietins, growth factors, artificial oxygen carriers, etc.**
	• The cost-effective use of blood	1	2	3	Need smaller units. **Comment VJ Louw: the statement pertains more to the role of the clinician in scarce resource management, rather than blood banking issues.**
	• An awareness of the limitations of the blood supply	1	2	3	
	• Not to waste blood	1	2	3	Need smaller units
	• Using a scarce resource responsibly	1	2	3	
e	**A patient management role which include**				
	• Having adequate knowledge about indications for blood products	1	2	3	
	• Identify and evaluate need for transfusion	1	2	3	
	• Obtaining informed consent	1	2	3	Can't get consent for everyone

	• Taking personal responsibility for obtaining cross-match sample from patient	1	2	3	It is the doctor's responsibility to ensure that compatibility tests are carried out when blood is ordered for transfusion. The actual cross-match sample may however be taken from the patient by an authorised phlebotomist. Impossible to do all the time.
	• Logistical issues, e.g. transportation of blood	1	2	3	Blood bank is responsible
	• Ensuring safe administration	1	2	3	
	• Post-transfusion follow-up	1	2	3	
	• Managing complications of transfusion	1	2	3	
f	**A role as researcher, which include**				
	• Support research aimed at better identifying the indications for blood transfusion	1	2	3	
	• Conduct audits on the use of blood	1	2	3	
	• Interpret the literature on blood transfusion	1	2	3	
2.	**SKILLS AND COMPETENCES**				
	The main skills and competences of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical**				
	• Clinical examination skills	1	2	3	
	• Skill in judging the need for a transfusion	1	2	3	
	• Competency in the management and follow-up of transfusion complications	1	2	3	
	• Resuscitation skills	1	2	3	

b	**Technical**				
	• Skills needed to use the different blood products	1	2	3	Unclear question. ? Skills needed to decide which blood product to use
	• Achieving venous access, including placement of central lines	1	2	3	Difficult to generalise. A central line must be placed by a medical doctor specifically trained and competent to do so. This can be delegated. Important that clinician can do so, but does not mean that he has to do so every time. **See comment under point 4 below.**
	• Competence in thawing of blood products, e.g. fresh frozen plasma	1	2	3	The Clinician must know the technical requirements of the handling of blood products (but does not need to be particularly skilled in performing the procedures). Blood banks should do it or sisters in ward.
	• Competency in the administration of blood products	1	2	3	
	• Competency in cold chain maintenance relating to blood products	1	2	3	The clinician must be knowledgeable on the storage requirements of blood products (and oversee the correct handling of blood products) but competency in maintaining the cold chain (or other transport and storage requirements) rests with the Blood Service and the Nursing Staff.

	• Competency in doing a cross-match	1	2	3	The Clinician must understand the principles of compatibility testing (and, to some extent, be able to interpret the results) but does not need to be competent in the performance of the procedure. Blood bank responsibility. Good that he knows what it entails, but does not need to do it Lab's job.
c	**Administrative**				
	• Administrative skills, including precise note-keeping	1	2	3	Usual role of doctor
d	**Social**				
	• Communication skills	1	2	3	
	• Interpersonal skills	1	2	3	
e	**ration**				
	• Problem-solving skills	1	2	3	
	• Competency in appropriate blood transfusion	1	2	3	
	• Practicing transfusion medicine in rural areas	1	2	3	
	• Competency in interpreting activities in the blood bank	1	2	3	
f	**Education**				
	• Teaching and training skills	1	2	3	
g	**Research**				
	• Auditing skills	1	2	3	
	• Know how to interpret the literature on blood transfusion	1	2	3	

3.	MAIN AREAS OF CLINICAL KNOWLEDGE				
		ESSENTIAL	USEFUL	UNNECESSARY	Comments
	The main areas of clinical knowledge required by the clinician dealing with blood transfusion can be described as:				
a	**Physiology**				
	• Oxygen transfer	1	2	3	This is not essential for the practicing doctor who uses blood transfusion at times.
	• Biological components of blood	1	2	3	This is not essential for the practicing doctor who uses blood transfusion at times.
	• Fluid balance, electrolytes and fluid replacement	1	2	3	This is not essential for the practicing doctor who uses blood transfusion at times.
	• Blood groups	1	2	3	This is not essential for the practicing doctor who uses blood transfusion at times.
	• Knowledge of the physiology of blood	1	2	3	This is not essential for the practicing doctor who uses blood transfusion at times.
	• Knowledge of transfusion immunology	1	2	3	This is not essential for the practicing doctor who uses blood transfusion at times.
b	**Pathophysiology**				
	• Pathophysiology of diseases where blood products may be indicated	1	2	3	This is not essential for the practicing doctor who uses blood transfusion at times.
	• Pathophysiology related to blood loss and blood transfusion	1	2	3	This is not essential for the practicing doctor who uses blood transfusion at times.
c	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	
	• Knowledge of aphaeresis	1	2	3	
	• Knowledge of blood grouping	1	2	3	

	• Thawing of blood products	1	2	3	
	• Knowledge of when blood products can be returned to the blood bank if unused	1	2	3	
	• Knowledge of the principles underlying the issuing of blood	1	2	3	
	• Knowledge of cross-matching	1	2	3	
d	**Haematology**				
	• Coagulation and anti-coagulant drugs	1	2	3	Depends again on scope of practice. **Comment VJ Louw: Maybe, but should one include this in the curriculum for a diploma as described.**
	• Haematology knowledge relevant to blood transfusion	1	2	3	
	• Anaemia	1	2	3	
	• Haemophilia	1	2	3	Depends on scope of practice.
e	**Clinical medicine**				
	• Judging the need and indication for a transfusion	1	2	3	
	• Different blood products and their use	1	2	3	
	• Knowledge of appropriate transfusion practice	1	2	3	
	• Use of blood in renal failure	1	2	3	
	• Intensive care issues related to blood transfusion	1	2	3	Depends on scope of practice.
	• Use of blood in surgery	1	2	3	Depends on scope of practice.
	• Knowledge of the relevance of co-morbid disease in patients that need a blood transfusion	1	2	3	
f	**Emergency Medicine**				
	• Resuscitation and the use of blood	1	2	3	
	• Using emergency blood	1	2	3	
	• Management of allergic reactions and anaphylaxis	1	2	3	

g	**Evidence-based medicine**				
	• Evidence behind appropriate transfusion	1	2	3	
	• Appropriate use of blood products	1	2	3	
h	**Blood administration**				
	• Administration of blood products	1	2	3	
	• Deciding on amount of blood product that needs to be transfused	1	2	3	
i	**Blood conservation**				
	Alternatives to blood transfusion	1	2	3	
	• Autologous transfusions	1	2	3	
	• Blood conservation methods	1	2	3	(Alternatives to blood transfusion) **Comment VJ Louw: Not necessarily the same. May include things such as cell salvage, techniques to minimise blood loss during surgery, etc.**
	• Platelet-refractoriness	1	2	3	
j	**Blood safety**				
	• Knowledge of the complications of blood transfusion	1	2	3	
	• Contra-indications for blood transfusion	1	2	3	
	• Transfusion-transmissible infections	1	2	3	
	• Haemovigilance	1	2	3	
	• Allo-immunisation	1	2	3	

4.	ANY FURTHER COMMENTS ON THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING
	The clinician should be in the know of most of these matters, but does not have necessarily have to do it him/her self every patient if the service facility is large. Rate of transfusion. Appropriate administration sets for transfusions. 1c (above): This depends on where the clinician works. So I can see if they work in the wards they will/must play a role in day-to-day bedside education of nursing staff. But how this will work for laboratory staff in a situation where there is an arm-to-arm blood service chain I am not sure. 2b (above): Thawing of products should be done by blood transfusion staff to ensure proper quality control, process and procedures, etc. In areas where an arm-to-arm blood service is supplied such as RSA, Malawi, Namibia, this is a function of the blood service. In areas where there are separate unlinked crossmatch labs, such as in USA these labs can take over this responsibility.

	SECTION B **THE SCOPE OF PRACTICE OF THE CLINICIAN INVOLVED WITH BLOOD TRANSFUSION**				
	This section deals with the difference in the scope of practice between a between a full-time specialist in transfusion medicine and a clinician who deals with blood transfusion on an *ad hoc* basis. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
4.	**THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE**				
	The scope of practice of a full-time Specialist in Transfusion Medicine can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical knowledge**				
	• Deals with a much wider spectrum of patients	1	2	3	
	• Has a broader knowledge of disease related to transfusion medicine	1	2	3	
	• Knowledge about transfusion in transplantation medicine	1	2	3	
	• Deals more with coagulation problems	1	2	3	
	• In-depth knowledge of a pre-transfusion interview	1	2	3	Never takes place. This question needs to be clarified. I presume it refers to the informed consent procedure.
	• Management of alloimmunisation	1	2	3	
	• Should have an interest in new developments	1	2	3	

b	**Blood banking**				
	• Covers the whole area of aphaeresis, including stem cell collection	1	2	3	Depends on scope of clinical practice.
	• Dealing with blood donors	1	2	3	**See comment 4b(i) under point 6 below**
	• Involved with quality control in blood bank	1	2	3	Depends on scope of practice and employment. **See comment 4b(ii) under point 6 below**
	• Involved in the running of the blood bank	1	2	3	Depends on scope of practice and employment.
	• Administrative aspects of blood banking, including tracking and retrieval of blood and computerisation	1	2	3	Depends on scope of practice and employment.
	• Have a deeper understanding of the laboratory testing for transfusion-transmitted infections	1	2	3	
c	**Teaching and training**				
	• Functions as a tutor to his colleagues	1	2	3	
	• Support activities centered around appropriate use, reducing use and optimising use of blood and blood products	1	2	3	
d	**Leadership and consultative roles**				
	• Coordinating role within the hospital	1	2	3	
	• Functions as a link between the clinical setting and the laboratory	1	2	3	
	• Should have sufficient stature to be able to advise, help and lead new developments	1	2	3	
	• Support colleagues across a range of specialties	1	2	3	
	ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE				
	Too many disciplines marked difference between adults and children. Students must appreciate that children are not small adults. Disease and indication for blood transfusions are different. Section 5 is very dependent on personal scope of practice. Haematopathologist deals with lots of issues and advice, but not addressed in questions. This person is primarily a clinician and his role should focus on treating patients and training others to do so. As a specialist in this field, it would also entail management of the system of using blood products. The admin of the blood bank and major lab skills, can be done by a scientist rather than the clinician.				

5.	**THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				
	The scope of practice of the clinician dealing with blood transfusion on an *ad hoc* basis can best be described as:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical knowledge**				
	• Can be of practical assistance by the bedside	1	2	3	
	• Should apply knowledge in local setting	1	2	3	
	• More clinically orientated than specialist	1	2	3	
	• Knowledge of transfusion basics, e.g. the indications for blood products	1	2	3	
	• Limited knowledge of more specialised issues, e.g. managing about massive transfusion	1	2	3	Depends on scope of practice. Should this question not read 'Knowledge of more specialised issues' (not 'limited' knowledge)?
b	**Blood banking**				
	• Can do basic cross-matching, blood grouping, blood smear review and urine testing	1	2	3	**See comment 4b(ii) under point 6 below**
	• Able to run a small blood bank	1	2	3	
	• Should know the concepts and principles underlying aphaeresis	1	2	3	
c	**Teaching and training**				
	• Can assist with transfusion medicine training of doctors, students, paramedical staff and nurses	1	2	3	
d	**Leadership and consultative**				
	• Can be consulted regarding transfusion in a big department	1	2	3	

6.	**ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**
	The questions may differ, depending on the scenario you think of. But in general i would condone the above staements. Be part of a team maintaining and audit of use blood products Blood banks need full-time medical doctors – not ad hoc basis 4b(i): Only if aphaeresis programme for e.g. stem cell collection is in the bone marrow transplant unit. There are too many policies and procedures in place to ensure the quality of blood products for clinicians whether they are in a full-time transfusion specialist post or doing blood transfusion on an ad hoc basis to get involved in these processes. 4b(ii): Quality control: These are functions for blood transfusion specialist employed by the blood transfusion services and not for transfusion specialist working on the clinical side. In the USA where there is not an arm-to-arm service, a bit more involvement is required from the transfusion specialist who is often employed by the hospital blood service. The ad-hoc clinician should not be seen as an expert, but rather as a generalist in this field. He should be competent in the BASICS and practice within that boundary. His focus should be on patient care and should only be responsible for safely and appropriately: collecting the blood sample of the recipient, ordering the blood product, administering it and dealing with common side effects. His scope of practice here, should be what we teach and expect at undergraduate level (i.e. for MO's and GP's). The outcome of this model for BASIC , ad-hoc, practitioners should inform what we teach at medical school.

	SECTION C **THE CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION**				
	This section deals with the current challenges faced by clinicians dealing with blood transfusion as well as the challenges anticipated in the next five years. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
7.	**CHALLENGES CURRENTLY FACED BY CLINICIANS**				
	The challenges currently faced by clinicians dealing with blood transfusion include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Quality and safety**				
	• Safety of blood products	1	2	3	
	• Limiting transfusion-transmitted infections	1	2	3	
	• Quality of blood products	1	2	3	
	• Effects of Human Immunodeficiency Virus (HIV) epidemic on transfusion medicine	1	2	3	
	• Management of side-effects blood transfusions	1	2	3	
	• Limiting unnecessary transfusions	1	2	3	
	• Restrictions on donors and increasing donor deferral	1	2	3	
	• West-Nile virus	1	2	3	If I think of the UFS setting exclusively. **Comment VJ Louw: Please consider the South African setting in general.**
	• Patients requiring repeated blood transfusion	1	2	3	

	• Clerical errors	1	2	3	
	• Sampling errors	1	2	3	
b	**Lack of knowledge and training**				
	• Appropriate use of blood	1	2	3	
	• Knowledge of indications for different blood products	1	2	3	
	• Lack of training in transfusion medicine on an undergraduate level	1	2	3	Absolutely! Don't think this is essential for the diplomat to be concerned with Question unclear. **Comment VJ Louw: See heading of section 7, in other words "The fact that there is a lack of training in transfusion medicine on an undergraduate level is a challenge for clinicians."**
	• Clinician knowledge on coagulation and anticoagulants	1	2	3	
	• Knowledge of the value of blood products	1	2	3	Monetary? What is meant by the 'value' of blood products needs to be clarified. **Answer VJ Louw: "Value" does not refer to costs, but rather that blood is a scarce resource and should be treated as such.**
	• Knowledge of the pre-analytical and analytical phase of blood sample processing	1	2	3	
	• Knowledge of the individual blood products, their methods of preparation, storage life and their contents	1	2	3	Two different issues in one question. **Comment VJ Louw: Indeed, but to split up for all products may become tedious. See this as a broad, general knowledge on these issues.**

	• Knowledge of practical issues relating to blood use, e.g. thawing, administration, irradiation	1	2	3	Blood bank procedures (SOP)
	• Knowledge of the management of transfusion-related complications	1	2	3	
	• Knowledge of the pathophysiology of transfusion-related complications	1	2	3	
c	**Access and availability**				
	• Adequate blood supply	1	2	3	
	• Inappropriate use of blood	1	2	3	
	• Decreasing donor pool	1	2	3	
	• Finding enough platelet donors	1	2	3	
	• Access to blood	1	2	3	
	• Effects of HIV epidemic on transfusion medicine	1	2	3	
	• Restrictions on donors and increasing donor deferral	1	2	3	
	• Lack of rare blood groups in the donor pool	1	2	3	
	• Development of anti-platelet antibodies and subsequent platelet refractoriness	1	2	3	
	• Immigration of peoples into areas with an inadequate supply of blood for their blood groups, e.g. immigration Africans to Europe	1	2	3	
	• Increasing demand for blood due to novel medical techniques requiring blood, e.g. increasing need for exchange transfusion for patients with sickle cell anaemia immigrating to Europe	1	2	3	
	• Increasing demand for blood in specialised medical care, e.g. leukaemia and cancer treatment	1	2	3	
	• Patients requiring repeated blood transfusion	1	2	3	

d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood transfusion	1	2	3	
	• Informed consent issues	1	2	3	
	• Physician responsibility for a product delivered to him/her by a third party	1	2	3	Not sure which 3rd party s referred to. We never accept blood – nursing staff does. **Comment VJ Louw: The issue here is the fact that the doctor has to take responsibility for a product and its complications produced by an external party, i.e. the blood bank. Is this a challenge for doctors or not?**
	• Refusal of blood products for religious reasons	1	2	3	
	• Issues flowing from breach of anonymity between recipient and donor ~~as donor's name is on blood product~~	1	2	3	Health act protects against this. Donor's name is not on the blood product.In other instances, e.g., in PBSC transplants from allogeneic donors identified through the SABMR, the identity of the donor is not disclosed to the recipient. **Answer VJ Louw: Indeed, this is quite correct in our setting. Statement adjusted.**
e	**Cultural perceptions and understanding**				
	• Cultural perceptions of blood transfusion	1	2	3	
	• Public fear of the blood supply, e.g. risk of contracting HIV	1	2	3	
f	**Cost-effectiveness**				
	• Cost-effective use of blood	1	2	3	
	• Appropriate use of blood	1	2	3	

	• Limiting unnecessary transfusions	1	2	3	Should this question not be rephrased? Transfusions must not be given unnecessarily. Unnecessary transfusions must be *avoided* (not limited).
8.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				
	Difficult to restrict the contents of the diplomats, as many issues are important, yet probably not all can be included. Knowledge among nursing staff probably not up to an acceptable standard Equipment to administer blood safely (IVAC's, infusion pumps) often outdated or not maintained.				
9.	**CHALLENGES CLINICIANS ARE EXPECTED TO BE FACED WITH IN THE NEXT FIVE YEARS**				
	The challenges clinicians involved in blood transfusion are expected to be faced with in the next five years, include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Quality and safety**				
	• Safety of blood products	1	2	3	
	• Limiting transfusion-transmitted infections	1	2	3	
	• Effects of HIV epidemic on transfusion medicine	1	2	3	
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, variant Creutzfeld-Jacob's disease (vCJD)	1	2	3	The profile is bacteria, but fear is disproportionate.
	• Quality of blood products	1	2	3	
	• Increase in Graft-versus-host-disease (GVHD)	1	2	3	

b	**Lack of knowledge and training**				
	• Lack of academic input regarding use of blood in the private sector	1	2	3	The clinicians in academic setup has misconception of level of academic input in private sector!!! Also see comment 9b(i) under 10 below. **Comment VJ Louw: This may be true, but remember that the statements here are ones made in the semi-structured interviews and the Delph's purpose is to determine how useful they are.**
c	**Access and availability**				
	• Supply of blood	1	2	3	
	• Increased demand for blood due to HIV epidemic	1	2	3	
	• Shrinking donor pool due to HIV epidemic	1	2	3	
	• Access to blood	1	2	3	
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	Same products available to both sectors!!! Ethical decision already made. Difficult to answer. The availability of blood products from the Blood Service would be expected to always be the same for the State and Private Sector. The provision of blood products may however be limited by one or other sector (e.g. by the State because of lack of funds, or by the Medical Aid Societies because of lack of funds). **Comment VJ Louw: The question is whether this is a challenge for clinicians.**

d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood use	1	2	3	
	• Informed consent issues	1	2	3	
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	Same products available to both sectors!!! Ethical decision already made.
e	**Cost-effective use**				
	• Cost-effective use of blood	1	2	3	
f	**Managing change**				
	• Keeping up with new developments	1	2	3	
	• Managing change in the field of blood transfusion	1	2	3	
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, vCJD	1	2	3	!!!Already bacterial!!! Awareness!!
10.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				
	All of the above questions relate to important issues however, the way I interpret the questions in this section, many of these issues are currently being effectively dealt with and are therefore not going to be a particular 'challenge' in the next five years. Failing health services with regard to resources – money/personal Increasing HIV-epidemic may mean less blood Some questions in this and previous section are applicable to first world countries. Comment 9b (i): More academically sound medicine is OFTEN practiced in private sector rather than academic sector!!! Misplaced PRIDE often situated in academic sector.				

	SECTION D **DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	This section deals with the deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
11	**DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	The deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products, include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Knowledge**				
	• Knowledge of the correct indications for transfusion	1	2	3	Not sure how to interpret all the questions in this section. There are many doctors (generalists and specialists) who are extremely knowledgeable in all these areas of transfusion medicine practice and others whose knowledge is deficient. (It is therefore difficult and somewhat unreasonable to generalise). **Comment VJ Louw: It is difficult, but I am trying to gauge from the collective experience of all the Delphi participants whether they consider this to be an important deficiency that should be addressed.**

	• Knowledge of transfusion triggers and their application	1	2	3	
	• Knowledge of transfusion in general	1	2	3	
	• Knowledge of available products	1	2	3	
	• Knowledge of complications of blood transfusion	1	2	3	
	• Knowledge of coagulation and haemostasis	1	2	3	
b	**Skills**				
	• Skills to correctly administer blood products	1	2	3	Sisters do this. **Comment VJ Louw: True, but should a diploma address this deficiency in clinicians if present.**
	• Skills required to obtain venous access, including central line placement, e.g. in shocked patient	1	2	3	
	• Incorrect handling of the product	1	2	3	Sisters do this.
	• Application of clinical skills - clinicians too focused on laboratory values and not enough by the bedside	1	2	3	Sisters do this.
c	**Evidence-based practice**				
	• Inappropriate use of blood and blood products	1	2	3	
	• Lack of guidelines on blood transfusion	1	2	3	
	• Inappropriate selection of blood products	1	2	3	
	• Non-adherence to guidelines and recommendations	1	2	3	
	• Transfusing patients unnecessarily	1	2	3	

	• Cross-matching and keeping blood unnecessarily, esp. in surgery and anesthesiology	1	2	3	Not my field. **Comment VJ Louw: True, but should a diploma address this deficiency in clinicians if present.**
	• Resistance of clinicians against changing behaviour despite being given guidelines	1	2	3	
d	**Human resources**				
	• Lack of time for participating in educational activities related to blood transfusion	1	2	3	
	• Lack of clinicians with an overview of all aspects of transfusion	1	2	3	
e	**Scarce resource management**				
	• Awareness of costs	1	2	3	
	• Lack of auditing systems	1	2	3	
f	**Attitude**				
	• Transfusion seen as an insignificant part of patient care	1	2	3	
12	**ANY FURTHER COMMENTS ON THE DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS?**				
	Not sure how to interpret all the questions in this section in terms of the subject heading (deficiencies of clinicians). There are many clinicians (generalists and specialists) who are extremely knowledgeable in all of these areas of transfusion medicine practice and others whose knowledge is deficient. (It is therefore difficult and perhaps unreasonable to generalise).				

	SECTION E **PROGRAMME OUTCOMES**				
	This section deals with the major outcomes of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
13	**THE MAJOR OUTCOMES OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
	The major outcomes for a clinician completing a postgraduate diploma should include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Basic sciences**				
	• Should have a proper knowledge of physiology related to blood transfusion	1	2	3	
	• Should have a basic knowledge of pathophysiology related to blood transfusion	1	2	3	
b	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	
	• Should know how cross-match testing is performed	1	2	3	
	• Should know about blood processing	1	2	3	
	• Should know about donor selection and donor-related issues	1	2	3	
	• Should know the different blood products and their component	1	2	3	
	• Should have an awareness of aphaeresis and its applications	1	2	3	

	• Understand antibody identification procedures	1	2	3	
	• Should know about blood collection and the different types of collection systems	1	2	3	
	• Should know about quality assurance in blood banking	1	2	3	
	• Should know about the new issues facing blood banking	1	2	3	
	• Should know about leukodepletion in laboratory and by bedside	1	2	3	
	• Should know how blood typing is done	1	2	3	
c	**Haematology**				
	• Knowledge of relevant aspects of haematology	1	2	3	
	• Knowledge of haemostasis in transfusion medicine	1	2	3	
d	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	
	• Should know how cross-match testing is performed	1	2	3	
	• Should know about blood processing	1	2	3	
	• Should know about donor selection and donor-related issues	1	2	3	
	• Should know the different blood products and their component	1	2	3	
e	**Clinical medicine**				
	• Should know the indications for blood products	1	2	3	
	• Should be able to apply knowledge practically in the clinical setting	1	2	3	
	• Understanding of transfusion in hemolytic anaemias	1	2	3	
	• Understand the management of the transfusion-refractory patient	1	2	3	

	• Should be able to use blood appropriately	1	2	3	
	• Should know how to administer blood	1	2	3	
	• The use of transfusions by a clinician doing the diploma should decrease	1	2	3	It should be appropriate. It may increase because of better understanding. Difficult to speculate. **Comment VJ Louw: The question is whether you think that should be an outcome of the diploma.**
	• The quality of the transfusions by a clinician doing the diploma should increase, e.g. less complications and wastage of blood products	1	2	3	It may increase because of better understanding.
	• Should be able to discuss the indications for stem cell transplantation	1	2	3	
	• Should know about sampling of blood	1	2	3	
	• Should know the ethical aspects concerning the use of blood and blood products	1	2	3	
f	**Blood conservation**				
	• Should have an understanding of the context of the issues and problems with the blood supply	1	2	3	
	• Should know about transfusion alternatives and blood conservation procedures, e.g. cell saving, erythropoietin, etc.	1	2	3	
	• Should know about cost-effectiveness in transfusion medicine	1	2	3	'Cost-effectiveness' will be a consequence of appropriate use of blood.
g	**Blood safety**				
	• Should know about blood safety	1	2	3	
	• Should know about TTIs	1	2	3	

	• Should know about GVHD	1	2	3	
	• Should be able to diagnose and manage complications of blood transfusion	1	2	3	
	• Should know the contra-indications for blood products	1	2	3	
	• Understand allo-immunisation and how to manage that	1	2	3	
	• Understand and be able to manage iron overload	1	2	3	
	• Should know about immunosuppression related to transfusion	1	2	3	
h	**Social skills**				
	• Should have communication skills	1	2	3	
	• Should be able to explain to a patient what a transfusion or transfusion-related procedure entails	1	2	3	
i	**Research**				
	• Should be able to participate in clinical research related to transfusion medicine	1	2	3	
	• Should have an understanding of the need for clinical trials in transfusion medicine	1	2	3	
14	**ANY FURTHER COMMENTS ON THE THE MAJOR OUTCOMES OF A CURRICULUM OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				
	I guess I assume that anybody wanting to do a diploma of this sort would be in the knowledge about research on this topic. Participate in training others (not necessarily at diploma level, but certainly at "updating" level.) IN ORDER TO DETERMINE THE MAJOR OUTCOMES OF THIS PROGRAM, IT IS ESSENTIAL TO DECIDE AND DECLARE THE AIMS OF THIS DIPLOMA. Do you want this person to be a leader in Trans medicine, a specialist in his/her field of trans medicine? The outcomes must underpin and produce the aims, if they are met during the course. How does the aims of a diploma differ from a Masters degree in trans medicine. These are important questions and related to the vision of the diploma course.				

	SECTION F **SUSTAINABILITY**				
	This section deals with the major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
15	**THE MAJOR FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Academic staff**				
	• Properly qualified staff that runs the Diploma	1	2	3	
	• Roles of team members need to be clearly defined	1	2	3	
	• Expose students to a broad spectrum of lecturers from different backgrounds	1	2	3	
	• Use different lecturers at different times	1	2	3	
	• There should be good guidance for the students	1	2	3	
	• Dedicated team needed	1	2	3	
	• Can use part-time staff to compensate for an insufficient number of full-time staff members	1	2	3	Not good idea, but I guess is what we all do! Not ideal, but we live in the real world.
b	**Value creation**				
	• Enough people should want to do it, i.e. there should be a need for the course	1	2	3	

	• The Diploma should have value to the person who does it	1	2	3	
	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	
	• There should be value in obtaining the qualification	1	2	3	Increased knowledge is assumed to lead to better clinical service. Absolutely.
	• Malpractice insurance levies for doctors who practice transfusion medicine without the qualification may make it more attractive	1	2	3	Probably. Do not support this negative approach. Africa and South Africa do not have the infrastructure to accommodate this. Bad idea – negative motivation.
	• Doing the course should allow the students to do certain extra things not otherwise part of their job description	1	2	3	The job description of drs is still very wide esp generalists
	• Blood banks should require that their doctors have a formal qualification in transfusion medicine	1	2	3	Only if such a qualification is available. (If the doctor does not have a specialist qualification in Haematology, Pathology or Internal Medicine). (Should require that trainee doctors in a Blood Service (MO's) *obtain* a formal qualification in Transfusion Medicine). This would collapse the services at least temporarily. That would mean all doctors must do the course!!
	• There should be a follow-up programme after the Diploma, e.g. where students can come back annually for refresher courses	1	2	3	Good idea to have refresher courses

	• Sponsor people to attend on a meritorial basis	1	2	3	
c	**Networking**				
	• Input needed from a variety of role players	1	2	3	
	• Get buy-in from the private sector	1	2	3	
d	**Financial viability**				
	• There should be a revenue stream/funding	1	2	3	
	• Get sponsorship from the private sector, e.g. private laboratories	1	2	3	And they would be interested, because…? What is in it for them?
e	**Structure and organisation**				
	• Should be a part-time programme, i.e. doctor should be able to do it from his/her practice	1	2	3	
	• You need dedicated administrative support, e.g. secretarial services, paper, printing	1	2	3	
	• Course can be short and full-time, but also reasonable to have a part-time course with intensive contact sessions	1	2	3	I think you would reach more by taking the part-time route, actually more sustainable. Short and full-time perhaps not feasible.
	• Course should not be too long or take too much time	1	2	3	
	• Should have defined blocks of contact time	1	2	3	
	• Needs to be well organised	1	2	3	Absolutely
	• There should be appropriate infrastructure/facilities for running the course	1	2	3	
	• Logistics to present course should be in place	1	2	3	
f	**Programme content and outcomes**				
	• The course should cover a broad spectrum of clinical issues	1	2	3	
	• The course should be relevant to clinical practice	1	2	3	
	• The course should be applied to clinical practice	1	2	3	

	• The course should not be too specialised	1	2	3	**See comment above on aims under point 14.**
	• The individual topics need to be well-structured	1	2	3	
	• Course should not be too intensive	1	2	3	
	• The curriculum needs to be clearly defined, e.g. with well defined start and end	1	2	3	
	• Should have practical sessions that are relevant	1	2	3	
	• Including a problem-based component in the curriculum using case studies where people can learn from mistakes	1	2	3	
	• There should be exposure to the actual blood bank	1	2	3	
	• The curriculum needs to be organised in and integrated way	1	2	3	
	• There should be good programme and educational material	1	2	3	
	• Outcomes need to be defined	1	2	3	As well as the aims
g	**Assessment**				
	• There should be deliverable assignments	1	2	3	
	• Evaluate the practice and knowledge of the students	1	2	3	
	• There should be self-assessment programmes	1	2	3	Possibly formative only.
	• Need to give feedback to students on assignments	1	2	3	Crucial.
h	**Career-path creation**				
	• Job possibilities need to be created, e.g. posts for doctors who take responsibility for clinical transfusion practice and the transfusion committee in a hospital	1	2	3	
	• Job opportunities for research in transfusion medicine	1	2	3	
i	**Recognition programme**				
	• The Diploma should be recognised by the relevant governing bodies	1	2	3	

	• A regulatory framework that requires certification in transfusion medicine	1	2	3	
	• Programmes should be certified according to certain criteria	1	2	3	
	• There should be a certifying agency	1	2	3	There is one already the HPCSA
	• Continuous professional development (CPD) accreditation of programme	1	2	3	
j	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	Major motivator to current students.
	• Get feedback from the participants	1	2	3	
	• One should diversify and broaden the interest in order to remain sustainable despite medical and technological advances, e.g. if artificial blood products are produced and the current educational needs in transfusion medicine change	1	2	3	One should diversify and broaden the interest in order to remain sustainable *taking into account* medical and technological advances. Feedback from participants will be very useful, as well as from those who graduated in the past and work in the field.

16	ANY FURTHER COMMENTS ON THE FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME?
	Advertise and increase awareness of course among doctors. Develop programme for nursing staff. The program is important to establish current practice in the public service (can be done through the participants). If these diplomats take up the challenge to improve the service at their facility the training has had its desired effect. It would be a constant challenge to improve the services for many yrs to come. Financial support should also come from the state sector. "Value in obtaining qualification", comment: Currently there is little appreciation by the employer (I can only speak for the state sector in SA) for any course that one does extra; no financial reward, no recognition of extra input. Mainly a gain in CPD points only, thereby maintaining registration. Often the only result is 'recognition' by direct collegues who would give this particular diplomat *extra* work. Part of this problem is the general shortage of trained medical staff in SA. Can't expect all doctors to do the diploma. Can't expect an expert in haematology to understand all the aspects of blood transfusion in paediatric oncology or paediatric surgery, so having one person "overseeing" all blood transfusion in a hospital is unpracticable and will not work. The curriculum should be very practical and relevant. It should make a real difference in the CONFIDENCE of the participants who did the course. A role model / tutor facility would also be very very good, since it will formalise a participant's access to an expert to enable and encourage them (the participants) to ask questions and learn.

	SECTION G **ACADEMIC FACTORS**				
	This section deals with the factors from an academic point of view that could be taken into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
17	**THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Programme development**				
	• Research and define the actual skills and knowledge required	1	2	3	
	• Objectives of course need to be tailored to the actual needs of the students, i.e. to the problems relevant to their settings	1	2	3	True, but also needs to lead to improved service delivery
	• Look at what other institutions are doing internationally and adapt what is useful to local circumstances	1	2	3	
	• Should go through the necessary channels of approval, e.g. university channels	1	2	3	I thought this is a pre-requisite
	• People involved with project need to have academic standing to give prestige to the project and the content of the curriculum so that it will inspire confidence in the end product	1	2	3	

b	**Programme structure**				
	• Proper structure	1	2	3	
	• The duration of the diploma needs to be fixed in advance	1	2	3	
	• The duration should not be more than two years	1	2	3	Some colleges said that they will do the diploma if it was only a year. Two years are too long.
	• It should be done part-time if run over a period longer than 18 months	1	2	3	
	• Students will not complete the course if it is too long	1	2	3	Don't believe this argument
	• The duration of each component should be set in great detail	1	2	3	
c	**Quality assurance**				
	• There should be an appropriate standard with internal and external moderation	1	2	3	
	• Final assessment should be externally moderated	1	2	3	Already requirement from University?
	• The certification needs to be limited in time, i.e. continuous professional development credits need to be obtained on an annual basis to maintain certification to ensure that those who qualify remain up-to-date	1	2	3	
	• A recertification process, be it correspondence or attendance-based refresher courses will ensure that those who qualified stay up-to-date and it can be a source of revenue	1	2	3	Don't think that it can be enforced at this stage. Good if it happens
	• Programme should be peer-reviewed according to accepted criteria, e.g. having a specific number of certified haematologists on staff	1	2	3	

	• The training programme should be documented, e.g. which lectures are given	1	2	3	
	• The programme needs to be standardised	1	2	3	
	• Record should be kept of which students attend each session	1	2	3	
d	**Admission criteria and recognition of prior learning**				
	• Applicants for Diploma should have a basic medical degree and do not need to be specialists	1	2	3	
e	**Academic culture**				
	• A spirit of inquisitiveness should be fostered	1	2	3	Already attained if someone shows interest in diploma
	• A culture of critical thinking should be fostered, where questions are asked about the appropriateness of current practice	1	2	3	
	• There should be a culture of continuous learning and updating your knowledge	1	2	3	
	• There should be regular journal reviews and seminars related to transfusion medicine	1	2	3	
f	**Research**				
	• A research component should be included in the programme	1	2	3	
	• The staff should be involved in the research programme which will keep them up-to-date and current	1	2	3	Always a good idea
	• Research and education should go hand in hand	1	2	3	I thought they do!
	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	
	• Research done should be appropriate for the country	1	2	3	

g	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	
18.	**ANY FURTHER COMMENTS ON THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				
	The course should not be longer than 12 months. Transfusion medicine is one aspect of medical services rendered. Compare to other diplomas offered (eg child health and anaesthetic, that have at least such an impact on health services), they are 6 months full time. Also, if course too long, candidates can lose interest, esp if have considerable other clinical duties. Basic diploma should be given without expiry date, but date at which it was done. There should be the *option* for those that would like updates to do them and also include them eg, in their CV. Also, candidates should be given option of receiving new material, eg articles via email to keep updated. However this should be separate from a formal update (though the particular info circulated to candidates that want to keep on reading could of course be part of the formal update.) Haematologists are not necessarily an expert in paeds, surgery, neurosurgery, etc, so can't expect them to dictate to other disciplines – can advise! Course length may become problematic if the diploma does not add possibilities of additional income for the qualified person. It adds knowledge on a very small part of clinical practice (for most doctors).				

	SECTION H **EDUCATIONAL FACTORS**				
	This section deals with major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one option.				
19.	**THE MAJOR EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Curriculum**				
	• You need a formal curriculum	1	2	3	
	• Curriculum needs to be well-defined	1	2	3	
	• The components of the training programme should be enunciated in great detail	1	2	3	*Components* (not content?). **Comment VJ Louw: Both would be correct. When I speak about components, I mean the theoretical and practical components.** Sufficient detail **Comment VJ Louw: I agree, see change in wording statement**

b	**Educational material and resources**				
	• Students need good handouts or educational material to enable them to prepare in advance	1	2	3	Don't need to be voluminous and can be journal articles etc
	• Should make use of the internet	1	2	3	
	• Students need a good bibliography, i.e. good books and references to good articles	1	2	3	This depends on whether you also want to teach the skill of accessing literature. So I would rather say they must have access to a good bibliography, but not that everything that is supllied is necessarily top-class.
	• Course content should be linked into other resources, e.g. one needs to ensure access to the library, including online, for non-resident students	1	2	3	This is a problem. Accessability from outside difficult! No way round this today
	• Students need to be taught how to use online study resources, e.g. PubMed	1	2	3	
	• There should be continuous guidance available to students with regards to use of resources, e.g. online resources	1	2	3	
	• Students should have a quick reference manual for each block	1	2	3	
c	**Learning as an experience**				
	• The content should be interesting	1	2	3	
	• Attendance should be an enriching experience	1	2	3	
	• Students should be inspired	1	2	3	
d	**Assessment**				
	• Assignments should be assessed	1	2	3	

	• Use a variety of teaching and assessment techniques, e.g. lectures, journal reviews, seminar presentations, examinations, etc.	1	2	3	
	• There should be some form of assessment on a regular basis to ensure that outcomes have been achieved	1	2	3	
	• Should have deliverable assignments	1	2	3	
	• Feedback should be given on assignments	1	2	3	
	• Assignments should be short	1	2	3	Depends on the skills you want to teach them.
	• There should be a final assessment to be able to judge whether course is working and force students to consolidate what they have learnt	1	2	3	
	• Core knowledge should be assessed in a final assessment	1	2	3	
	• Make use of peer assessment	1	2	3	Throughout the course
	• Competence should be proven, e.g. keeping a logbook and being signed off for certain procedures or skills attained	1	2	3	
	• Logbooks will allow for auditing	1	2	3	
	• Assessment should be authentic, i.e. applied to real-life situations	1	2	3	Problem-based assessment.
e	**Outcomes**				
	• Outcomes need to well-defined and clearly delineated	1	2	3	
	• Outcomes should be measurable	1	2	3	
f	**Contact time**				
	• Contact sessions are important	1	2	3	
	• Working in small groups is important, with less than ten people in a group	1	2	3	

	• Sessions with students should be interactive	1	2	3	
	• One on one communication or with small groups is very important	1	2	3	
	• Distance learning components should be built in	1	2	3	Can be
g	**Forms of learning**				
	• Emphasis should be on the practical issues more than theoretical things unrelated to day-to-day practice, e.g. seeing cases, evaluating blood request forms critically, going to the blood bank laboratory, how to prescribe blood, administer blood, transporting of blood from laboratory to patient, doing a cross-match, Coombs or a blood group	1	2	3	One lecture tops!
	• Make use of case studies and make it problem-based, e.g. learning from real-life mistakes	1	2	3	
	• Learning should be integrated	1	2	3	
	• Some issues should be taught to give insight, but does not necessarily have to be assessed, e.g. processing of blood, politics and transfusion	1	2	3	Remember, assessment drives learning! Sad, but true. Is assessed indirectly in any case. **Comment VJ Louw: I mean formally assessed.**
	• Problem-based learning is important	1	2	3	
	• Self-directed learning is important	1	2	3	

h	**Teacher**				
	• Lecturers should be people who are actively involved with blood transfusion every day (e.g. trauma surgeons, haematologists, intensivists)	1	2	3	Many persons beside those mentioned use blood. The oncologist (both adult and paeds) use blood, but are not on your list. **Comment VJ Louw: You are quite right, I have only given some examples.** Haematologists from lab rarely (!) use blood and theoretically have no contact with patients. **Comment VJ Louw: This varies quite a lot from center to center. In some centers in South Africa (e.g. KZN) the lab haematologists deliver the full clinical service. At UFS the lab haematologists are very involved in adult patient care including the use of blood.** If there is not a strong knowledge base on transfusion medicine in these specialities you do not necessarily want to use these staff members.
	• Avoid using lecturers who have high positions in transfusion medicine, but who "don't have their feet on the ground" and who can't bring the message across	1	2	3	Why not? Students should see feet of clay as well… all is not well in blood transfusion. Are there many of these around? **Comment VJ Louw: Not in South Africa, but statement includes anyone, also experts from outside the country.**

	• Having speakers from blood transfusion services may be good in terms of allowing the students to build networks with people in the field	1	2	3	
	• Lecturers who are local experts should be used in contact sessions	1	2	3	
	• Lecturers who are national experts should be used in contact sessions	1	2	3	
	• Lecturers who are international experts should be used in contact sessions	1	2	3	Good to have
i	**The student as an adult learner**				
	• The course content should be relevant to the adult learner's work environment	1	2	3	
	• Learner's existing knowledge should be explored	1	2	3	
	• Students should know the benefits and rationale of what is being taught	1	2	3	One would hope that this is the case with all applicants
	• Facilitator should provide an environment wthin which the adult learner feel safe to cooperate and explore	1	2	3	
	• The individual learner's attributes, preferences and needs should be accommodated	1	2	3	
	• New knowledge should be tied to the learners' previous knowledge and experiences	1	2	3	Depends on the learners
	• Should be given the opportunity to solve problems relevant to their real-life worlds	1	2	3	
	• Course content should provide immediacy, i.e. be immediately relevant to the learner's current working environment	1	2	3	
	• Learning approach should promote adulthood (i.e. independence, responsibility, self-direction)	1	2	3	

	• A cooperatve learning climate should be created	1	2	3	
	• Programme should utilise the adult learner's accumulated experience	1	2	3	
	• Provide opportunities for linteraction with co-learner's in small groups	1	2	3	
	• Create experiences that can enhance the construction of meaning (e.g. through role play, case studies, simulations or discussion)	1	2	3	
j	**Alignment**				
	• The content should be aligned with the needs of the students	1	2	3	
	• Assessment should be aligned with course outcomes	1	2	3	
20	**ANY FURTHER COMMENTS ON THE EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				
	Many of the principles tested are mainly common sense. Learners of a program like this should be self motivated and eager to learn something relevant to their working environment. It is probably impossible to take into account the need of every learner. Specific needs will come out in discussion. If learner's needs are considered too much, the scope of the course might be hampered by myopic vision of learners that just haven't seen the full spectrum yet. Role modeling and mentorship - I think this would close the loop on continuous learning for the students of this course. It is becoming an ever bigger issue in medical education and adds real value to the students esp after completing the course.				
21	**PLEASE INDICATE BELOW IF THERE ARE ANY OTHER COMPONENTS THAT YOU WOULD LIKE TO SEE INCLUDED IN A MODEL FOR A POSTGRADUATE DIPLOMA FOR TRANSFUSION MEDICINE THAT WAS NOT DEALT WITH OR CONSIDERED IN THIS SURVEY.**				
	How to ensure implementation and application of new protocols in the learner's environment i.e. how to motivate people to comply with new rules. Effective ways in which transfusion committee members can communicate with hospital staff on new protocols i.e. how to spread the word through the hospital. "Privilege" of access to expert advice by course teachers after achieving a diploma. Alternatively, providing learners contact details of experts, should this be needed.				

APPENDIX D1

LETTER TO DELPHI PANEL ROUND TWO

APPENDIX D1

LETTER TO DELPHI PANEL ROUND TWO

A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE IN THE SCHOOL OF MEDICINE AT THE UNIVERSITY OF THE FREE STATE

Dear Delphi participant,

Thank you once again for your participation in the Delphi process and for the feedback given during Round One of the survey.

PURPOSE OF THE ROUND TWO QUESTIONNAIRE

In Round Two of the questionnaire you are provided with all the statements (criteria) on which consensus was **not reached** during Round One. Consensus was pre-defined according to the literature as the state where 80% of the participants vote on a specific item with the same value on the three-point scale. All the questions on which consensus were reached, have been removed from this questionnaire as explained in the feedback letter sent to you on the 20th of April 2010.

In this round of the Delphi process you are given the opportunity to reconsider your opinion on the statements that are left, taking into account the anonymous feedback that was provided by your fellow participants and some clarifications made by the researcher. All sections and statements are numbered in exactly the same way as in the first round.

INSTRUCTIONS FOR COMPLETION OF THE SECOND ROUND

As mentioned above, the Round Two questionnaire only contains the statements on which no consensus could be reached in Round One. During this round, you are allowed to change your opinion if you want to and you can make new comments in the spaces provided.

Please use the following scale again:

1 = Essential (This criterion must **DEFINITELY BE INCLUDED** in the model)
2 = Useful (This criterion **CAN BE INCLUDED** in the model)
3 = Unnecessary (This criterion must **DEFINITELY BE EXCLUDED** from the model)

If possible, please complete the questionnaire in its electronic form. If, however, you prefer to print it out and complete it in paper format, please feel free to do so. In both cases please answer all the points by placing an **X** over or next to the specific number of your choice in the scale provided with each statement. **Please answer all questions in the questionnaire.** Do not hesitate to contact me if anything is unclear.

The questionnaire in this round should take approximately 1 hour of your time. Please contact me if you have any questions or uncertainties. As always, your response remains anonymous and confidential with regards to all other participants and will be known only to the research team.

Please return the filled-out questionnaires by the **19th of May 2010**. The analysis can only be done once all questionnaires are received back, so your cooperation with regards to the deadline is greatly appreciated.

I would like thank all of you once again for the tremendous effort put into this exercize thus far.

Prof VJ Louw (Researcher)
Student number: 2005175779

PLEASE NOTE:

Save the attached Delphi questionnaire as a Word document on your computer before completing it. Send the completed questionnaire back to us as an attachment to an email message (louwvj@ufs.ac.za or vernon.louw@gmail.com) or fax it back to 051-4441036 before or on the **19th of May 2010**. A hard copy of this questionnaire can be made available if required.

APPENDIX D2

QUESTIONNAIRE FOR DELPHI PANEL ROUND TWO

APPENDIX D2

QUESTIONNAIRE FOR DELPHI PANEL ROUND TWO

	SECTION A **THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING**				
	This section deals with the description of the main roles, including tasks and functions of the clinician dealing with blood transfusion in the clinical setting. It also deals with the description of the main areas of clinical knowledge, skills and competences required, as well as the deficiencies in the abilities of clinicians dealing with blood transfusion in the clinical setting. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
1.	**MAIN ROLES, TASKS AND FUNCTIONS**				
	The main roles, including tasks and functions of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**A supervisory function in which he/she should**				
	• Ensure that there are no clerical errors	1	2	3	
b	**Governance role which include**				
	• Developing policies for blood transfusion in consultation with relevant colleagues	1	2	3	
	• Give feedback to hospital management on utilisation of blood products in the hospital	1	2	3	

	• Conduct audits on the use of blood	1	2	3	
c	**A training role, which include**				
	• clinical undergraduate teaching	1	2	3	
	• postgraduate teaching	1	2	3	
	• Training of nursing and laboratory personnel as well as medical students and specialists-in-training	1	2	3	
d	**A role in scarce resource management, which include**				
	• Limiting the use of blood	1	2	3	
	• Using appropriate alternatives to transfusion	1	2	3	
	• The cost-effective use of blood	1	2	3	
	• An awareness of the limitations of the blood supply	1	2	3	
e	**A patient management role which include**				
	• Taking personal responsibility for obtaining cross-match sample from patient	1	2	3	
	• Logistical issues, e.g. transportation of blood	1	2	3	
f	**A role as researcher, which include**				
	• Support research aimed at better identifying the indications for blood transfusion	1	2	3	
	• Interpret the literature on blood transfusion	1	2	3	
2.	**SKILLS AND COMPETENCES**				
	The main skills and competences of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
b	**Technical**				
	• Achieving venous access, including placement of central lines	1	2	3	
	• Competence in thawing of blood products, e.g. fresh frozen plasma	1	2	3	

	• Competency in doing a cross-match	1	2	3	
c	**Administrative**				
	• Administrative skills, including precise note-keeping	1	2	3	
d	**Social**				
	• Communication skills	1	2	3	
	• Interpersonal skills	1	2	3	
e	**Integration**				
	• Practicing transfusion medicine in rural areas	1	2	3	
	• Competency in interpreting activities in the blood bank	1	2	3	
g	**Research**				
	• Auditing skills	1	2	3	
	• Know how to interpret the literature on blood transfusion	1	2	3	
3.	**MAIN AREAS OF CLINICAL KNOWLEDGE**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
	The main areas of clinical knowledge required by the clinician dealing with blood transfusion can be described as:				
a	**Physiology**				
	• Blood groups	1	2	3	
	• Knowledge of transfusion immunology	1	2	3	
b	**Pathophysiology**				
	• Pathophysiology of diseases where blood products may be indicated	1	2	3	
	• Pathophysiology related to blood loss and blood transfusion	1	2	3	
c	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	
	• Knowledge of blood grouping	1	2	3	

	• Thawing of blood products	1	2	3	
	• Knowledge of the principles underlying the issuing of blood	1	2	3	
	• Knowledge of cross-matching	1	2	3	
d	**Haematology**				
	• Coagulation and anti-coagulant drugs	1	2	3	
	• Haemophilia	1	2	3	
e	**Clinical medicine**				
	• Intensive care issues related to blood transfusion	1	2	3	
	• Knowledge of the relevance of co-morbid disease in patients that need a blood transfusion	1	2	3	
g	**Evidence-based medicine**				
	• Evidence behind appropriate transfusion	1	2	3	
	• Appropriate use of blood products	1	2	3	
h	**Blood administration**				
	• Administration of blood products	1	2	3	
	• Deciding on amount of blood product that needs to be transfused	1	2	3	
i	**Blood conservation**				
	• Autologous transfusions	1	2	3	
	• Blood conservation methods	1	2	3	
	• Platelet-refractoriness	1	2	3	
j	**Blood safety**				
	• Transfusion-transmissible infections	1	2	3	
	• Haemovigilance	1	2	3	
	• Allo-immunisation	1	2	3	
4.	**ANY FURTHER COMMENTS ON THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING**				

	SECTION B **THE SCOPE OF PRACTICE OF THE CLINICIAN INVOLVED WITH BLOOD TRANSFUSION**				
	This section deals with the difference in the scope of practice between a full-time specialist in transfusion medicine and a clinician who deals with blood transfusion on an *ad hoc* basis. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
4.	**THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE**				
	The scope of practice of a full-time Specialist in Transfusion Medicine can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical knowledge**				
	• Deals more with coagulation problems	1	2	3	
b	**Blood banking**				
	• Dealing with blood donors	1	2	3	
	• Involved with quality control in blood bank	1	2	3	
	• Involved in the running of the blood bank	1	2	3	
	• Administrative aspects of blood banking, including tracking and retrieval of blood and computerisation	1	2	3	
	• Have a deeper understanding of the laboratory testing for transfusion-transmitted infections	1	2	3	
c	**Teaching and training**				
	• Functions as a tutor to his colleagues	1	2	3	

d	**Leadership and consultative roles**				
	• Coordinating role within the hospital	1	2	3	
	• Should have sufficient stature to be able to advise, help and lead new developments	1	2	3	
	ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE				
5.	**THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				
	The scope of practice of the clinician dealing with blood transfusion on an *ad hoc* basis can best be described as:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical knowledge**				
	• Can be of practical assistance by the bedside	1	2	3	
	• Should apply knowledge in local setting	1	2	3	
	• More clinically orientated than specialist	1	2	3	
	• Knowledge of transfusion basics, e.g. the indications for blood products	1	2	3	
b	**Blood banking**				
	• Can do basic cross-matching, blood grouping, blood smear review and urine testing	1	2	3	
	• Should know the concepts and principles underlying aphaeresis	1	2	3	
c	**Teaching and training**				
	• Can assist with transfusion medicine training of doctors, students, paramedical staff and nurses	1	2	3	
d	**Leadership and consultative**				
	• Can be consulted regarding transfusion in a big department	1	2	3	
6.	**ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				

	SECTION C **THE CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION**				
	This section deals with the current challenges faced by clinicians dealing with blood transfusion as well as the challenges anticipated in the next five years. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
7.	**CHALLENGES CURRENTLY FACED BY CLINICIANS**				
	The challenges currently faced by clinicians dealing with blood transfusion include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Quality and safety**				
	• Limiting transfusion-transmitted infections	1	2	3	
	• Quality of blood products	1	2	3	
	• Restrictions on donors and increasing donor deferral	1	2	3	
	• West-Nile virus	1	2	3	
	• Patients requiring repeated blood transfusion	1	2	3	
	• Clerical errors	1	2	3	
b	**Lack of knowledge and training**				
	• Lack of training in transfusion medicine on an undergraduate level	1	2	3	
	• Clinician knowledge on coagulation and anticoagulants	1	2	3	
	• Knowledge of the value of blood products	1	2	3	
	• Knowledge of the pre-analytical and analytical phase of blood sample processing	1	2	3	
	• Knowledge of the individual blood products, their methods of preparation, storage life and their contents	1	2	3	

	• Knowledge of practical issues relating to blood use, e.g. thawing, administration, irradiation	1	2	3	
	• Knowledge of the pathophysiology of transfusion-related complications	1	2	3	
c	**Access and availability**				
	• Adequate blood supply	1	2	3	
	• Decreasing donor pool	1	2	3	
	• Finding enough platelet donors	1	2	3	
	• Restrictions on donors and increasing donor deferral	1	2	3	
	• Lack of rare blood groups in the donor pool	1	2	3	
	• Development of anti-platelet antibodies and subsequent platelet refractoriness	1	2	3	
	• Immigration of peoples into areas with an inadequate supply of blood for their blood groups, e.g. immigration Africans to Europe	1	2	3	
	• Increasing demand for blood due to novel medical techniques requiring blood, e.g. increasing need for exchange transfusion for patients with sickle cell anaemia immigrating to Europe	1	2	3	
	• Increasing demand for blood in specialised medical care, e.g. leukaemia and cancer treatment	1	2	3	
	• Patients requiring repeated blood transfusion	1	2	3	
d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood transfusion	1	2	3	
	• Informed consent issues	1	2	3	
	• Physician responsibility for a product delivered to him/her by a third party	1	2	3	
	• Refusal of blood products for religious reasons	1	2	3	
	• Issues flowing from breach of anonymity between recipient and donor ~~as donor's name is on blood product~~	1	2	3	
e	**Cultural perceptions and understanding**				
	• Cultural perceptions of blood transfusion	1	2	3	
	• Public fear of the blood supply, e.g. risk of contracting HIV	1	2	3	
f	**Cost-effectiveness**				
	• Cost-effective use of blood	1	2	3	

8.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				
9.	**CHALLENGES CLINICIANS ARE EXPECTED TO BE FACED WITH IN THE NEXT FIVE YEARS**				
	The challenges clinicians involved in blood transfusion are expected to be faced with in the next five years, include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Quality and safety**				
	• Effects of HIV epidemic on transfusion medicine	1	2	3	
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, variant Creutzfeld-Jacob's disease (vCJD)	1	2	3	
	• Quality of blood products	1	2	3	
	• Increase in Graft-versus-host-disease (GVHD)	1	2	3	
b	**Lack of knowledge and training**				
	• Lack of academic input regarding use of blood in the private sector	1	2	3	
c	**Access and availability**				
	• Increased demand for blood due to HIV epidemic	1	2	3	
	• Shrinking donor pool due to HIV epidemic	1	2	3	
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	
d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood use	1	2	3	
	• Informed consent issues	1	2	3	
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	
e	**Cost-effective use**				
	• Cost-effective use of blood	1	2	3	

f	**Managing change**				
	• Keeping up with new developments	1	2	3	
	• Managing change in the field of blood transfusion	1	2	3	
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, vCJD	1	2	3	
10.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				

	SECTION D **DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	This section deals with the deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
11	**DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	The deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products, include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Knowledge**				
	• Knowledge of the correct indications for transfusion	1	2	3	
	• Knowledge of transfusion in general	1	2	3	
	• Knowledge of available products	1	2	3	
	• Knowledge of coagulation and haemostasis	1	2	3	
b	**Skills**				
	• Skills to correctly administer blood products	1	2	3	
	• Skills required to obtain venous access, including central line placement, e.g. in shocked patient	1	2	3	
	• Application of clinical skills - clinicians too focused on laboratory values and not enough by the bedside	1	2	3	
c	**Evidence-based practice**				
	• Inappropriate use of blood and blood products	1	2	3	
	• Lack of guidelines on blood transfusion	1	2	3	

	• Inappropriate selection of blood products	1	2	3	
	• Non-adherence to guidelines and recommendations	1	2	3	
	• Transfusing patients unnecessarily	1	2	3	
	• Cross-matching and keeping blood unnecessarily, esp. in surgery and anesthesiology	1	2	3	
	• Resistance of clinicians against changing behaviour despite being given guidelines	1	2	3	
d	**Human resources**				
	• Lack of time for participating in educational activities related to blood transfusion	1	2	3	
	• Lack of clinicians with an overview of all aspects of transfusion	1	2	3	
e	**Scarce resource management**				
	• Awareness of costs	1	2	3	
	• Lack of auditing systems	1	2	3	
f	**Attitude**				
	• Transfusion seen as an insignificant part of patient care	1	2	3	
12	**ANY FURTHER COMMENTS ON THE DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS?**				

	SECTION E **PROGRAMME OUTCOMES**				
	This section deals with the major outcomes of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
13	**THE MAJOR OUTCOMES OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
	The major outcomes for a clinician completing a postgraduate diploma should include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
b	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	
	• Should know how cross-match testing is performed	1	2	3	
	• Should know about blood processing	1	2	3	
	• Should know about donor selection and donor-related issues	1	2	3	
	• Should have an awareness of aphaeresis and its applications	1	2	3	
	• Understand antibody identification procedures	1	2	3	
	• Should know about blood collection and the different types of collection systems	1	2	3	
	• Should know about quality assurance in blood banking	1	2	3	
	• Should know about the new issues facing blood banking	1	2	3	
	• Should know about leukodepletion in laboratory and by bedside	1	2	3	
	• Should know how blood typing is done	1	2	3	

c	**Haematology**				
	• Knowledge of relevant aspects of haematology	1	2	3	
e	**Clinical medicine**				
	• The use of transfusions by a clinician doing the diploma should decrease	1	2	3	
	• The quality of the transfusions by a clinician doing the diploma should increase, e.g. less complications and wastage of blood products	1	2	3	
	• Should know the ethical aspects concerning the use of blood and blood products	1	2	3	
f	**Blood conservation**				
	• Should know about cost-effectiveness in transfusion medicine	1	2	3	
g	**Blood safety**				
	• Should know about GVHD	1	2	3	
h	**Social skills**				
	• Should have communication skills	1	2	3	
i	**Research**				
	• Should be able to participate in clinical research related to transfusion medicine	1	2	3	
	• Should have an understanding of the need for clinical trials in transfusion medicine	1	2	3	
14	**ANY FURTHER COMMENTS ON THE THE MAJOR OUTCOMES OF A CURRICULUM OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				

	SECTION F **SUSTAINABILITY**				
	This section deals with the major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
15	**THE MAJOR FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Academic staff**				
	• Roles of team members need to be clearly defined	1	2	3	
	• Expose students to a broad spectrum of lecturers from different backgrounds	1	2	3	
	• Use different lecturers at different times	1	2	3	
	• Can use part-time staff to compensate for an insufficient number of full-time staff members	1	2	3	
b	**Value creation**				
	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	
	• There should be value in obtaining the qualification	1	2	3	
	• Malpractice insurance levies for doctors who practice transfusion medicine without the qualification may make it more attractive	1	2	3	
	• Blood banks should require that their doctors have a formal qualification in transfusion medicine	1	2	3	
	• Sponsor people to attend on a meritorial basis	1	2	3	

c	**Networking**				
	• Input needed from a variety of role players	1	2	3	
	• Get buy-in from the private sector	1	2	3	
d	**Financial viability**				
	• There should be a revenue stream/funding	1	2	3	
	• Get sponsorship from the private sector, e.g. private laboratories	1	2	3	
e	**Structure and organisation**				
	• Should be a part-time programme, i.e. doctor should be able to do it from his/her practice	1	2	3	
	• Course can be short and full-time, but also reasonable to have a part-time course with intensive contact sessions	1	2	3	
	• Course should not be too long or take too much time	1	2	3	
	• Should have defined blocks of contact time	1	2	3	
	• There should be appropriate infrastructure/facilities for running the course	1	2	3	
f	**Programme content and outcomes**				
	• The course should not be too specialised	1	2	3	
	• Course should not be too intensive	1	2	3	
	• The curriculum needs to be clearly defined, e.g. with well defined start and end	1	2	3	
	• Should have practical sessions that are relevant	1	2	3	
	• Including a problem-based component in the curriculum using case studies where people can learn from mistakes	1	2	3	
	• There should be exposure to the actual blood bank	1	2	3	
	• The curriculum needs to be organised in and integrated way	1	2	3	
g	**Assessment**				
	• There should be self-assessment programmes	1	2	3	
	• Need to give feedback to students on assignments	1	2	3	

h	**Career-path creation**				
	• Job possibilities need to be created, e.g. posts for doctors who take responsibility for clinical transfusion practice and the transfusion committee in a hospital	1	2	3	
	• Job opportunities for research in transfusion medicine	1	2	3	
i	**Recognition programme**				
	• The Diploma should be recognised by the relevant governing bodies	1	2	3	
	• A regulatory framework that requires certification in transfusion medicine	1	2	3	
	• Programmes should be certified according to certain criteria	1	2	3	
	• There should be a certifying agency	1	2	3	
	• Continuous professional development (CPD) accreditation of programme	1	2	3	
j	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	
	• Get feedback from the participants	1	2	3	
	• One should diversify and broaden the interest in order to remain sustainable despite medical and technological advances, e.g. if artificial blood products are produced and the current educational needs in transfusion medicine change	1	2	3	
16	**ANY FURTHER COMMENTS ON THE FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME?**				

	SECTION G **ACADEMIC FACTORS**				
	This section deals with the factors from an academic point of view that could be taken into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
17	**THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Programme development**				
	• Objectives of course need to be tailored to the actual needs of the students, i.e. to the problems relevant to their settings	1	2	3	
	• Look at what other institutions are doing internationally and adapt what is useful to local circumstances	1	2	3	
	• People involved with project need to have academic standing to give prestige to the project and the content of the curriculum so that it will inspire confidence in the end product	1	2	3	
b	**Programme structure**				
	• It should be done part-time if run over a period longer than 18 months	1	2	3	
	• Students will not complete the course if it is too long	1	2	3	
	• The duration of each component should be set in great detail	1	2	3	

c	**Quality assurance**				
	• The certification needs to be limited in time, i.e. continuous professional development credits need to be obtained on an annual basis to maintain certification to ensure that those who qualify remain up-to-date	1	2	3	
	• A recertification process, be it correspondence or attendance-based refresher courses will ensure that those who qualified stay up-to-date and it can be a source of revenue	1	2	3	
	• Programme should be peer-reviewed according to accepted criteria, e.g. having a specific number of certified haematologists on staff	1	2	3	
	• Record should be kept of which students attend each session	1	2	3	
d	**Admission criteria and recognition of prior learning**				
	• Applicants for Diploma should have a basic medical degree and do not need to be specialists	1	2	3	
e	**Academic culture**				
	• A spirit of inquisitiveness should be fostered	1	2	3	
	• There should be regular journal reviews and seminars related to transfusion medicine	1	2	3	
f	**Research**				
	• A research component should be included in the programme	1	2	3	
	• The staff should be involved in the research programme which will keep them up-to-date and current	1	2	3	
	• Research and education should go hand in hand	1	2	3	
	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	
	• Research done should be appropriate for the country	1	2	3	
g	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	
18	**ANY FURTHER COMMENTS ON THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				

	SECTION H **EDUCATIONAL FACTORS**				
	This section deals with major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one option.				
19	**THE MAJOR EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Curriculum**				
	• The components of the training programme should be enunciated in sufficient detail	1	2	3	
b	**Educational material and resources**				
	• Students need good handouts or educational material to enable them to prepare in advance	1	2	3	
	• Should make use of the internet	1	2	3	
	• Students need a good bibliography, i.e. good books and references to good articles	1	2	3	
	• Students need to be taught how to use online study resources, e.g. PubMed	1	2	3	
	• There should be continuous guidance available to students with regards to use of resources, e.g. online resources	1	2	3	
	• Students should have a quick reference manual for each block	1	2	3	
c	**Learning as an experience**				
	• The content should be interesting	1	2	3	
	• Attendance should be an enriching experience	1	2	3	

d	**Assessment**				
	• Use a variety of teaching and assessment techniques, e.g. lectures, journal reviews, seminar presentations, examinations, etc.	1	2	3	
	• There should be some form of assessment on a regular basis to ensure that outcomes have been achieved	1	2	3	
	• Assignments should be short	1	2	3	
	• There should be a final assessment to be able to judge whether course is working and force students to consolidate what they have learnt	1	2	3	
	• Core knowledge should be assessed in a final assessment	1	2	3	
	• Make use of peer assessment	1	2	3	
	• Competence should be proven, e.g. keeping a logbook and being signed off for certain procedures or skills attained	1	2	3	
	• Logbooks will allow for auditing	1	2	3	
	• Assessment should be authentic, i.e. applied to real-life situations	1	2	3	
f	**Contact time**				
	• Working in small groups is important, with less than ten people in a group	1	2	3	
	• One on one communication or with small groups is very important	1	2	3	
	• Distance learning components should be built in	1	2	3	
g	**Forms of learning**				
	• Emphasis should be on the practical issues more than theoretical things unrelated to day-to-day practice, e.g. seeing cases, evaluating blood request forms critically, going to the blood bank laboratory, how to prescribe blood, administer blood, transporting of blood from laboratory to patient, doing a cross-match, Coombs or a blood group	1	2	3	
	• Learning should be integrated	1	2	3	
	• Some issues should be taught to give insight, but does not necessarily have to be assessed, e.g. processing of blood, politics and transfusion	1	2	3	
	• Problem-based learning is important	1	2	3	
	• Self-directed learning is important	1	2	3	

h	**Teacher**				
	• Lecturers should be people who are actively involved with blood transfusion every day (e.g. trauma surgeons, haematologists, intensivists)	1	2	3	
	• Avoid using lecturers who have high positions in transfusion medicine, but who "don't have their feet on the ground" and who can't bring the message across	1	2	3	
	• Having speakers from blood transfusion services may be good in terms of allowing the students to build networks with people in the field	1	2	3	
	• Lecturers who are local experts should be used in contact sessions	1	2	3	
	• Lecturers who are national experts should be used in contact sessions	1	2	3	
	• Lecturers who are international experts should be used in contact sessions	1	2	3	
i	**The student as an adult learner**				
	• The course content should be relevant to the adult learner's work environment	1	2	3	
	• Learner's existing knowledge should be explored	1	2	3	
	• Students should know the benefits and rationale of what is being taught	1	2	3	
	• Facilitator should provide an environment within which the adult learner feel safe to cooperate and explore	1	2	3	
	• The individual learner's attributes, preferences and needs should be accommodated	1	2	3	
	• New knowledge should be tied to the learners' previous knowledge and experiences	1	2	3	
	• Should be given the opportunity to solve problems relevant to their real-life worlds	1	2	3	
	• Course content should provide immediacy, i.e. be immediately relevant to the learner's current working environment	1	2	3	
	• Learning approach should promote adulthood (i.e. independence, responsibility, self-direction)	1	2	3	
	• A cooperative learning climate should be created	1	2	3	
	• Programme should utilize the adult learner's accumulated experience	1	2	3	
	• Provide opportunities for linteraction with co-learner's in small groups	1	2	3	

	• Create experiences that can enhance the construction of meaning (e.g. through role play, case studies, simulations or discussion)	1	2	3	
j	**Alignment**				
	• The content should be aligned with the needs of the students	1	2	3	
20	**ANY FURTHER COMMENTS ON THE EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				
21	**PLEASE INDICATE BELOW IF THERE ARE ANY OTHER COMPONENTS THAT YOU WOULD LIKE TO SEE INCLUDED IN A MODEL FOR A POSTGRADUATE DIPLOMA FOR TRANSFUSION MEDICINE THAT WAS NOT DEALT WITH OR CONSIDERED IN THIS SURVEY.**				

APPENDIX D3a

FEEDBACK ON DELPHI ROUND TWO

APPENDIX D3a

FEEDBACK ON DELPHI ROUND TWO

A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE IN THE SCHOOL OF MEDICINE AT THE UNIVERSITY OF THE FREE STATE

Dear Delphi participant,

Thank you once again for taking the time to complete the second round Delphi questionnaire. Attached you will find the results of the second round of the Delphi process. I am sending you this feedback with the sole purpose of providing you with the results and information regarding the second round. **You do not need to do anything with it.**

According to Larson and Wissman consensus is reached where 80% of the participants indicate a similar value (to a specific item) as their choice. After Round One and Round Two of this Delphi process, out of 387 statements, consensus was reached on 174 (45.0%) of these. These statements will be removed from Round Three, and only the remaining statements will be left for your consideration. The questionnaire will reach you soon.

In the attached feedback you will note that all the statements on which consensus had been reached have been shaded and comments from participants are included. In a number of instances, I have made comments to help clarify some of the issues raised by participants. These are indicated below the participant's comment as "Comment VJ Louw" in bold.

Please keep the attached feedback next to you when you complete the last round.

Kind regards
Vernon Louw

APPENDIX D3b

FEEDBACK DELPHI ROUND TWO

APPENDIX D3b

FEEDBACK DELPHI ROUND TWO

	SECTION A **THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING**
	This section deals with the description of the main roles, including tasks and functions of the clinician dealing with blood transfusion in the clinical setting. It also deals with the description of the main areas of clinical knowledge, skills and competences required, as well as the deficiencies in the abilities of clinicians dealing with blood transfusion in the clinical setting. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).

1.	**MAIN ROLES, TASKS AND FUNCTIONS**				
	The main roles, including tasks and functions of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**A supervisory function in which he/she should**				
	• Ensure that there are no clerical errors	1	2	3	Part of every professional's work. Clerical errors will generate at best, non-conformance, at worst, SAE's and should be pre-emptively supervised. It is doubtful that a clinician in a general setting would pay attention to this unless it is his direct responsibility in the hospital. Dr only fills in form and writes the prescription. This is very hard to do. The system should be so organized that the clinician is one cog in the system, as far as clerical issues go.
b	**Governance role which include**				
	• Developing policies for blood transfusion in consultation with relevant colleagues	1	2	3	I guess essential, if you are trained for this. In your specific setting. Master's (i.e. ideally for a Master's programme not a diploma programme)
	• Give feedback to hospital management on utilisation of blood products in the hospital	1	2	3	Master's (i.e. ideally for a Master's programme not a diploma programme)
	• Conduct audits on the use of blood	1	2	3	Master's (i.e. ideally for a Master's programme not a diploma programme)

c	**A training role, which include**				
	• Clinical undergraduate teaching	1	2	3	If in teaching environment. If there are students they must be taught to do it right. Master's
	• Postgraduate teaching	1	2	3	If in teaching environment All these questions: the intensity of the teaching depends on the setting, but even trained people in non-academic settings should be teachers Master's
	• Training of nursing and laboratory personnel as well as medical students and specialists-in-training	1	2	3	No contact with lab staff. How does this function differ from the 2 bullets above? **Answer VJ Louw: I meant teaching of medical students in bullet one and medical doctors in bullet 2. Thanks for pointing this out.** Master's
d	**A role in scarce resource management, which include**				
	• Limiting the use of blood	1	2	3	"Optimising" is more appropriate **Comment VJ Louw: Thank you. Will change in round three.** Limiting should be with the correct indications These are very important aspects because blood products are a scarce resource

	• Using appropriate alternatives to transfusion	1	2	3	Essential, but how many of the alternatives are 1) available 2) cheaper? These are very important aspects because blood products are a scarce resource
	• The cost-effective use of blood	1	2	3	These are very important aspects because blood products are a scarce resource
	• An awareness of the limitations of the blood supply	1	2	3	These are very important aspects because blood products are a scarce resource
e	**A patient management role which include**				
	• Taking personal responsibility for obtaining cross-match sample from patient	1	2	3	Can't be available all the time. There are different people who take the blood, write it up and get the consent – 3different persons. Taking blood is easy, but whoever does it must take responsibility This is important but the doctor does not need to take personal responsibility in every situation
	• Logistical issues, e.g. transportation of blood	1	2	3	Not my job Hospital and blood bank responsible Should be aware of how blood products gets to his area of practice from the blood bank at least, so this could be useful
f	**A role as researcher, which include**				
	• Support research aimed at better identifying the indications for blood transfusion	1	2	3	Master's

	• Interpret the literature on blood transfusion	1	2	3	Section f is mainly aimed at doctors in academic sector **Comment VJ Louw: Is this true? Do blood banks and private hospitals not audit their practices and usage of blood.** Interpret the literature as it relates to the use of blood products and clinical indications for transfusion (in the clinical setting relevant to the attending doctor). Master's
2.	**SKILLS AND COMPETENCES**				
	The main skills and competences of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
b	**Technical**				
	• Achieving venous access, including placement of central lines	1	2	3	Very important
	• Competence in thawing of blood products, e.g. fresh frozen plasma	1	2	3	Blood bank's job! Blood bank responsibility as there is need for quality control, etc. Knowledge, not doing necessarily Awareness only not competence

	• Competency in doing a cross-match	1	2	3	Blood bank's job! Blood bank responsibility as there is need for quality control, etc. Full understanding of the technique principles, yes Knowledge of principles only Awareness only not competence
c	**Administrative**				
	• Administrative skills, including precise note-keeping	1	2	3	Useful
d	**Social**				
	• Communication skills	1	2	3	Basic skills of a clinician As must all doctors. What if you're not a good communicator or a "people person"? **Comment VJ Louw: The question is how essential this skill is. If considered important enough, one can build training into such a course to empower the course participants if they lack these skills.**
	• Interpersonal skills	1	2	3	Basic skills of a clinician As must all doctors. What if you're not a good communicator or a "people person"? **Comment VJ Louw: The question is how essential this skill is. If considered important enough, one can build training into such a course to empower the course participants if they lack these skills.**

e	**Integration**				
	• Practicing transfusion medicine in rural areas	1	2	3	Core material: the diploma course should ideally concentrate on blood banking and clinical use of blood products Question not clear: Is doctor placed in rural area? Or advisor?If he works there. A clinician should be able to apply in all sectors of health care **VJ Louw: Please see my comment under point 4.**
	• Competency in interpreting activities in the blood bank	1	2	3	Core material: the diploma course should ideally concentrate on blood banking and clinical use of blood products Which activities? **Answer VJ Louw: Interpret the laboratory tests and challenges that may arise with donors or preparation of blood products.**
g	**Research**				
	• Auditing skills	1	2	3	Master's
	• Know how to interpret the literature on blood transfusion	1	2	3	Interpret the literature as it relates to the use of blood products and clinical indications for transfusion (in the clinical setting relevant to the attending doctor). Master's

3.	MAIN AREAS OF CLINICAL KNOWLEDGE				
		ESSENTIAL	USEFUL	UNNECESSARY	Comments
	The main areas of clinical knowledge required by the clinician dealing with blood transfusion can be described as:				
a	**Physiology**				
	• Blood groups	1	2	3	Not essential Core material
	• Knowledge of transfusion immunology	1	2	3	Not essential Core material
b	**Pathophysiology**				
	• Pathophysiology of diseases where blood products may be indicated	1	2	3	Not essential Core material
	• Pathophysiology related to blood loss and blood transfusion	1	2	3	Not essential Core material
c	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	Not needed by the clinician – is the lab's job Core material
	• Knowledge of blood grouping	1	2	3	Not needed by the clinician – is the lab's job Core material
	• Thawing of blood products	1	2	3	Not needed by the clinician – is the lab's job Core material
	• Knowledge of the principles underlying the issuing of blood	1	2	3	Not needed by the clinician – is the lab's job Core material
	• Knowledge of cross-matching	1	2	3	Not needed by the clinician – is the lab's job Undecided on whether this is useful or essential. Core material

d	**Haematology**				
	• Coagulation and anti-coagulant drugs	1	2	3	I think one should not confuse the role of a haematologist and any other doctor dealing with blood transfusion Core material
	• Haemophilia	1	2	3	This is not applicable to gynaes for example. Core material
e	**Clinical medicine**				
	• Intensive care issues related to blood transfusion	1	2	3	Core material Depending on where these clinicians work , this may be indicated as essential Depends on the work setting If one works in that type of setting, otherwise less important **VJL: Please see my comment point 4.**
	• Knowledge of the relevance of co-morbid disease in patients that need a blood transfusion	1	2	3	Depending on where these clinicians work , this may be indicated as essential Core material
g	**Evidence-based medicine**				
	• Evidence behind appropriate transfusion	1	2	3	Masters
	• Appropriate use of blood products	1	2	3	Masters
h	**Blood administration**				
	• Administration of blood products	1	2	3	IM or IV – how else? Core material
	• Deciding on amount of blood product that needs to be transfused	1	2	3	Core material
i	**Blood conservation**				
	• Autologous transfusions	1	2	3	Core material
	• Blood conservation methods	1	2	3	Core material

	• Platelet-refractoriness	1	2	3	I don't know what this is **Answer VJ Louw: This is when a patient's platelet count does not significantly increase after platelet transfusion, often due to HLA-antibodies against platelets that form after multiple transfusions.** Core material
j	**Blood safety**				
	• Transfusion-transmissible infections	1	2	3	Core material
	• Haemovigilance	1	2	3	Core material
	• Allo-immunisation	1	2	3	Core material
4.	**ANY FURTHER COMMENTS ON THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING**				
	The difficulty here is what you actually mean with the transfusion responsibilities of the "clinician dealing with blood transfusion in the clinical setting" – but I am assuming it is not a casual association with transfusion, but a focused one, i.e. with some responsibility attached to it Lots of the questions above would be useful to know, but not essential. Blood bank needs to know more about the cross-matching etc. The clinical settings differ significantly in RSA. Would not expect a rural clinician to know all intricacies of intensive care transfusion. **Answer VJ Louw: I think the issue is whether one should train broader rather than narrower in order to enable the clinician to be at home in varied settings, <u>not only</u> the one where he/she is currently working.**				

	SECTION B **THE SCOPE OF PRACTICE OF THE CLINICIAN INVOLVED WITH BLOOD TRANSFUSION**				
	This section deals with the difference in the scope of practice between a between a full-time specialist in transfusion medicine and a clinician who deals with blood transfusion on an *ad hoc* basis. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
4.	**THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE**				
	The scope of practice of a full-time Specialist in Transfusion Medicine can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical knowledge**				
	• Deals more with coagulation problems	1	2	3	Not really. Only if his job description is for blood bank! More than what/who? **Answer VJ Louw: More than a clinician who deals with blood transfusion on an *ad hoc* basis (see above)**
b	**Blood banking**				
	• Dealing with blood donors	1	2	3	e.g. Dealing with devising acceptance and deferral criteria for donors, dealing with the interpretation of positive TTI tests etc. Only if his job description is for blood bank! Section b is highly dependent on the work environment Useful to know as part of blood banking

	• Involved with quality control in blood bank	1	2	3	Quality control in a Blood Service Only if his job description is for blood bank! Section b is highly dependent on the work environment Useful to know as part of blood banking
	• Involved in the running of the blood bank	1	2	3	Only if his job description is for blood bank! Section b is highly dependent on the work environment The actual running of a specific compatibility testing laboratory (blood bank) is the responsibility (and within the scope of practice) of Medical Technologists Useful to know as part of blood banking
	• Administrative aspects of blood banking, including tracking and retrieval of blood and computerisation	1	2	3	Only if his job description is for blood bank! Section b is highly dependent on the work environment Depends on staff available Useful to know as part of blood banking
	• Have a deeper understanding of the laboratory testing for transfusion-transmitted infections	1	2	3	Only if his job description is for blood bank! Section b is highly dependent on the work environment Useful to know as part of blood banking
c	**Teaching and training**				
	• Functions as a tutor to his colleagues	1	2	3	Master's

d	**Leadership and consultative roles**				
	• Coordinating role within the hospital	1	2	3	Probably only needed for special cases Master's
	• Should have sufficient stature to be able to advise, help and lead new developments	1	2	3	If sufficient knowledge the respect should be semi-automatic Also very dependent on the work environment Master's
	ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE				
	Depends on where he works full-time. If in blood bank, he will have different duties. In hospital there will again be a different emphasis. The contexts needs to be spelled out more specifically **Answer VJ Louw: A full-time specialist would be one that works in transfusion medicine only. Such a person usually has responsibilities clinically and often also in the blood bank. These questions intend to delineate the how the Delphi participants see the difference in the roles of such a specialist compared to the clinician who gives transfusions as part of his/her day-to-day work.**				
5.	**THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				
	The scope of practice of the clinician dealing with blood transfusion on an *ad hoc* basis can best be described as:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical knowledge**				
	• Can be of practical assistance by the bedside	1	2	3	
	• Should apply knowledge in local setting	1	2	3	
	• More clinically orientated than specialist	1	2	3	Surely both specialist and *ad hoc* clinician must be highly 'clinically orientated' Specialist would ideally have a Master's

	• Knowledge of transfusion basics, e.g. the indications for blood products	1	2	3	I think knowledge should be wider…
b	**Blood banking**				
	• Can do basic cross-matching, blood grouping, blood smear review and urine testing	1	2	3	This can only be done reliably if done often In some settings this might be needed (?rural Africa), but I am not sure how this can be taught in isolation from the clinician's local blood service
	• Should know the concepts and principles underlying aphaeresis	1	2	3	Probably not applicable
c	**Teaching and training**				
	• Can assist with transfusion medicine training of doctors, students, paramedical staff and nurses	1	2	3	Knowledge must be deeper if involved in training; a little knowledge is a dangerous knowledge Master's
d	**Leadership and consultative**				
	• Can be consulted regarding transfusion in a big department	1	2	3	Master's
6.	**ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				
	ABOVE COMMENTS WILL DEPEND ON THE KNOWLEDGE AND UPDATE INFO THAT THIS DOCOR HAS AND WHETHER HE/SHE IS KEEPING UP WITH THE LATEST PRACTICES OF TRANSFUSION MEDICINE. What is the difference between "clinician" (section A), and section B "ad hoc clinician" and "full-time specialist" ? Does the first encompass the second part (for that is how I understand your general vs specialized sections) or are they three different groups altogether? I think it would have been easier to answer these questions if that was clearer. Also, does "ad hoc clinician" mean each and every doctor ever giving a transfusion in the course of his/her work? I would have thought the diploma is meant for only those clinicians who deal with transfusion in a leadership/managerial role in his/her local setting. **Answer VJ Louw: Clinician and ad hoc clinician is used interchangeably here. These are doctors who in the course of their work give transfusions on a regular basis and who may or may not want to apply their knowledge gained from such a Diploma in a managerial or leadership position. In summary, a clinician who does not necessarily work with blood transfusion full-time (although the latter is not excluded) with a special interest in blood transfusion.**				

	SECTION C **THE CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION**				
	This section deals with the current challenges faced by clinicians dealing with blood transfusion as well as the challenges anticipated in the next five years. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
7.	**CHALLENGES CURRENTLY FACED BY CLINICIANS**				
	The challenges currently faced by clinicians dealing with blood transfusion include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Quality and safety**				
	• Limiting transfusion-transmitted infections	1	2	3	
	• Quality of blood products	1	2	3	Responsibility of the blood bank : screening Can we currently accept acceptable quality of the blood products? **Comment VJ Louw: The question is whether you think that these are "essential", "useful" or "unnecessary" in a training programme, depending on whether you think they are real challenges or not.** These are all potential problems but they are not very common occurrences

	• West-Nile virus	1	2	3	These are all potential problems but they are not very common occurrences Definitely not the biggest issue Responsibility of the blood bank : screening
	• Patients requiring repeated blood transfusion	1	2	3	Responsibility of the blood bank : screening These are all potential problems but they are not very common occurrences
	• Clerical errors	1	2	3	Every cog in the wheel is responsible These are all potential problems but they are not very common occurrences
b	**Lack of knowledge and training**				
	• Lack of training in transfusion medicine on an undergraduate level	1	2	3	
	• Clinician knowledge on coagulation and anticoagulants	1	2	3	
	• Knowledge of the value of blood products	1	2	3	
	• Knowledge of the pre-analytical and analytical phase of blood sample processing	1	2	3	
	• Knowledge of the individual blood products, their methods of preparation, storage life and their contents	1	2	3	
	• Knowledge of practical issues relating to blood use, e.g. thawing, administration, irradiation	1	2	3	
	• Knowledge of the pathophysiology of transfusion-related complications	1	2	3	
c	**Access and availability**				
	• Adequate blood supply	1	2	3	Most of these (*statements under c)* are all potential problems but they are not very common occurrences
	• Decreasing donor pool	1	2	3	
	• Finding enough platelet donors	1	2	3	

	• Restrictions on donors and increasing donor deferral	1	2	3	
	• Lack of rare blood groups in the donor pool	1	2	3	
	• Development of anti-platelet antibodies and subsequent platelet refractoriness	1	2	3	
	• Immigration of peoples into areas with an inadequate supply of blood for their blood groups, e.g. immigration Africans to Europe	1	2	3	Depends on locality
	• Increasing demand for blood due to novel medical techniques requiring blood, e.g. increasing need for exchange transfusion for patients with sickle cell anaemia immigrating to Europe	1	2	3	TTP probably more relevant… Depends on locality
	• Increasing demand for blood in specialised medical care, e.g. leukaemia and cancer treatment	1	2	3	
	• Patients requiring repeated blood transfusion	1	2	3	
d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood transfusion	1	2	3	Core material for Diploma course in Blood Transfusion Medicine I think
	• Informed consent issues	1	2	3	Core material for Diploma course in Blood Transfusion Medicine I think
	• Physician responsibility for a product delivered to him/her by a third party	1	2	3	Core material for Diploma course in Blood Transfusion Medicine I think
	• Refusal of blood products for religious reasons	1	2	3	Core material for Diploma course in Blood Transfusion Medicine I think
	• Issues flowing from breach of anonymity between recipient and donor ~~as donor's name is on blood product~~	1	2	3	Clerical issue
e	**Cultural perceptions and understanding**				
	• Cultural perceptions of blood transfusion	1	2	3	Depends on cultural group

	• Public fear of the blood supply, e.g. risk of contracting HIV	1	2	3	Blood bank policies should sort this out
f	**Cost-effectiveness**				
	• Cost-effective use of blood	1	2	3	
8.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				
	I am not quite sure why you say "challenges facing clinicians" and not "challenges facing transfusion specialists". It would be better if all clinicians would face the challenges, but unless they are forced to (by shortages/infectious risks/increased SAE's) most clinicians will only be considering those challenges that are directly related to what they perceive as being their daily responsibility. It seems that some of these questions are highly specialized and only relevant to blood transfusion specialists, while others pertain to general clinical settings. **Answer VJ Louw: Point taken. The goal of this questionnaire is exactly that, namely to determine which of these questions are relevant to the 'general' clinicians dealing with transfusion rather than the transfusion specialist.**				
9.	**CHALLENGES CLINICIANS ARE EXPECTED TO BE FACED WITH IN THE NEXT FIVE YEARS**				
	The challenges clinicians involved in blood transfusion are expected to be faced with in the next five years, include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Quality and safety**				
	• Effects of HIV epidemic on transfusion medicine	1	2	3	Stays an issue, might have to decide what to do with viral load undetectable donors
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, variant Creutzfeld-Jacob's disease (vCJD)	1	2	3	
	• Quality of blood products	1	2	3	Must always be top class
	• Increase in Graft-versus-host-disease (GVHD)	1	2	3	Only in specialist settings Masters

b	**Lack of knowledge and training**				
	• Lack of academic input regarding use of blood in the private sector	1	2	3	Still very offended by this question: Where do you think private doctors come from? Europe? USA? It's the academic centers where they are bred!!!! Use of blood is lower in private sector for all major surgery probably due to expertise and better support systems; and it has been proven! More comprehensive blood conservation practiced in private sector probably due to financial resources. **Comment VJ Louw: Point taken!** Private should not mean not keeping up to date Masters
c	**Access and availability**				
	• Increased demand for blood due to HIV epidemic	1	2	3	
	• Shrinking donor pool due to HIV epidemic	1	2	3	Shrinking donor pool is ascribed to a lot of reasons of which HIV is probably a lesser factor The HIV negative pool is still huge
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	Not true; read SANBS mission statement!!!!! **Comment VJ Louw: The question here is more on whether there is a difference in access, i.e. does the state (public) sector have less access due to financial constraints for instance? Is this a problem?** National Health Insurance will sort this out? Masters

d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood use	1	2	3	
	• Informed consent issues	1	2	3	Could well become very important, but then artificially so
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	SANBS is a section 21 company; NHS will probably prevent this as well.
e	**Cost-effective use**				
	• Cost-effective use of blood	1	2	3	
f	**Managing change**				
	• Keeping up with new developments	1	2	3	Ideally should be for a Masters course
	• Managing change in the field of blood transfusion	1	2	3	Ideally should be for a Masters course
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, vCJD	1	2	3	Ideally should be for a Masters course
10.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				

	SECTION D **DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	This section deals with the deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
11	**DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	The deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products, include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Knowledge**				
	• Knowledge of the correct indications for transfusion	1	2	3	
	• Knowledge of transfusion in general	1	2	3	
	• Knowledge of available products	1	2	3	
	• Knowledge of coagulation and haemostasis	1	2	3	
b	**Skills**				
	• Skills to correctly administer blood products	1	2	3	
	• Skills required to obtain venous access, including central line placement, e.g. in shocked patient	1	2	3	
	• Application of clinical skills - clinicians too focused on laboratory values and not enough by the bedside	1	2	3	

c	**Evidence-based practice**				
	• Inappropriate use of blood and blood products	1	2	3	See comment under 12
	• Lack of guidelines on blood transfusion	1	2	3	See 12
	• Inappropriate selection of blood products	1	2	3	See 12
	• Non-adherence to guidelines and recommendations	1	2	3	See 12
	• Transfusing patients unnecessarily	1	2	3	See 12
	• Cross-matching and keeping blood unnecessarily, esp. in surgery and anesthesiology	1	2	3	See 12 Much more of a problem in academic sector than private!!!!!!!!
	• Resistance of clinicians against changing behaviour despite being given guidelines	1	2	3	See 12 Need to be informed
d	**Human resources**				
	• Lack of time for participating in educational activities related to blood transfusion	1	2	3	See 12 Anyone in the SA health services who is motivated has this issue
	• Lack of clinicians with an overview of all aspects of transfusion	1	2	3	See 12
e	**Scarce resource management**				
	• Awareness of costs	1	2	3	See 12 Also much more of a problem in academic / public sector than in private!!!!!!!!!!!!
	• Lack of auditing systems	1	2	3	See 12
f	**Attitude**				
	• Transfusion seen as an insignificant part of patient care	1	2	3	See 12
12	**ANY FURTHER COMMENTS ON THE DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS?**				
	I do not understand how to answer this section. I think the terms "essential", "useful" and "unnecessary" are confusing. **Answer VJ Louw: I can see that. The way it should perhaps read (i.e. the way in which this question was meant) is: The deficiencies <u>that should be addressed</u> in the abilities of clinicians dealing with the transfusion of blood and blood products, include the following: I will amend this in round three.** If proper time is spent on the protocols for transfusing blood products, many of the other issues will be addressed.				

	SECTION E **PROGRAMME OUTCOMES**				
	This section deals with the major outcomes of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
13	**THE MAJOR OUTCOMES OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
	The major outcomes for a clinician completing a postgraduate diploma should include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
b	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	
	• Should know how cross-match testing is performed	1	2	3	
	• Should know about blood processing	1	2	3	
	• Should know about donor selection and donor-related issues	1	2	3	
	• Should have an awareness of aphaeresis and its applications	1	2	3	Awareness
	• Understand antibody identification procedures	1	2	3	
	• Should know about blood collection and the different types of collection systems	1	2	3	
	• Should know about quality assurance in blood banking	1	2	3	
	• Should know about the new issues facing blood banking	1	2	3	

	• Should know about leukodepletion in laboratory and by bedside	1	2	3	
	• Should know how blood typing is done	1	2	3	
c	**Haematology**				
	• Knowledge of relevant aspects of haematology	1	2	3	
e	**Clinical medicine**				
	• The use of transfusions by a clinician doing the diploma should decrease	1	2	3	No, the emphasis should be on appropriate. **Comment VJ Louw: I am testing the premise that blood is often used unnecessarily by the doctor with limited training in transfusion medicine. If this is true, then the use of transfusions will be more appropriate and decrease? I would like to hear what you think.** Not necessarily
	• The quality of the transfusions by a clinician doing the diploma should increase, e.g. less complications and wastage of blood products	1	2	3	
	• Should know the ethical aspects concerning the use of blood and blood products	1	2	3	
f	**Blood conservation**				
	• Should know about cost-effectiveness in transfusion medicine	1	2	3	
g	**Blood safety**				
	• Should know about GVHD	1	2	3	Transfusion-associated-GVHD **Comment VJ Louw: Yes.** Masters
h	**Social skills**				
	• Should have communication skills	1	2	3	What if you don't have them?? **Comment VJ Louw: Are they important and can they be taught?** Masters

i	**Research**				
	• Should be able to participate in clinical research related to transfusion medicine	1	2	3	Depends on field of practice Masters
	• Should have an understanding of the need for clinical trials in transfusion medicine	1	2	3	Masters/or even PhD Comment VJ Louw: Note the phrasing of the statement: "understanding of the need". This does not imply that the student should do this.
14	**ANY FURTHER COMMENTS ON THE THE MAJOR OUTCOMES OF A CURRICULUM OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				
	This section was answered with the perception that the Diploma and evaluations are aimed at Clinical Transfusion Medicine and not Blood Banking . Answer VJ Louw: This assumption is correct as the Diploma envisaged is aimed at clinicians. Although relevant aspects of haematology is vague, they should at least know where to find the information. It is good to understand and be able to appreciate what happens in a Blood bank. This will improve the working relationships.				

	SECTION F **SUSTAINABILITY**				
	This section deals with the major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
15	**THE MAJOR FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Academic staff**				
	• Roles of team members need to be clearly defined	1	2	3	
	• Expose students to a broad spectrum of lecturers from different backgrounds	1	2	3	Why not?
	• Use different lecturers at different times	1	2	3	Why not?
	• Can use part-time staff to compensate for an insufficient number of full-time staff members	1	2	3	Why not?
b	**Value creation**				
	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	Masters
	• There should be value in obtaining the qualification	1	2	3	However the value is measured. Otherwise nobody will do the course. Why else would anybody want to do the course Academic, monetary, promotion? **VJ Louw comment: Could be any of the above. This is a broad, general statement.**

	• Malpractice insurance levies for doctors who practice transfusion medicine without the qualification may make it more attractive	1	2	3	No! HOW? If this is your major concern, you should probably not practice medicine at all. **Comment VJ Louw: This was a suggestion (as were all the other points in this survey) raised by one of the experts involved in the structured questionnaires. The idea is to test their statements here.** Patients will suffer!
	• Blood banks should require that their doctors have a formal qualification in transfusion medicine	1	2	3	Yes! This excludes doctors outside the blood banks.
	• Sponsor people to attend on a meritorial basis	1	2	3	Always a good idea
c	**Networking**				
	• Input needed from a variety of role players	1	2	3	Always useful
	• Get buy-in from the private sector	1	2	3	Always useful
d	**Financial viability**				
	• There should be a revenue stream/funding	1	2	3	Ensures sustainability
	• Get sponsorship from the private sector, e.g. private laboratories	1	2	3	I think this is a "dream on" thought; chances of enticing private labs to sponsor a registrar (ala Discovery / Netcare) is more likely. **Comment VJ Louw: What about the pharmaceutical industry involved in transfusion equipment, bags, etc.?** Desirable
e	**Structure and organisation**				
	• Should be a part-time programme, i.e. doctor should be able to do it from his/her practice	1	2	3	Helps

	• Course can be short and full-time, but also reasonable to have a part-time course with intensive contact sessions	1	2	3	
	• Course should not be too long or take too much time	1	2	3	
	• Should have defined blocks of contact time	1	2	3	
	• There should be appropriate infrastructure/facilities for running the course	1	2	3	
f	**Programme content and outcomes**				
	• The course should not be too specialised	1	2	3	You want to spread the knowledge with a diploma
	• Course should not be too intensive	1	2	3	
	• The curriculum needs to be clearly defined, e.g. with well defined start and end	1	2	3	
	• Should have practical sessions that are relevant	1	2	3	
	• Including a problem-based component in the curriculum using case studies where people can learn from mistakes	1	2	3	
	• There should be exposure to the actual blood bank	1	2	3	
	• The curriculum needs to be organised in and integrated way	1	2	3	Useful
g	**Assessment**				
	• There should be self-assessment programmes	1	2	3	Useful to have
	• Need to give feedback to students on assignments	1	2	3	
h	**Career-path creation**				
	• Job possibilities need to be created, e.g. posts for doctors who take responsibility for clinical transfusion practice and the transfusion committee in a hospital	1	2	3	The motivation needs to some from the top; not from the programme. Jobs limited in SA. Probably wouldn't need a whole career path, but a special responsibility in the dr's sphere of work Always useful

	• Job opportunities for research in transfusion medicine	1	2	3	Where??? I know of almost no funded research jobs… Would be nice for the keenies Masters
i	**Recognition programme**				
	• The Diploma should be recognised by the relevant governing bodies	1	2	3	
	• A regulatory framework that requires certification in transfusion medicine	1	2	3	Towards what end? **Comment VJ Louw: To ensure that standards are maintained, to provide recognition of the qualification in line with other similar level qualifications, etc.**
	• Programmes should be certified according to certain criteria	1	2	3	Probably first the experience and the criteria, then the certifying agency if there is enough momentum? If the momentum is the other way round, the focus may be regulatory rather than scientific content.
	• There should be a certifying agency	1	2	3	We have the HPCSA. Is there not the HPCSA? **Comment VJ Louw: Yes, but the question is not whether we have one. The question is whether a certifying agency is necessary. Remember that the idea is to develop a <u>model</u> that could be used elsewhere as well.**
	• Continuous professional development (CPD) accreditation of programme	1	2	3	
j	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	

	• Get feedback from the participants	1	2	3	
	• One should diversify and broaden the interest in order to remain sustainable despite medical and technological advances, e.g. if artificial blood products are produced and the current educational needs in transfusion medicine change	1	2	3	Depends on who is the target population of course goers. But not at the expense of core concepts
16	**ANY FURTHER COMMENTS ON THE FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME?**				
	Obviously if doctors are (financially or organizationally) rewarded in their places of work for their extra knowledge. Or actively stand in need of the knowledge in order to fulfill their duties successfully. I do not know under which circumstances or due to which changes (in practice/availability/regulation) this will be a perceived need of the clinician.				

	SECTION G **ACADEMIC FACTORS**				
	This section deals with the factors from an academic point of view that could be taken into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
17	**THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Programme development**				
	• Objectives of course need to be tailored to the actual needs of the students, i.e. to the problems relevant to their settings	1	2	3	Tailor the course to the students you want to attract
	• Look at what other institutions are doing internationally and adapt what is useful to local circumstances	1	2	3	Good combination of points i and ii Useful
	• People involved with project need to have academic standing to give prestige to the project and the content of the curriculum so that it will inspire confidence in the end product	1	2	3	Not all of the teachers need prestige, not so famous people can also be good teachers. Useful
b	**Programme structure**				
	• It should be done part-time if run over a period longer than 18 months	1	2	3	Too long 18 months too long

	• Students will not complete the course if it is too long	1	2	3	Yes True, in terms of who you want. People really passionate about the topic that will work mainly in this area will go on for ever….
	• The duration of each component should be set in great detail	1	2	3	
c	**Quality assurance**				
	• The certification needs to be limited in time, i.e. continuous professional development credits need to be obtained on an annual basis to maintain certification to ensure that those who qualify remain up-to-date	1	2	3	It's not a specialist course or is it? **Comment VJ Louw: No, it is not envisaged to be a specialist qualification such as Internal Medicine, Paediatrics, etc.**
	• A recertification process, be it correspondence or attendance-based refresher courses will ensure that those who qualified stay up-to-date and it can be a source of revenue	1	2	3	optional
	• Programme should be peer-reviewed according to accepted criteria, e.g. having a specific number of certified haematologists on staff	1	2	3	
	• Record should be kept of which students attend each session	1	2	3	
d	**Admission criteria and recognition of prior learning**				
	• Applicants for Diploma should have a basic medical degree and do not need to be specialists	1	2	3	
e	**Academic culture**				
	• A spirit of inquisitiveness should be fostered	1	2	3	
	• There should be regular journal reviews and seminars related to transfusion medicine	1	2	3	What do you mean by this? Regular – what time period? Via internet, email? **Answer VJ Louw: Ideally in person or in refresher course format, 2 to 3 times per year.** Masters

f	**Research**				
	• A research component should be included in the programme	1	2	3	Nice to have, should be optional Masters
	• The staff should be involved in the research programme which will keep them up-to-date and current	1	2	3	Masters
	• Research and education should go hand in hand	1	2	3	Usually do Masters
	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	Not everyone is a researcher, or has the support for research Masters
	• Research done should be appropriate for the country	1	2	3	Masters
g	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	Not necessary
18	**ANY FURTHER COMMENTS ON THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				
	Expertise is important and does not only have to be haematologists This last section is tailored around people in academic medicine. It is not applicable to people in private sector. So, even though research is a valuable tool, it is not viable in a non-academic setting. **Comment VJ Louw: See my previous comments regarding research in the private sector.**				

	SECTION H **EDUCATIONAL FACTORS**				
	This section deals with major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one option.				
19	**THE MAJOR EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Curriculum**				
	• The components of the training programme should be enunciated in great detail	1	2	3	
b	**Educational material and resources**				
	• Students need good handouts or educational material to enable them to prepare in advance	1	2	3	Good is not equal to copious! Guidance and handouts.
	• Should make use of the internet	1	2	3	
	• Students need a good bibliography, i.e. good books and references to good articles	1	2	3	
	• Students need to be taught how to use online study resources, e.g. PubMed	1	2	3	Also need to be given access, many journals only accessible to university staff
	• There should be continuous guidance available to students with regards to use of resources, e.g. online resources	1	2	3	(Students should know how to do this on their own)
	• Students should have a quick reference manual for each block	1	2	3	

c	**Learning as an experience**				
	• The content should be interesting	1	2	3	But include the necessary basics too
	• Attendance should be an enriching experience	1	2	3	
d	**Assessment**				
	• Use a variety of teaching and assessment techniques, e.g. lectures, journal reviews, seminar presentations, examinations, etc.	1	2	3	
	• There should be some form of assessment on a regular basis to ensure that outcomes have been achieved	1	2	3	
	• Assignments should be short	1	2	3	
	• There should be a final assessment to be able to judge whether course is working and force students to consolidate what they have learnt	1	2	3	
	• Core knowledge should be assessed in a final assessment	1	2	3	
	• Make use of peer assessment	1	2	3	
	• Competence should be proven, e.g. keeping a logbook and being signed off for certain procedures or skills attained	1	2	3	
	• Logbooks will allow for auditing	1	2	3	
	• Assessment should be authentic, i.e. applied to real-life situations	1	2	3	Depends on the setting the trainees are working in.
f	**Contact time**				
	• Working in small groups is important, with less than ten people in a group	1	2	3	
	• One on one communication or with small groups is very important	1	2	3	
	• Distance learning components should be built in	1	2	3	

g	**Forms of learning**				
	• Emphasis should be on the practical issues more than theoretical things unrelated to day-to-day practice, e.g. seeing cases, evaluating blood request forms critically, going to the blood bank laboratory, how to prescribe blood, administer blood, transporting of blood from laboratory to patient, doing a cross-match, Coombs or a blood group	1	2	3	Need to combine theory and practical situations It is not either/or but both
	• Learning should be integrated	1	2	3	Don't really know what this means or how it translates into reality (as opposed to other statements) **Comment VJ Louw: This means that one should integrate physiology, pathophysiology, laboratory and clinical aspects t enhance understanding**
	• Some issues should be taught to give insight, but does not necessarily have to be assessed, e.g. processing of blood, politics and transfusion	1	2	3	I agree
	• Problem-based learning is important	1	2	3	
	• Self-directed learning is important	1	2	3	
h	**Teacher**				
	• Lecturers should be people who are actively involved with blood transfusion every day (e.g. trauma surgeons, haematologists, intensivists)	1	2	3	Or people from the blood service And scientists in the lab or managers of transfusion aspects
	• Avoid using lecturers who have high positions in transfusion medicine, but who "don't have their feet on the ground" and who can't bring the message across	1	2	3	Are there people like this? I don't know someone higher than prof. Heyns who articulates with as much difficulty. And he is a pillar! So this is a nonsense point. Good teachers with experience tops everything

	• Having speakers from blood transfusion services may be good in terms of allowing the students to build networks with people in the field	1	2	3	
	• Lecturers who are local experts should be used in contact sessions	1	2	3	
	• Lecturers who are national experts should be used in contact sessions	1	2	3	YES,YES,YES!
	• Lecturers who are international experts should be used in contact sessions	1	2	3	An issue of finances Whoever is available is good, as long as the message gets across – local as well as fresh, foreign perspectives can be integrated
i	**The student as an adult learner**				
	• The course content should be relevant to the adult learner's work environment	1	2	3	No idea what that entails **Answer VJ Louw: For example, a student should be allowed to answer an assignment taking into account their local perspective (e.g. rural or urban setting). Also, the teaching may need to take into account that students work in very different settings**
	• Learner's existing knowledge should be explored	1	2	3	
	• Students should know the benefits and rationale of what is being taught	1	2	3	
	• Facilitator should provide an environment within which the adult learner feel safe to cooperate and explore	1	2	3	
	• The individual learner's attributes, preferences and needs should be accommodated	1	2	3	
	• New knowledge should be tied to the learners' previous knowledge and experiences	1	2	3	
	• Should be given the opportunity to solve problems relevant to their real-life worlds	1	2	3	

	• Course content should provide immediacy, i.e. be immediately relevant to the learner's current working environment	1	2	3	Knowing one's target students before the course is developed, then, and anticipating their different environments
	• Learning approach should promote adulthood (i.e. independence, responsibility, self-direction)	1	2	3	However, good experience comes after bad judgment and good judgment comes through bad experiences… **Comment VJ Louw: Well said!**
	• A cooperative learning climate should be created	1	2	3	The challenge is to make it cooperative using various forms of "small group interaction" in such a way that it is not an easy cop-out for the teacher, but a formative, constructive experience. Why does the term "ice-breaker" float across my mind…?
	• Programme should utilize the adult learner's accumulated experience	1	2	3	
	• Provide opportunities for interaction with co-learners in small groups	1	2	3	
	• Create experiences that can enhance the construction of meaning (e.g. through role play, case studies, simulations or discussion)	1	2	3	"Active" small groups!
j	**Alignment**				
	• The content should be aligned with the needs of the students	1	2	3	Correct, but the needs of the patient requiring transfusion and the needs of the transfusion community, have to be brought to the learner as well
20	**ANY FURTHER COMMENTS ON THE EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				
	Student needs are important, but may vary a lot and the outcome of the course should not only look at these needs, but should address the diploma academic outcomes.				

21	PLEASE INDICATE BELOW IF THERE ARE ANY OTHER COMPONENTS THAT YOU WOULD LIKE TO SEE INCLUDED IN A MODEL FOR A POSTGRADUATE DIPLOMA FOR TRANSFUSION MEDICINE THAT WAS NOT DEALT WITH OR CONSIDERED IN THIS SURVEY.

APPENDIX E1

LETTER TO DELPHI PANEL ROUND THREE

APPENDIX E1

LETTER TO DELPHI PANEL ROUND THREE

A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE IN THE SCHOOL OF MEDICINE AT THE UNIVERSITY OF THE FREE STATE

Dear Delphi participant,

Thank you once again for your participation in the Delphi process and for completing the first two rounds. **This is the third and last round.**

PURPOSE OF THE ROUND THREE QUESTIONNAIRE

In the first two rounds consensus was reached on 45.5% of the questions posed. Consensus was pre-defined according to the literature as the state where 80% of the participants vote on a specific item with the same value on the three-point scale. All the questions on which consensus were reached, have been removed from this questionnaire as explained in the feedback letter sent to you on the 3rd of June 2010.

In this round of the Delphi process you are given the opportunity to reconsider your opinion on the statements that are left, taking into account the anonymous feedback that was provided by your fellow participants and some clarifications made by the researcher. All sections and statements are numbered in exactly the same way as in the first round.

In the attached Delphi questionnaire you will find values in the comments column referring to "Essential", "Useful" and "Unnecessary". These values refer to the percentages of the Delphi panel members who rated each particular statement.

You will also find an indication (an '#') of the answer that you provided in round two. **Please look at all these questions again and confirm whether you stand by your opinion as you indicated in round two. Please note that you only have to mark with an 'X' those statements where you want to change your mind. In those cases you do not have to delete the '#'. Just add the X to the column where you want to make the change to.**

INSTRUCTIONS FOR COMPLETION OF THE THIRD ROUND

Please use the following scale again:

1 = Essential (This criterion must **DEFINITELY BE INCLUDED** in the model)

2 = Useful (This criterion **CAN BE INCLUDED** in the model)

3 = Unnecessary (This criterion must **DEFINITELY BE EXCLUDED** from the model)

Please note that you are allowed to change your opinion if you feel like doing so. You can therefore indicate a different level of importance to any of the statements, as you consider it appropriate.

If possible, please complete the questionnaire in its electronic form. If, however, you prefer to print it out and complete it in paper format, please feel free to do so. **Please answer all questions in the questionnaire if you feel equipped to do so.** Do not hesitate to contact me if anything is unclear. **We are aiming to achieve consensus or stability on as many questions as possible.** Stability has been described as the natural tendency of opinions of experts to centralise. Stability can be declared when movement of the opinion of the group as a whole remains unchanged.

As always, your response remains anonymous and confidential with regards to all other participants and will be known only to the research team.

Please return the filled-out questionnaires by the **17th of June 2010**. The analysis can only be done once all questionnaires are received back, so your cooperation with regards to the deadline will be greatly appreciated.

I would like to thank all of you once again for the tremendous effort put into this exercise thus far.

Vernon Louw

PLEASE NOTE:

Save the attached Delphi questionnaire as a Word document on your computer before completing it. Send the completed questionnaire back to me as an attachment to an email message (louwvj@ufs.ac.za or vernon.louw@gmail.com) or fax it back to 051-4441036 before or on the **15th of June 2010**. A hard copy of this questionnaire can be made available if required.

APPENDIX E2

DELPHI ROUND THREE (PARTICIPANT SJ)

APPENDIX E2

DELPHI ROUND THREE (PARTICIPANT SJ)

	SECTION A **THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING**				
	This section deals with the description of the main roles, including tasks and functions of the clinician dealing with blood transfusion in the clinical setting. It also deals with the description of the main areas of clinical knowledge, skills and competences required, as well as the deficiencies in the abilities of clinicians dealing with blood transfusion in the clinical setting. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
1.	**MAIN ROLES, TASKS AND FUNCTIONS**				
	The main roles, including tasks and functions of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**A supervisory function in which he/she should**				
	• Ensure that there are no clerical errors	1#	2	3	(1=33%;2=50%;3=17%)
	Governance role which include				
	• Developing policies for blood transfusion in consultation with relevant colleagues	1#	2	3	(1=75%;2=25%)

	• Give feedback to hospital management on utilisation of blood products in the hospital	1	2#	3	(1=33%;2=67%)
c	**A training role, which include**				
	• clinical undergraduate teaching	1#	2	3	(1=42%;2=58%)
	• postgraduate teaching	1	2	3#	(1=42%;2=50%;3=8%)
	• Training of nursing and laboratory personnel as well as medical students and specialists-in-training	1#	2	3	(1=45%;2=45%;3=9%)
d	**A role in scarce resource management, which include**				
	• Optimising the use of blood	1#	2	3	(1=67%;2=25%;3=8%)
	• Using appropriate alternatives to transfusion	1	2#	3	(1=67%;2=33%)
	• The cost-effective use of blood	1#	2	3	(1=75%;2=25%)
	• An awareness of the limitations of the blood supply	1	2#	3	(1=67%;2=33%)
e	**A patient management role which include**				
	• Taking personal responsibility for obtaining cross-match sample from patient	1#	2	3	(1=17%;2=17%;3=67%)
	• Logistical issues, e.g. transportation of blood	1	2	3#	(1=0%;2=25%;3=75%)
f	**A role as researcher, which include**				
	• Interpret the literature on blood transfusion	1	2#	3	(1=42%;2=58%)
2.	**SKILLS AND COMPETENCES**				
	The main skills and competences of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
b	**Technical**				
	• Achieving venous access, including placement of central lines	1#	2	3	(1=67%;2=25%;3=8%)

	• Competence in thawing of blood products, e.g. fresh frozen plasma	1	2	3#	(1=33%;2=17%;3=50%)
	• Competency in doing a cross-match	1	2	3#	(1=0%;2=33%;3=67%)
d	**Social**				
	• Communication skills	1#	2	3	(1=67%;2=33%)
	• Interpersonal skills	1#	2	3	(1=67%;2=33%)
e	**Integration**				
	• Practicing transfusion medicine in rural areas	1	2#	3	(1=45%;2=55%)
	• Competency in interpreting activities in the blood bank	1	2	3#	(1=45%;2=18%;3=36%)
g	**Research**				
	• Know how to interpret the literature on blood transfusion	1	2	3#	(1=58%;2=33%;3=8%)
3.	**MAIN AREAS OF CLINICAL KNOWLEDGE**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
	The main areas of clinical knowledge required by the clinician dealing with blood transfusion can be described as:				
a	**Physiology**				
	• Blood groups	1	2#	3	(1=58%;2=42%)
	• Knowledge of transfusion immunology	1	2#	3	(1=33%;2=67%)
b	**Pathophysiology**				
	• Pathophysiology of diseases where blood products may be indicated	1#	2	3	(1=75%;2=25%)
	• Pathophysiology related to blood loss and blood transfusion	1#	2	3	(1=75%;2=25%)
c	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3#	(1=8%;2=67%;3=25%)
	• Knowledge of blood grouping	1	2#	3	(1=42%;2=50%;3=8%)

	• Thawing of blood products	1	2	3#	(1=42%;2=25%;3=33%)
	• Knowledge of the principles underlying the issuing of blood	1	2	3#	(1=33%;2=58%;3=17%)
	• Knowledge of cross-matching	1	2#	3	(1=17%;2=75%;3=8%)
d	**Haematology**				
	• Haemophilia	1	2#	3	(1=67%;2=33%)
e	**Clinical medicine**				
	• Intensive care issues related to blood transfusion	1#	2	3	(1=50%;2=50%)
	• Knowledge of the relevance of co-morbid disease in patients that need a blood transfusion	1#	2	3	(1=75%;2=25%)
g	**Evidence-based medicine**				
	• Evidence behind appropriate transfusion	1	2#	3	(1=25%;2=75%)
	• Appropriate use of blood products	1#	2	3	(1=67%;2=33%)
i	**Blood conservation**				
	• Autologous transfusions	1	2#	3	(1=64%;2=36%)
	• Blood conservation methods	1	2#	3	(1=45%;2=55%)
	• Platelet-refractoriness	1	2#	3	(1=50%;2=50%)
j	**Blood safety**				
	• Haemovigilance	1#	2	3	(1=64%;2=36%)
	• Allo-immunisation	1	2#	3	(1=55%;2=45%)
4.	**ANY FURTHER COMMENTS ON THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING**				

	SECTION B **THE SCOPE OF PRACTICE OF THE CLINICIAN INVOLVED WITH BLOOD TRANSFUSION**				
	This section deals with the difference in the scope of practice between a between a full-time specialist in transfusion medicine and a clinician who deals with blood transfusion on an *ad hoc* basis. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
4.	**THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE**				
	The scope of practice of a full-time Specialist in Transfusion Medicine can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical knowledge**				
	• Deals more with coagulation problems	1#	2	3	(1=67%;2=33%)
b	**Blood banking**				
	• Dealing with blood donors	1	2#	3	(1=50%;2=33%;3=17%)
	• Involved with quality control in blood bank	1	2#	3	(1=58%;2=25%;3=17%)
	• Involved in the running of the blood bank	1	2	3#	(1=25%;2=42%;3=33%)
	• Administrative aspects of blood banking, including tracking and retrieval of blood and computerisation	1	2	3#	(1=17%;2=42%;3=42%)
	• Have a deeper understanding of the laboratory testing for transfusion-transmitted infections	1#	2	3	(1=67%;2=17%;3=17%)
c	**Teaching and training**				
	• Functions as a tutor to his colleagues	1#	2	3	(1=75%;2=17%;3=8%)

d	**Leadership and consultative roles**				
	• Coordinating role within the hospital	1#	2	3	(1=50%;2=42%;3=8%)
	• Should have sufficient stature to be able to advise, help and lead new developments	1#	2	3	(1=67%;2=25%;3=8%)
	ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE				
5.	**THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				
	The scope of practice of the clinician dealing with blood transfusion on an *ad hoc* basis can best be described as:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Clinical knowledge**				
	• Can be of practical assistance by the bedside	1	2#	3	(1=50%;2=50%)
	• More clinically orientated than specialist	1	2#	3	(1=58%;2=25%;3=8%)
b	**Blood banking**				
	• Can do basic cross-matching, blood grouping, blood smear review and urine testing	1	2	3#	(1=8%;2=50%;3=42%)
	• Should know the concepts and principles underlying aphaeresis	1	2	3#	(1=17%;2=67%;3=17%)
c	**Teaching and training**				
	• Can assist with transfusion medicine training of doctors, students, paramedical staff and nurses	1	2	3#	(1=8%;2=75%;3=17%)
d	**Leadership and consultative**				
	• Can be consulted regarding transfusion in a big department	1	2	3#	(1=17%;2=67%;3=17%)
6.	**ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				

	SECTION C **THE CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION**				
	This section deals with the current challenges faced by clinicians dealing with blood transfusion as well as the challenges anticipated in the next five years. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
7.	**CHALLENGES CURRENTLY FACED BY CLINICIANS**				
	The challenges currently faced by clinicians dealing with blood transfusion include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Quality and safety**				
	• Limiting transfusion-transmitted infections	1	2#	3	(1=42%;2=50%;3=8%)
	• Quality of blood products	1	2#	3	(1=33%;2=33%;3=33%)
	• West-Nile virus	1	2#	3	(2=58%;3=42%)
	• Patients requiring repeated blood transfusion	1#	2	3	(1=75%;2=17%;3=8%)
	• Clerical errors	1#	2	3	(1=42%;2=50%;3=8%)
b	**Lack of knowledge and training**				
	• Lack of training in transfusion medicine on an undergraduate level	1#	2	3	(1=75%;2=25%)
	• Clinician knowledge on coagulation and anticoagulants	1#	2	3	(1=50%;2=50%)
	• Knowledge of the value of blood products	1#	2	3	(1=67%;2=33%)
	• Knowledge of the pre-analytical and analytical phase of blood sample processing	1	2	3#	(1=8%;2=58%;3=33%)

	• Knowledge of the individual blood products, their methods of preparation, storage life and their contents	1	2#	3	(1=50%;2=42%;3=8%)
	• Knowledge of practical issues relating to blood use, e.g. thawing, administration, irradiation	1	2#	3	(1=25%;2=50%;3=25%)
	• Knowledge of the pathophysiology of transfusion-related complications	1	2#	3	(1=42%;2=58%)
c	**Access and availability**				
	• Adequate blood supply	1#	2	3	(1=75%;2=25%)
	• Decreasing donor pool	1#	2	3	(1=25%;2=76%;3=8%)
	• Finding enough platelet donors	1#	2	3	(1=25%;2=58%;3=17%)
	• Restrictions on donors and increasing donor deferral	1	2#	3	(1=17%;2=58%;3=25%)
	• Immigration of peoples into areas with an inadequate supply of blood for their blood groups, e.g. immigration Africans to Europe	1#	2	3	(1=8%;2=33%;3=58%)
	• Increasing demand for blood due to novel medical techniques requiring blood, e.g. increasing need for exchange transfusion for patients with sickle cell anaemia immigrating to Europe	1	2	3#	(1=8%;2=75%;3=17%)
	• Increasing demand for blood in specialised medical care, e.g. leukaemia and cancer treatment	1#	2	3	(1=58%;2=42%)
	• Patients requiring repeated blood transfusion	1#	2	3	(1=67%;2=33%)
d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood transfusion	1#	2	3	(1=58%;2=42%)
	• Physician responsibility for a product delivered to him/her by a third party	1	2#	3	(1=33%;2=50%;3=17%)
	• Refusal of blood products for religious reasons	1#	2	3	(1=42%;2=50%;3=8%)
	• Issues flowing from breach of anonymity between recipient and donor	1#	2	3	(1=17%;2=42%;3=42%)

e	**Cultural perceptions and understanding**				
	• Cultural perceptions of blood transfusion	1#	2	3	(1=33%;2=50%;3=17%)
	• Public fear of the blood supply, e.g. risk of contracting HIV	1	2#	3	(1=58%;2=33%;3=8%)
f	**Cost-effectiveness**				
	• Cost-effective use of blood	1#	2	3	(1=64%;2=36%)
8.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				
9.	**CHALLENGES CLINICIANS ARE EXPECTED TO BE FACED WITH IN THE NEXT FIVE YEARS**				
	The challenges clinicians involved in blood transfusion are expected to be faced with in the next five years, include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Quality and safety**				
	~~• Safety of blood products~~	~~1~~	~~2~~	~~3~~	Consensus reached in round 1
	~~• Limiting transfusion transmitted infections~~	~~1~~	~~2~~	~~3~~	Consensus reached in round 1
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, variant Creutzfeld-Jacob's disease (vCJD)	1	2#	3	(1=42%;2=58%;3=0%)
	• Quality of blood products	1	2#	3	(1=50%;2=50%)
	• Increase in Transfusion-associated Graft-versus-host-disease (GVHD)	1	2	3#	(1=10%;2=50%;3=40%)

b	**Lack of knowledge and training**				
	• Lack of academic input regarding use of blood in the private sector	1#	2	3	(1=42%;2=50%;3=8%)
c	**Access and availability**				
	• Increased demand for blood due to HIV epidemic	1	2	3#	(1=50%;2=42%;3=8%)
	• Shrinking donor pool due to HIV epidemic	1#	2	3	(1=42%;2=58%)
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3#	(1=25%;2=25%;3=50%)
d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood use	1#	2	3	(1=67%;2=25%;3=8%)
	• Informed consent issues	1#	2	3	(1=67%;2=33%)
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3#	(2=58%;3=42%)
e	**Cost-effective use**				
	• Cost-effective use of blood	1#	2	3	(1=75%;2=25%)
f	**Managing change**				
	• Keeping up with new developments	1#	2	3	(1=55%;2=45%)
	• Managing change in the field of blood transfusion	1#	2	3	(1=58%;2=25%;3=8%)
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, vCJD	1	2#	3	(1=27%;2=73%)
10.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				

	SECTION D **DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	This section deals with the deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
11.	**DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	The deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products, include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
b	**Skills**				
	• Skills to correctly administer blood products	1#	2	3	(1=75%;2=25%)
	• Skills required to obtain venous access, including central line placement, e.g. in shocked patient	1#	2	3	(1=67%;2=33%)
	• Application of clinical skills - clinicians too focused on laboratory values and not enough by the bedside	1	2	3#	(1=50%;2=33%;3=17%)
c	**Evidence-based practice**				
	• Inappropriate use of blood and blood products	1#	2	3	(1=75%;2=25%)
	• Inappropriate selection of blood products	1#	2	3	(1=75%;2=25%)
	• Non-adherence to guidelines and recommendations	1	2#	3	(1=58%;2=42%)
	• Transfusing patients unnecessarily	1#	2	3	(1=67%;2=33%)

	• Cross-matching and keeping blood unnecessarily, esp. in surgery and anesthesiology	1	2#	3	(1=42%;2=58%)
	• Resistance of clinicians against changing behaviour despite being given guidelines	1	2#	3	(1=55%;2=45%)
d	**Human resources**				
	• Lack of time for participating in educational activities related to blood transfusion	1	2#	3	(1=50%;2=50%)
	• Lack of clinicians with an overview of all aspects of transfusion	1	2#	3	(1=67%;2=33%)
e	**Scarce resource management**				
	• Awareness of costs	1#	2	3	(1=50%;2=50%)
	• Lack of auditing systems	1#	2	3	(1=42%;2=58%)
f	**Attitude**				
	• Transfusion seen as an insignificant part of patient care	1#	2	3	(1=58%;2=42%)
12.	**ANY FURTHER COMMENTS ON THE DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS?**				

	SECTION E **PROGRAMME OUTCOMES**				
	This section deals with the major outcomes of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
13.	**THE MAJOR OUTCOMES OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
	The major outcomes for a clinician completing a postgraduate diploma should include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
b	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1#	2	3	(1=58%;2=42%)
	• Should know how cross-match testing is performed	1#	2	3	(1=67%;2=25%;3=8%)
	• Should know about blood processing	1#	2	3	(1=58%;2=42%)
	• Should know about donor selection and donor-related issues	1#	2	3	(1=50%;2=42%;3=8%)
	• Should have an awareness of aphaeresis and its applications	1#	2	3	(1=67%;2=33%)
	• Understand antibody identification procedures	1#	2	3	(1=58%;2=42%)
	• Should know about blood collection and the different types of collection systems	1#	2	3	(1=58%;2=42%)
	• Should know about quality assurance in blood banking	1#	2	3	(1=67%;2=25%;3=8%)

	• Should know about the new issues facing blood banking	1#	2	3	(1=58%;2=33%;3=8%)
	• Should know about leukodepletion in laboratory and by bedside	1#	2	3	(1=67%;2=33%)
	• Should know how blood typing is done	1#	2	3	(1=67%;2=33%)
c	**Haematology**				
	• Knowledge of relevant aspects of haematology	1	2#	3	(1=67%;2=33%)
e	**Clinical medicine**				
	• The use of transfusions by a clinician doing the diploma should decrease	1#	2	3	(1=17%;2=67%;3=17%)
	• The quality of the transfusions by a clinician doing the diploma should increase, e.g. less complications and wastage of blood products	1#	2	3	(1=75%;2=25%)
f	**Blood conservation**				
	• Should know about cost-effectiveness in transfusion medicine	1#	2	3	(1=67%;2=33%)
g	**Blood safety**				
	• Should know about Transfusion-associated graft-versus-host-disease	1#	2	3	(1=58%;2=42%)
h	**Social skills**				
	• Should have communication skills	1#	2	3	(1=42%;2=58%)
i	**Research**				
	• Should be able to participate in clinical research related to transfusion medicine	1#	2	3	(1=33%;2=58%;3=8%)
	• Should have an understanding of the need for clinical trials in transfusion medicine	1#	2	3	(1=55%;2=45%)
14	**ANY FURTHER COMMENTS ON THE THE MAJOR OUTCOMES OF A CURRICULUM OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				

	SECTION F **SUSTAINABILITY**				
	This section deals with the major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
15	**THE MAJOR FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Academic staff**				
	• Roles of team members need to be clearly defined	1#	2	3	(1=75%;2=25%)
	• Expose students to a broad spectrum of lecturers from different backgrounds	1#	2	3	(1=67%;2=25%;3=8%)
	• Use different lecturers at different times	1#	2	3	(1=42%;2=50%;3=8%)
	• Can use part-time staff to compensate for an insufficient number of full-time staff members	1	2#	3	(1=33%;2=67%)
b	**Value creation**				
	• The course should empower the students to go back and research relevant issues in their clinical environment	1#	2	3	(1=58%;2=42%)
	• There should be value in obtaining the qualification	1#	2	3	(1=75%;2=25%)
	• Malpractice insurance levies for doctors who practice transfusion medicine without the qualification may make it more attractive	1	2#	3	(2=33%;3=67%)

	• Blood banks should require that their doctors have a formal qualification in transfusion medicine	1	2#	3	(1=55%;2=45%)
c	**Networking**				
	• Input needed from a variety of role players	1#	2	3	(1=50%;2=50%)
	• Get buy-in from the private sector	1#	2	3	(1=25%;2=75%)
d	**Financial viability**				
	• There should be a revenue stream/funding	1#	2	3	(1=33%;2=67%)
	• Get sponsorship from the private sector, e.g. private laboratories	1#	2	3	(1=25%;2=58%;3=17%)
e	**Structure and organisation**				
	• Should be a part-time programme, i.e. doctor should be able to do it from his/her practice	1#	2	3	(1=75%;2=25%)
	• Course can be short and full-time, but also reasonable to have a part-time course with intensive contact sessions	1	2	3#	(1=33%;2=58%;3=8%)
	• Course should not be too long or take too much time	1	2	3#	(1=50%;2=33%;3=17%)
	• Should have defined blocks of contact time	1#	2	3	(1=67%;2=33%)
f	**Programme content and outcomes**				
	• The course should not be too specialised	1	2	3#	(1=33%;2=50%;3=17%)
	• Course should not be too intensive	1	2	3#	(1=25%;2=42%;3=33%)
	• There should be exposure to the actual blood bank	1#	2	3	(1=67%;2=33%)
	• The curriculum needs to be organised in and integrated way	1#	2	3	(1=75%;2=25%)
g	**Assessment**				
	• There should be self-assessment programmes	1#	2	3	(1=42%;2=58%)
h	**Career-path creation**				
	• Job opportunities for research in transfusion medicine	1#	2	3	(1=75%;2=17%;3=8%)
i	**Recognition programme**				
	• A regulatory framework that requires certification in transfusion medicine	1#	2	3	(1=33%;2=33%;3=25%)

	• Programmes should be certified according to certain criteria	1#	2	3	(1=75%;2=17%;3=8%)
	• There should be a certifying agency	1	2#	3	(1=58%;2=17%;3=25%)
j	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1#	2	3	(1=58%;2=42%)
	• One should diversify and broaden the interest in order to remain sustainable despite medical and technological advances, e.g. if artificial blood products are produced and the current educational needs in transfusion medicine change	1#	2	3	(1=42%;2=58%)
16	**ANY FURTHER COMMENTS ON THE FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME?**				

	SECTION G **ACADEMIC FACTORS**				
	This section deals with the factors from an academic point of view that could be taken into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one of the three choices (Essential, Useful, and Unnecessary).				
17	**THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
a	**Programme development**				
	• Objectives of course need to be tailored to the actual needs of the students, i.e. to the problems relevant to their settings	1	2#	3	(1=42%;2=58%)
	• Look at what other institutions are doing internationally and adapt what is useful to local circumstances	1	2#	3	(1=50%;2=50%)
	• People involved with project need to have academic standing to give prestige to the project and the content of the curriculum so that it will inspire confidence in the end product	1#	2	3	(1=50%;2=50%)
b	**Programme structure**				
	• It should be done part-time if run over a period longer than 18 months	1#	2	3	(1=67%;2=8%;3=25%)
	• Students will not complete the course if it is too long	1	2	3#	(1=33%;2=58%;3=8%)
	• The duration of each component should be set in great detail	1#	2	3	(1=42%;2=50%;3=8%)

c	**Quality assurance**				
	• The certification needs to be limited in time, i.e. continuous professional development credits need to be obtained on an annual basis to maintain certification to ensure that those who qualify remain up-to-date	1	2#	3	(1=8%;2=58%;3=33%)
	• A recertification process, be it correspondence or attendance-based refresher courses will ensure that those who qualified stay up-to-date and it can be a source of revenue	1#	2	3	(1=17%;2=75%;3=8%)
	• Programme should be peer-reviewed according to accepted criteria, e.g. having a specific number of certified haematologists on staff	1#	2	3	(1=58%;2=42%)
	• Record should be kept of which students attend each session	1#	2	3	(1=67%;2=33%)
e	**Academic culture**				
	• A spirit of inquisitiveness should be fostered	1#	2	3	(1=67%;2=33%)
	• There should be regular journal reviews and seminars related to transfusion medicine	1#	2	3	(1=50%;2=50%)
f	**Research**				
	• A research component should be included in the programme	1#	2	3	(1=58%;2=33%;3=8%)
	• The staff should be involved in the research programme which will keep them up-to-date and current	1#	2	3	(1=58%;2=42%)
	• Research and education should go hand in hand	1#	2	3	(1=58%;2=42%)
	• The course should empower the students to go back and research relevant issues in their clinical environment	1#	2	3	(1=67%;2=25%;3=8%)
	• Research done should be appropriate for the country	1	2#	3	(1=58%;2=42%)
g	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1#	2	3	(1=67%;2=25%;3=8%)

18.	**ANY FURTHER COMMENTS ON THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**

	SECTION H **EDUCATIONAL FACTORS**				
	This section deals with major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. Please indicate how important each of the following statements is according to the following scale: 1 = Essential 2 = Useful 3 = Unnecessary Please mark the appropriate block with an X. Only mark one option.				
19	**THE MAJOR EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	Comments
b	**Educational material and resources**				
	• Students need good handouts or educational material to enable them to prepare in advance	1#	2	3	(1=50%;2=50%)
	• Students need a good bibliography, i.e. good books and references to good articles	1#	2	3	(1=75%;2=25%)
	• Students need to be taught how to use online study resources, e.g. PubMed	1#	2	3	(1=67%;2=33%)
	• There should be continuous guidance available to students with regards to use of resources, e.g. online resources	1#	2	3	(1=42%;2=58%)
	• Students should have a quick reference manual for each block	1#	2	3	(1=50%;2=50%)
c	**Learning as an experience**				
	• The content should be interesting	1#	2	3	(1=67%;2=33%)
	• Attendance should be an enriching experience	1#	2	3	(1=75%;2=25%)

d	**Assessment**				
	• Use a variety of teaching and assessment techniques, e.g. lectures, journal reviews, seminar presentations, examinations, etc.	1#	2	3	(1=58%;2=42%)
	• There should be some form of assessment on a regular basis to ensure that outcomes have been achieved	1#	2	3	(1=67%;2=33%)
	• Assignments should be short	1#	2	3	(1=42%;2=58%)
	• There should be a final assessment to be able to judge whether course is working and force students to consolidate what they have learnt	1	2	3#	(1=42%;2=50%;3=8%)
	• Core knowledge should be assessed in a final assessment	1	2	3#	(1=58%;2=33%;3=8%)
	• Make use of peer assessment	1#	2	3	(1=33%;2=67%)
	• Competence should be proven, e.g. keeping a logbook and being signed off for certain procedures or skills attained	1	2	3#	(1=25%;2=50%;3=25%)
	• Logbooks will allow for auditing	1	2	3#	(1=17%;2=58%;3=25%)
	• Assessment should be authentic, i.e. applied to real-life situations	1#	2	3	(1=67%;2=25%;3=8%)
f	**Contact time**				
	• Working in small groups is important, with less than ten people in a group	1#	2	3	(1=33%;2=58%;3=8%)
	• One on one communication or with small groups is very important	1#	2	3	(1=45%;2=55%)
	• Distance learning components should be built in	1#	2	3	(1=33%;2=67%)

g	**Forms of learning**				
	• Emphasis should be on the practical issues more than theoretical things unrelated to day-to-day practice, e.g. seeing cases, evaluating blood request forms critically, going to the blood bank laboratory, how to prescribe blood, administer blood, transporting of blood from laboratory to patient, doing a cross-match, Coombs or a blood group	1	2#	3	(1=42%;2=50%;3=8%)
	• Learning should be integrated	1#	2	3	(1=73%;2=27%)
	• Some issues should be taught to give insight, but does not necessarily have to be assessed, e.g. processing of blood, politics and transfusion	1#	2	3	(1=50%;2=50%)
h	**Teacher**				
	• Lecturers should be people who are actively involved with blood transfusion every day (e.g. trauma surgeons, haematologists, intensivists)	1#	2	3	(1=42%;2=58%)
	• Avoid using lecturers who have high positions in transfusion medicine, but who "don't have their feet on the ground" and who can't bring the message across	1	2#	3	(1=50%;2=42%;3=8%)
	• Having speakers from blood transfusion services may be good in terms of allowing the students to build networks with people in the field	1#	2	3	(1=50%;2=50%)
	• Lecturers who are local experts should be used in contact sessions	1#	2	3	(1=58%;2=33%;3=8%)
	• Lecturers who are national experts should be used in contact sessions	1#	2	3	(1=67%;2=25%;3=8%)
	• Lecturers who are international experts should be used in contact sessions	1#	2	3	(1=42%;2=50%;3=8%)

I	**The student as an adult learner**				
	• Learner's existing knowledge should be explored	1#	2	3	(1=50%;2=50%)
	• Facilitator should provide an environment within which the adult learner feel safe to cooperate and explore	1#	2	3	(1=75%;2=25%)
	• The individual learner's attributes, preferences and needs should be accommodated	1	2	3#	(1=17%;2=75%;3=8%)
	• New knowledge should be tied to the learners' previous knowledge and experiences	1	2#	3	(1=42%;2=50%;3=8%)
	• Course content should provide immediacy, i.e. be immediately relevant to the learner's current working environment	1#	2	3	(1=58%;2=42%)
	• Learning approach should promote adulthood (i.e. independence, responsibility, self-direction)	1	2#	3	(1=58%;2=42%)
	• A cooperative learning climate should be created	1	2#	3	(1=58%;2=42%)
	• Programme should utilise the adult learner's accumulated experience	1	2#	3	(1=25%;2=58%;3=17%)
	• Provide opportunities for interaction with co-learners in small groups	1#	2	3	(1=58%;2=33%;3=8%)
	• Create experiences that can enhance the construction of meaning (e.g. through role play, case studies, simulations or discussion)	1	2#	3	(1=58%;2=42%)
j	**Alignment**				
	• The content should be aligned with the needs of the students	1	2	3#	(1=25%;2=67%;3=8%)
20.	**ANY FURTHER COMMENTS ON THE EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				

21.	PLEASE INDICATE BELOW IF THERE ARE ANY OTHER COMPONENTS THAT YOU WOULD LIKE TO SEE INCLUDED IN A MODEL FOR A POSTGRADUATE DIPLOMA FOR TRANSFUSION MEDICINE THAT WAS NOT DEALT WITH OR CONSIDERED IN THIS SURVEY.

APPENDIX E3

FEEDBACK ON DELPHI ROUND THREE

APPENDIX E3

FEEDBACK ON DELPHI ROUND THREE

A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE IN THE SCHOOL OF MEDICINE AT THE UNIVERSITY OF THE FREE STATE

Dear Delphi participant,

Thank you once again for participating in the Delphi survey. Attached you will find the results of the third and last round of the Delphi process. I am sending you this feedback with the sole purpose of providing you with the results and information regarding the second round. You do not need to do anything with it. After Round Three, consensus was reached on 240 of the 387 statements in the questionnaire, giving a 62.0% overall consensus. Stability was reached on 136 of 387 statements in Round Three, giving a 35.1% overall stability. The total number of statements where either consensus or stability had been reached is therefore 376 out of 387 (97.2%). As in the previous rounds, all the statements on which consensus has been reached, have been shaded. Where stability was reached, this was indicated as well.

Thank you once again for your participation, the many insightful comments made and for your support in this very important endeavour.

Kind regards

Vernon Louw

APPENDIX E4

CONSOLIDATED FINDINGS FROM THE DELPHI SURVEY

APPENDIX E4

CONSOLIDATED FINDINGS FROM THE DELPHI SURVEY

	SECTION A **THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING**				
	This section deals with the description of the main roles, including tasks and functions of the clinician dealing with blood transfusion in the clinical setting. It also deals with the description of the main areas of clinical knowledge, skills and competences required, as well as the deficiencies in the abilities of clinicians dealing with blood transfusion in the clinical setting. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
1.	**MAIN ROLES, TASKS AND FUNCTIONS**				
	The main roles, including tasks and functions of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
a	**A supervisory function in which he/she should**				
	• Ensure that correct procedures are followed	1	2	3	Consensus R1 (100:0:0)
	• Ensure that there are no clerical errors	1	2	3	Consensus R3 (92:8:0)
	• Recognise the inappropriate use of blood	1	2	3	Consensus R1 (100:0:0)
	• Monitor clinical use of blood and blood products	1	2	3	Consensus R1 (83:17:0)

b	**Governance role which include**				
	• Developing policies for blood transfusion in consultation with relevant colleagues	1	2	3	Consensus R3 (92:8:0)
	• Give feedback to hospital management on utilisation of blood products in the hospital	1	2	3	Stability (33:67:0)
	• Conduct audits on the use of blood	1	2	3	Consensus R2 (17:83:0)
c	**A training role, which include**				
	• clinical undergraduate teaching	1	2	3	Stability (33:58:8)
	• postgraduate teaching	1	2	3	Stability (33:50:17)
	• Training of nursing and laboratory personnel as well as medical students and specialists-in-training	1	2	3	Stability (42:50:8)
d	**A role in scarce resource management, which include**				
	• Using blood appropriately	1	2	3	Consensus R1 (92:8:0)
	• Limiting the use of blood	1	2	3	Consensus R3 (83:17:0)
	• Using appropriate alternatives to transfusion	1	2	3	Consensus R3 (83:17:0)
	• Using blood appropriately	1	2	3	Consensus R3 (92:8:0)
	• An awareness of the limitations of the blood supply	1	2	3	Consensus R3 (83:17:0)
	• Not to waste blood	1	2	3	Consensus R1 (83:17:0)
	• Using a scarce resource responsibly	1	2	3	Consensus R1 (83:17:0)
e	**A patient management role which include**				
	• Having adequate knowledge about indications for blood products	1	2	3	Consensus R1 (100:0:0)
	• Identify and evaluate need for transfusion	1	2	3	Consensus R1 (92:8:0)
	• Obtaining informed consent	1	2	3	Consensus R1 (92:8:0)
	• Taking personal responsibility for obtaining cross-match sample from patient	1	2	3	Stability (17:8:75)
	• Logistical issues, e.g. transportation of blood	1	2	3	Consensus R3 (0:8:92)

	• Ensuring safe administration	1	2	3	Consensus R1 (92:8:0)
	• Post-transfusion follow-up	1	2	3	Consensus R1 (92:8:0)
	• Managing complications of transfusion	1	2	3	Consensus R1 (100:0:0)
f	**A role as researcher, which include**				
	• Support research aimed at better identifying the indications for blood transfusion	1	2	3	Consensus R2 (8:83:8)
	• Conduct audits on the use of blood	1	2	3	Consensus R1 (8:83:8)
	• Interpret the literature on blood transfusion	1	2	3	Stability (42:58:0)
2.	**SKILLS AND COMPETENCES**				
	The main skills and competences of a clinician dealing with blood transfusion in the clinical setting can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
a	**Clinical**				
	• Clinical examination skills	1	2	3	Consensus R1 (100:0:0)
	• Skill in judging the need for a transfusion	1	2	3	Consensus R1 (100:0:0)
	• Competency in the management and follow-up of transfusion complications	1	2	3	Consensus R1 (100:0:0)
	• Resuscitation skills	1	2	3	Consensus R1 (100:0:0)
b	**Technical**				
	• Skills needed to use the different blood products	1	2	3	Consensus R1 (83:17:0)
	• Achieving venous access, including placement of central lines	1	2	3	Consensus R3 (83:8:8)
	• Competence in thawing of blood products, e.g. fresh frozen plasma	1	2	3	Stability (33:8:58)
	• Competency in the administration of blood products	1	2	3	Consensus R1 (91:9:0)

	• *Competency in cold chain maintenance relating to blood products*	*1*	*2*	*3*	*Removed due to incorrect allocation.*
	• Competency in doing a cross-match	1	2	3	Consensus R3 (0:17:83)
c	**Administrative**				
	• Administrative skills, including precise note-keeping	1	2	3	Consensus R2 (83:17:0)
d	**Social**				
	• Communication skills	1	2	3	Consensus R3 (83:17:0)
	• Interpersonal skills	1	2	3	Consensus R3 (83:17:0)
e	**Integration**				
	• Problem-solving skills	1	2	3	Consensus R1 (83:17:0)
	• Competency in appropriate blood transfusion	1	2	3	Consensus R1 (100:0:0)
	• Practicing transfusion medicine in rural areas	1	2	3	Stability (42:58:0)
	• Competency in interpreting activities in the blood bank	1	2	3	Stability (58:8:33)
f	**Education**				
	• Teaching and training skills	1	2	3	Consensus R1 (17:83:0)
g	**Research**				
	• Auditing skills	1	2	3	Consensus R2 (8:83:8)
	• Know how to interpret the literature on blood transfusion	1	2	3	Consensus R3 (92:8:0)
3.	**MAIN AREAS OF CLINICAL KNOWLEDGE**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
	The main areas of clinical knowledge required by the clinician dealing with blood transfusion can be described as:				
a	**Physiology**				
	• Oxygen transfer	1	2	3	Consensus R1 (83:17:0)
	• Biological components of blood	1	2	3	Consensus R1 (92:8:0)

	• Fluid balance, electrolytes and fluid replacement	1	2	3	Consensus R1 (92:8:0)
	• Blood groups	1	2	3	Stability (58:42:0)
	• Knowledge of the physiology of blood	1	2	3	Consensus R1 (83:17:0)
	• Knowledge of transfusion immunology	1	2	3	Consensus R3 (17:83:0)
b	**Pathophysiology**				
	• Pathophysiology of diseases where blood products may be indicated	1	2	3	Consensus R3 (92:8:0)
	• Pathophysiology related to blood loss and blood transfusion	1	2	3	Consensus R3 (92:8:0)
c	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	Stability (8:75:17)
	• Knowledge of aphaeresis	1	2	3	Consensus R1 (0:83:17)
	• Knowledge of blood grouping	1	2	3	Stability (33:67:0)
	• Thawing of blood products	1	2	3	Stability (42:25:33)
	• Knowledge of when blood products can be returned to the blood bank if unused	1	2	3	Consensus R1 (83:17:0)
	• Knowledge of the principles underlying the issuing of blood	1	2	3	Stability (17:75:8)
	• Knowledge of cross-matching	1	2	3	Consensus R3 (17:83:0)
d	**Haematology**				
	• Coagulation and anti-coagulant drugs	1	2	3	Consensus R2 (92:8:0)
	• Haematology knowledge relevant to blood transfusion	1	2	3	Consensus R1 (92:8:0)
	• Anaemia	1	2	3	Consensus R1 (92:8:0)
	• Haemophilia	1	2	3	Stability (75:25:0)
e	**Clinical medicine**				
	• Judging the need and indication for a transfusion	1	2	3	Consensus R1 (92:8:0)
	• Different blood products and their use	1	2	3	Consensus R1 (92:8:0)
	• Knowledge of appropriate transfusion practice	1	2	3	Consensus R1 (83:17:0)
	• Use of blood in renal failure	1	2	3	Consensus R1 (92:8:0)

	• Intensive care issues related to blood transfusion	1	2	3	Stability (58:42:0)
	• Use of blood in surgery	1	2	3	Consensus R1 (83:17:0)
	• Knowledge of the relevance of co-morbid disease in patients that need a blood transfusion	1	2	3	Consensus R3 (92:8:0)
f	**Emergency Medicine**				
	• Resuscitation and the use of blood	1	2	3	Consensus R1 (92:8:0)
	• Using emergency blood	1	2	3	Consensus R1 (92:8:0)
	• Management of allergic reactions and anaphylaxis	1	2	3	Consensus R1 (92:8:0)
g	**Evidence-based medicine**				
	• Evidence behind appropriate transfusion	1	2	3	Stability (25:75:0)
	• Appropriate use of blood products	1	2	3	Stability (75:25:0)
h	**Blood administration**				
	• Administration of blood products	1	2	3	Consensus R2 (83:17:0)
	• Deciding on amount of blood product that needs to be transfused	1	2	3	Consensus R2 (100:0:0)
i	**Blood conservation**				
	• Alternatives to blood transfusion	1	2	3	Consensus R1 (92:8:0)
	• Autologous transfusions	1	2	3	Stability (75:25:0)
	• Blood conservation methods	1	2	3	Stability (42:58:0)
	• Platelet-refractoriness	1	2	3	No stability (58:42:0)
j	**Blood safety**				
	• Knowledge of the complications of blood transfusion	1	2	3	Consensus R1 (100:0:0)
	• Contra-indications for blood transfusion	1	2	3	Consensus R1 (100:0:0)
	• Transfusion-transmissible infections	1	2	3	Consensus R2 (82:18:0)
	• Haemovigilance	1	2	3	Consensus R3 (83:17:0)
	• Allo-immunisation	1	2	3	Consensus R3 (83:17:0)
	ANY FURTHER COMMENTS ON THE CLINICIAN DEALING WITH BLOOD TRANSFUSION IN THE CLINICAL SETTING				

	SECTION B **THE SCOPE OF PRACTICE OF THE CLINICIAN INVOLVED WITH BLOOD TRANSFUSION**				
	This section deals with the difference in the scope of practice between a full-time specialist in transfusion medicine and a clinician who deals with blood transfusion on an *ad hoc* basis. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
4.	**THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE**				
	The scope of practice of a full-time Specialist in Transfusion Medicine can be described as follows:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
a	**Clinical knowledge**				
	• Deals with a much wider spectrum of patients	1	2	3	Consensus R1 (92:8:0)
	• Has a broader knowledge of disease related to transfusion medicine	1	2	3	Consensus R1 (92:8:0)
	• Knowledge about transfusion in transplantation medicine	1	2	3	Consensus R1 (100:0:0)
	• Deals more with coagulation problems	1	2	3	Stability (75:25:0)
	• In-depth knowledge of a pre-transfusion interview	1	2	3	Consensus R1 (92:8:0)
	• Management of alloimmunisation	1	2	3	Consensus R1 (100:0:0)
	• Should have an interest in new developments	1	2	3	Consensus R1 (83:17:0)
b	**Blood banking**				
	• Covers the whole area of aphaeresis, including stem cell collection	1	2	3	Consensus R1 (83:17:0)

	• Dealing with blood donors	1	2	3	No stability (50:42:8)
	• Involved with quality control in blood bank	1	2	3	No stability (58:33:8)
	• Involved in the running of the blood bank	1	2	3	Stability (8:67:25)
	• Administrative aspects of blood banking, including tracking and retrieval of blood and computerisation	1	2	3	Stability (8:50:42)
	• Have a deeper understanding of the laboratory testing for transfusion-transmitted infections	1	2	3	Stability (67:25:8)
c	**Teaching and training**				
	• Functions as a tutor to his colleagues	1	2	3	Consensus R3 (83:8:8)
	• Support activities centered around appropriate use, reducing use and optimising use of blood and blood products	1	2	3	Consensus R1 (92:8:0)
d	**Leadership and consultative roles**				
	• Coordinating role within the hospital	1	2	3	Stability (58:42:0)
	• Functions as a link between the clinical setting and the laboratory	1	2	3	Consensus R1 (83:17:0)
	• Should have sufficient stature to be able to advise, help and lead new developments	1	2	3	Stability (75:25:0)
	• Support colleagues across a range of specialties	1	2	3	Consensus R1 (83:17:0)
	ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE FULL-TIME SPECIALIST IN TRANSFUSION MEDICINE				

5.	**THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				
	The scope of practice of the clinician dealing with blood transfusion on an *ad hoc* basis can best be described as:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
a	**Clinical knowledge**				
	• Can be of practical assistance by the bedside	1	2	3	Stability (58:42:0)
	• Should apply knowledge in local setting	1	2	3	Consensus R2 (83:17:0)
	• More clinically orientated than specialist	1	2	3	Stability (58:33:8)
	• Knowledge of transfusion basics, e.g. the indications for blood products	1	2	3	Consensus R2 (83:17:0)
	• *Limited knowledge of more specialised issues, e.g. managing about massive transfusion*	*1*	*2*	*3*	*Removed due to incorrect allocation*
b	**Blood banking**				
	• Can do basic cross-matching, blood grouping, blood smear review and urine testing	1	2	3	Stability (0:67:33)
	• Able to run a small blood bank	1	2	3	Consensus R1 (0:17:83)
	• Should know the concepts and principles underlying aphaeresis	1	2	3	Consensus R3 (83:17:0)
c	**Teaching and training**				
	• Can assist with transfusion medicine training of doctors, students, paramedical staff and nurses	1	2	3	Stability (8:75:18)
d	**Leadership and consultative**				
	• Can be consulted regarding transfusion in a big department	1	2	3	Stability (17:67:17)
6.	**ANY FURTHER COMMENTS ON THE SCOPE OF PRACTICE OF THE CLINICIAN DEALING WITH BLOOD TRANSFUSION ON AN *AD HOC* BASIS**				

	SECTION C **THE CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION**				
	This section deals with the current challenges faced by clinicians dealing with blood transfusion as well as the challenges anticipated in the next five years. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
7.	**CHALLENGES CURRENTLY FACED BY CLINICIANS**				
	The challenges currently faced by clinicians dealing with blood transfusion include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
a	**Quality and safety**				
	• Safety of blood products	1	2	3	Consensus R1 (92:8:0)
	• Limiting transfusion-transmitted infections	1	2	3	Stability (50:50:0)
	• Quality of blood products	1	2	3	Stability (25:50:25)
	• Effects of Human Immunodeficiency Virus (HIV) epidemic on transfusion medicine	1	2	3	Consensus R1 (92:8:0)
	• Management of side-effects blood transfusions	1	2	3	Consensus R1 (92:8:0)
	• Limiting unnecessary transfusions	1	2	3	Consensus R1 (83:17:0)
	• *Restrictions on donors and unnecessary donor deferrals*	*1*	*2*	*3*	*Removed due to incorrect allocation.*
	• West-Nile virus	1	2	3	Stability (0:75:25)
	• Patients requiring repeated blood transfusion	1	2	3	Stability (75:25:0)

	• Clerical errors	1	2	3	Stability (33:67:0)
	• Sampling errors	1	2	3	Consensus R1 (83:17:0)
b	**Lack of knowledge and training**				
	• Appropriate use of blood	1	2	3	Consensus R1 (92:8:0)
	• Knowledge of indications for different blood products	1	2	3	Consensus R1 (100:0:0)
	• Lack of training in transfusion medicine on an undergraduate level	1	2	3	Consensus R3 (100:0:0)
	• Clinician knowledge on coagulation and anticoagulants	1	2	3	Stability (58:42:0)
	• Knowledge of the value of blood products	1	2	3	Consensus R3 (83:17:0)
	• Knowledge of the pre-analytical and analytical phase of blood sample processing	1	2	3	Stability (0:67:33)
	• Knowledge of the individual blood products, their methods of preparation, storage life and their contents	1	2	3	No stability (67:33:0)
	• Knowledge of practical issues relating to blood use, e.g. thawing, administration, irradiation	1	2	3	Stability (25:58:17)
	• Knowledge of the management of transfusion-related complications	1	2	3	Consensus R1 (100:0:0)
	• Knowledge of the pathophysiology of transfusion-related complications	1	2	3	Stability (42:58:0)
c	**Access and availability**				
	• Adequate blood supply	1	2	3	Consensus R3 (92:8:0)
	• Inappropriate use of blood	1	2	3	Consensus R1 (92:8:0)
	• Decreasing donor pool	1	2	3	Consensus R3 (17:83:0)
	• Finding enough platelet donors	1	2	3	Stability (17:75:8)
	• Access to blood	1	2	3	Consensus R1 (92:8:0)
	• Effects of HIV epidemic on transfusion medicine	1	2	3	Consensus R1 (92:8:0)
	• Restrictions on donors and increasing donor deferral	1	2	3	Stability (8:75:17)
	• Lack of rare blood groups in the donor pool	1	2	3	Consensus R2 (8:83:8)
	• Development of anti-platelet antibodies and subsequent platelet refractoriness	1	2	3	Consensus R2 (9:91:0)

	• Immigration of peoples into areas with an inadequate supply of blood for their blood groups, e.g. immigration Africans to Europe	1	2	3	Stability (8:25:67)
	• Increasing demand for blood due to novel medical techniques requiring blood, e.g. increasing need for exchange transfusion for patients with sickle cell anaemia immigrating to Europe	1	2	3	Consensus R3 (8:83:8)
	• Increasing demand for blood in specialised medical care, e.g. leukaemia and cancer treatment	1	2	3	Stability (58:42:0)
	• Patients requiring repeated blood transfusion	1	2	3	Stability (75:25:0)
d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood transfusion	1	2	3	Stability (75:25:0)
	• Informed consent issues	1	2	3	Consensus R2 (83:17:0)
	• Physician responsibility for a product delivered to him/her by a third party	1	2	3	No stability (17:75:8)
	• Refusal of blood products for religious reasons	1	2	3	Stability (33:58:8)
	• Issues flowing from breach of anonymity between recipient and donor	1	2	3	Stability (17:42:42)
e	**Cultural perceptions and understanding**				
	• Cultural perceptions of blood transfusion	1	2	3	Stability (33:58:8)
	• Public fear of the blood supply, e.g. risk of contracting HIV	1	2	3	No stability (75:25:0)
f	**Cost-effectiveness**				
	• Cost-effective use of blood	1	2	3	Consensus R3 (83:17:0)
	• Appropriate use of blood	1	2	3	Consensus R1 (100:0:0)
	• Limiting unnecessary transfusions	1	2	3	Consensus R1 (100:0:0)
8.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				

9.	**CHALLENGES CLINICIANS ARE EXPECTED TO BE FACED WITH IN THE NEXT FIVE YEARS**				
	The challenges clinicians involved in blood transfusion are expected to be faced with in the next five years, include issues related to:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
a	**Quality and safety**				
	• Safety of blood products	1	2	3	Consensus R1 (92:8:0)
	• Limiting transfusion-transmitted infections	1	2	3	Consensus R1 (92:8:0)
	• Effects of HIV epidemic on transfusion medicine	1	2	3	Consensus R2 (83:17:0)
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, variant Creutzfeld-Jacob's disease (vCJD)	1	2	3	Stability (42:58:0)
	• Quality of blood products	1	2	3	Stability (50:50:0)
	• Increase in Graft-versus-host-disease (GVHD)	1	2	3	Stability (9:64:27)
b	**Lack of knowledge and training**				
	• Lack of academic input regarding use of blood in the private sector	1	2	3	Stability (33:58:8)
c	**Access and availability**				
	• Supply of blood	1	2	3	Consensus R1 (92:8:0)
	• Increased demand for blood due to HIV epidemic	1	2	3	Stability (50:42:8)
	• Shrinking donor pool due to HIV epidemic	1	2	3	Stability (42:58:0)
	• Access to blood	1	2	3	Consensus R1 (92:8:0)
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	Stability (25:25:50)
d	**Ethical and medico-legal**				
	• Ethical issues pertaining to blood use	1	2	3	Stability (67:25:8)
	• Informed consent issues	1	2	3	Stability (67:33:0)
	• Increasing disparity in terms of the availability of different products between state and private sector	1	2	3	Stability (0:58:42)

e	**Cost-effective use**				
	• Cost-effective use of blood	1	2	3	Stability (75:25:0)
f	**Managing change**				
	• Keeping up with new developments	1	2	3	Stability (67:33:0)
	• Managing change in the field of blood transfusion	1	2	3	No stability (75:25:0)
	• Changing profile of transfusion-transmitted infections, e.g. more bacterial pathogens, vCJD	1	2	3	Stability (25:75:0)
10.	**ANY FURTHER COMMENTS ON THE CURRENT CHALLENGES FACED BY CLINICIANS DEALING WITH BLOOD TRANSFUSION?**				

	SECTION D **DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	This section deals with the deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
11	**DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS.**				
	The deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products, include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
a	**Knowledge**				
	• Knowledge of the correct indications for transfusion	1	2	3	Consensus R2 (92:8:0)
	• Knowledge of transfusion triggers and their application	1	2	3	Consensus R1 (83:17:0)
	• Knowledge of transfusion in general	1	2	3	Consensus R2 (83:17:0)
	• Knowledge of available products	1	2	3	Consensus R2 (92:8:0)
	• Knowledge of complications of blood transfusion	1	2	3	Consensus R1 (83:17:0)
	• Knowledge of coagulation and haemostasis	1	2	3	Consensus R2 (83:17:0)
b	**Skills**				
	• Skills to correctly administer blood products	1	2	3	Consensus R3 (83:17:0)
	• Skills required to obtain venous access, including central line placement, e.g. in shocked patient	1	2	3	Consensus R3 (83:17:0)

	• Incorrect handling of the product	1	2	3	Consensus R1 (83:17:0)
	• Application of clinical skills - clinicians too focused on laboratory values and not enough by the bedside	1	2	3	No stability (75:25:0)
c	**Evidence-based practice**				
	• Inappropriate use of blood and blood products	1	2	3	Consensus R3 (83:17:0)
	• Lack of guidelines on blood transfusion	1	2	3	Consensus R2 (83:17:0)
	• Inappropriate selection of blood products	1	2	3	Consensus R3 (83:17:0)
	• Non-adherence to guidelines and recommendations	1	2	3	Stability (67:33:0)
	• Transfusing patients unnecessarily	1	2	3	Consensus R3 (83:17:0)
	• Cross-matching and keeping blood unnecessarily, esp. in surgery and anesthesiology	1	2	3	Stability (42:58:0)
	• Resistance of clinicians against changing behaviour despite being given guidelines	1	2	3	Stability (58:42:0)
d	**Human resources**				
	• Lack of time for participating in educational activities related to blood transfusion	1	2	3	Stability (50:50:0)
	• Lack of clinicians with an overview of all aspects of transfusion	1	2	3	Stability (75:25:0)
e	**Scarce resource management**				
	• Awareness of costs	1	2	3	Stability (50:50:0)
	• Lack of auditing systems	1	2	3	Stability (42:58:0)
f	**Attitude**				
	• Transfusion seen as an insignificant part of patient care	1	2	3	Stability (58:42:0)
12	**ANY FURTHER COMMENTS ON THE DEFICIENCIES IN THE ABILITIES OF CLINICIANS DEALING WITH THE TRANSFUSION OF BLOOD AND BLOOD PRODUCTS?**				

	SECTION E **PROGRAMME OUTCOMES**				
	This section deals with the major outcomes of a Postgraduate Diploma in Transfusion Medicine. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
13	**THE MAJOR OUTCOMES OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
	The major outcomes for a clinician completing a postgraduate diploma should include the following:				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
a	**Basic sciences**				
	• Should have a proper knowledge of physiology related to blood transfusion	1	2	3	Consensus R1 (92:8:0)
	• Should have a basic knowledge of pathophysiology related to blood transfusion	1	2	3	Consensus R1 (83:17:0)
b	**Blood banking**				
	• Knowledge of laboratory aspects of transfusion medicine	1	2	3	Stability (67:33:0)
	• Should know how cross-match testing is performed	1	2	3	Stability (67:33:0)
	• Should know about blood processing	1	2	3	Stability (58:42:0)
	• Should know about donor selection and donor-related issues	1	2	3	Stability (50:50:0)
	• Should know the different blood products and their component	1	2	3	Consensus R1 (92:8:0)
	• Should have an awareness of aphaeresis and its applications	1	2	3	Consensus R3 (83:17:0)

	• Understand antibody identification procedures	1	2	3	Stability (58:42:0)
	• Should know about blood collection and the different types of collection systems	1	2	3	Stability (67:33:0)
	• Should know about quality assurance in blood banking	1	2	3	Stability (67:33:0)
	• Should know about the new issues facing blood banking	1	2	3	Stability (58:42:0)
	• Should know about leukodepletion in laboratory and by bedside	1	2	3	Stability (75:25:0)
	• Should know how blood typing is done	1	2	3	Stability (67:33:0)
c	**Haematology**				
	• Knowledge of relevant aspects of haematology	1	2	3	Consensus R3 (92:8:0)
	• Knowledge of haemostasis in transfusion medicine	1	2	3	Consensus R1 (92:8:0)
e	**Clinical medicine**				
	• Should know the indications for blood products	1	2	3	Consensus R1 (100:0:0)
	• Should be able to apply knowledge practically in the clinical setting	1	2	3	Consensus R1 (100:0:0)
	• Understanding of transfusion in hemolytic anaemias	1	2	3	Consensus R1 (83:17:0)
	• Understand the management of the transfusion-refractory patient	1	2	3	Consensus R1 (83:17:0)
	• Should be able to use blood appropriately	1	2	3	Consensus R1 (100:0:0)
	• Should know how to administer blood	1	2	3	Consensus R1 (92:8:0)
	• The use of transfusions by a clinician doing the diploma should decrease	1	2	3	Stability (17:75:8)
	• The quality of the transfusions by a clinician doing the diploma should increase, e.g. less complications and wastage of blood products	1	2	3	Consensus R3 (92:8:0)
	• Should be able to discuss the indications for stem cell transplantation	1	2	3	Consensus R1 (8:83:8)
	• Should know about sampling of blood	1	2	3	Consensus R1 (83:17:0)
	• Should know the ethical aspects concerning the use of blood and blood products	1	2	3	Consensus R2 (92:8:0)

f	**Blood conservation**				
	• Should have an understanding of the context of the issues and problems with the blood supply	1	2	3	Consensus R1 (83:17:0)
	• Should know about transfusion alternatives and blood conservation procedures, e.g. cell saving, erythropoietin, etc.	1	2	3	Consensus R1 (92:8:0)
	• Should know about cost-effectiveness in transfusion medicine	1	2	3	Stability (67:33:0)
g	**Blood safety**				
	• Should know about blood safety	1	2	3	Consensus R1 (92:8:0)
	• Should know about TTIs	1	2	3	Consensus R1 (92:8:0)
	• Should know about GVHD	1	2	3	Consensus R3 (83:17:0)
	• Should be able to diagnose and manage complications of blood transfusion	1	2	3	Consensus R1 (92:8:0)
	• Should know the contra-indications for blood products	1	2	3	Consensus R1 (92:8:0)
	• Understand allo-immunisation and how to manage that	1	2	3	Consensus R1 (83:17:0)
	• Understand and be able to manage iron overload	1	2	3	Consensus R1 (83:17:0)
	• Should know about immunosuppression related to transfusion	1	2	3	Consensus R1 (92:8:0)
h	**Social skills**				
	• Should have communication skills	1	2	3	Stability (42:58:0)
	• Should be able to explain to a patient what a transfusion or transfusion-related procedure entails	1	2	3	Consensus R1 (92:8:0)
i	**Research**				
	• Should be able to participate in clinical research related to transfusion medicine	1	2	3	No stability (25:75:0)
	• Should have an understanding of the need for clinical trials in transfusion medicine	1	2	3	Stability (58:42:0)

14	ANY FURTHER COMMENTS ON THE THE MAJOR OUTCOMES OF A CURRICULUM OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?

	SECTION F **SUSTAINABILITY**				
	This section deals with the major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
15	**THE MAJOR FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
a	**Academic staff**				
	• Properly qualified staff that runs the Diploma	1	2	3	Consensus R1 (100:0:0)
	• Roles of team members need to be clearly defined	1	2	3	Consensus R3 (92:8:0)
	• Expose students to a broad spectrum of lecturers from different backgrounds	1	2	3	Stability (75:25:0)
	• Use different lecturers at different times	1	2	3	Stability (33:58:8)
	• There should be good guidance for the students	1	2	3	Consensus R1 (83:17:0)
	• Dedicated team needed	1	2	3	Consensus R1 (92:8:0)
	• Can use part-time staff to compensate for an insufficient number of full-time staff members	1	2	3	Consensus R3 (8:92:0)
b	**Value creation**				
	• Enough people should want to do it, i.e. there should be a need for the course	1	2	3	Consensus R1 (83:17:0)
	• The Diploma should have value to the person who does it	1	2	3	Consensus R1 (100:0:0)

	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	Stability (67:33:0)
	• There should be value in obtaining the qualification	1	2	3	Consensus R3 (83:17:0)
	• Malpractice insurance levies for doctors who practice transfusion medicine without the qualification may make it more attractive	1	2	3	Consensus R3 (0:17:83)
	• Doing the course should allow the students to do certain extra things not otherwise part of their job description	1	2	3	Consensus R1 (8:83:8)
	• Blood banks should require that their doctors have a formal qualification in transfusion medicine	1	2	3	No stability (67:25:8)
	• There should be a follow-up programme after the Diploma, e.g. where students can come back annually for refresher courses	1	2	3	Consensus R1 (8:92:0)
	• Sponsor people to attend on a meritorial basis	1	2	3	Consensus R2 (8:83:8)
c	**Networking**				
	• Input needed from a variety of role players	1	2	3	Stability (50:50:0)
	• Get buy-in from the private sector	1	2	3	Consensus R3 (8:92:0)
d	**Financial viability**				
	• There should be a revenue stream/funding	1	2	3	Stability (25:75:0)
	• Get sponsorship from the private sector, e.g. private laboratories	1	2	3	Consensus R3 (8:83:8)
e	**Structure and organisation**				
	• Should be a part-time programme, i.e. doctor should be able to do it from his/her practice	1	2	3	Consensus R3 (83:17:0)
	• You need dedicated administrative support, e.g. secretarial services, paper, printing	1	2	3	Consensus R1 (92:8:0)
	• Course can be short and full-time, but also reasonable to have a part-time course with intensive contact sessions	1	2	3	Consensus R3 (8:92:0)

	• Course should not be too long or take too much time	1	2	3	Stability (58:25:17)
	• Should have defined blocks of contact time	1	2	3	Consensus R3 (83:17:0)
	• Needs to be well organised	1	2	3	Consensus R1 (83:17:0)
	• There should be appropriate infrastructure/facilities for running the course	1	2	3	Consensus R2 (92:8:0)
	• Logistics to present course should be in place	1	2	3	Consensus R1 (83:17:0)
f	**Programme content and outcomes**				
	• The course should cover a broad spectrum of clinical issues	1	2	3	Consensus R1 (92:8:0)
	• The course should be relevant to clinical practice	1	2	3	Consensus R1 (100:0:0)
	• The course should be applied to clinical practice	1	2	3	Consensus R1 (100:0:0)
	• The course should not be too specialised	1	2	3	Stability (17:67:17)
	• The individual topics need to be well-structured	1	2	3	Consensus R1 (92:8:0)
	• Course should not be too intensive	1	2	3	Stability (17:50:53)
	• The curriculum needs to be clearly defined, e.g. with well defined start and end	1	2	3	Consensus R2 (92:8:0)
	• Should have practical sessions that are relevant	1	2	3	Consensus R2 (83:17:0)
	• Including a problem-based component in the curriculum using case studies where people can learn from mistakes	1	2	3	Consensus R2 (92:8:0)
	• There should be exposure to the actual blood bank	1	2	3	Stability (75:25:0)
	• The curriculum needs to be organised in and integrated way	1	2	3	Consensus R3 (100:0:0)
	• There should be good programme and educational material	1	2	3	Consensus R1 (83:17:0)
	• Outcomes need to be defined	1	2	3	Consensus R1 (92:8:0)
g	**Assessment**				
	• There should be deliverable assignments	1	2	3	Consensus R1 (92:8:0)
	• Evaluate the practice and knowledge of the students	1	2	3	Consensus R1 (92:8:0)

	• There should be self-assessment programmes	1	2	3	Stability (33:67:0)
	• Need to give feedback to students on assignments	1	2	3	Consensus R2 (100:0:0)
h	**Career-path creation**				
	• Job possibilities need to be created, e.g. posts for doctors who take responsibility for clinical transfusion practice and the transfusion committee in a hospital	1	2	3	Consensus R2 (8:92:0)
	• Job opportunities for research in transfusion medicine	1	2	3	Stability (33:58:0)
i	**Recognition programme**				
	• The Diploma should be recognised by the relevant governing bodies	1	2	3	Consensus R2 (92:8:0)
	• A regulatory framework that requires certification in transfusion medicine	1	2	3	Stability (33:42:25)
	• Programmes should be certified according to certain criteria	1	2	3	Consensus R3 (83:17:0)
	• There should be a certifying agency	1	2	3	Consensus R3 (83:8:8)
	• Continuous professional development (CPD) accreditation of programme	1	2	3	Consensus R2 (92:8:0)
j	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	Consensus R3 (83:17:0)
	• Get feedback from the participants	1	2	3	Consensus R2 (83:17:0)
	• One should diversify and broaden the interest in order to remain sustainable despite medical and technological advances, e.g. if artificial blood products are produced and the current educational needs in transfusion medicine change	1	2	3	Stability (42:58:0)
16	**ANY FURTHER COMMENTS ON THE FACTORS THAT MAKE A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE A SUSTAINABLE PROGRAMME?**				

	SECTION G **ACADEMIC FACTORS**				
	This section deals with the factors from an academic point of view that could be taken into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
17	**THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
a	**Programme development**				
	• Research and define the actual skills and knowledge required	1	2	3	Consensus R1 (100:0:0)
	• Objectives of course need to be tailored to the actual needs of the students, i.e. to the problems relevant to their settings	1	2	3	Stability (33:67:0)
	• Look at what other institutions are doing internationally and adapt what is useful to local circumstances	1	2	3	Stability (50:50:0)
	• Should go through the necessary channels of approval, e.g. university channels	1	2	3	Consensus R1 (92:8:0)
	• People involved with project need to have academic standing to give prestige to the project and the content of the curriculum so that it will inspire confidence in the end-product	1	2	3	Stability (50:50:0)
b	**Programme structure**				
	• Proper structure	1	2	3	Consensus R1 (92:8:0)

	• The duration of the diploma needs to be fixed in advance	1	2	3	Consensus R1 (92:8:0)
	• The duration should not be more than two years	1	2	3	Consensus R1 (83:8:8)
	• It should be done part-time if run over a period longer than 18 months	1	2	3	Consensus R3 (83:0:17)
	• Students will not complete the course if it is too long	1	2	3	Consensus R3 (17:83:0)
	• The duration of each component should be set in great detail	1	2	3	Stability (33:58:8)
c	**Quality assurance**				
	• There should be an appropriate standard with internal and external moderation	1	2	3	Consensus R1 (83:17:0)
	• Final assessment should be externally moderated	1	2	3	Consensus R1 (83:8:8)
	• The certification needs to be limited in time, i.e. continuous professional development credits need to be obtained on an annual basis to maintain certification to ensure that those who qualify remain up-to-date	1	2	3	Stability (8:58:33)
	• A recertification process, be it correspondence or attendance-based refresher courses will ensure that those who qualified stay up-to-date and it can be a source of revenue	1	2	3	Consensus R3 (8:83:8)
	• Programme should be peer-reviewed according to accepted criteria, e.g. having a specific number of certified haematologists on staff	1	2	3	Stability (75:25:0)
	• The training programme should be documented, e.g. which lectures are given	1	2	3	Consensus R1 (83:17:0)
	• The programme needs to be standardised	1	2	3	Consensus R1 (83:17:0)
	• Record should be kept of which students attend each session	1	2	3	Stability (75:25:0)
d	**Admission criteria and recognition of prior learning**				
	• Applicants for Diploma should have a basic medical degree and do not need to be specialists	1	2	3	Consensus R2 (92:8:0)

e	**Academic culture**				
	• A spirit of inquisitiveness should be fostered	1	2	3	Consensus R3 (83:17:0)
	• A culture of critical thinking should be fostered, where questions are asked about the appropriateness of current practice	1	2	3	Consensus R1 (92:8:0)
	• There should be a culture of continuous learning and updating your knowledge	1	2	3	Consensus R1 (83:17:0)
	• There should be regular journal reviews and seminars related to transfusion medicine	1	2	3	Stability (50:50:0)
f	**Research**				
	• A research component should be included in the programme	1	2	3	Stability (67:33:0)
	• The staff should be involved in the research programme which will keep them up-to-date and current	1	2	3	Stability (67:33:0)
	• Research and education should go hand in hand	1	2	3	Stability (67:33:0)
	• The course should empower the students to go back and research relevant issues in their clinical environment	1	2	3	Stability (75:25:0)
	• Research done should be appropriate for the country	1	2	3	Stability (75:25:0)
g	**Continuous improvement**				
	• The outcomes and new developments achieved by the students who have qualified should be fed back into the course	1	2	3	Consensus R3 (92:8:0)
18	**ANY FURTHER COMMENTS ON THE FACTORS THAT SHOULD BE TAKEN INTO CONSIDERATION WITH REGARDS TO THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				

	SECTION H **EDUCATIONAL FACTORS**				
	This section deals with major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. 1 = percentage of participants who indicated that the statement is essential and must be included in the model 2 = percentage of participants who indicated that the statement is useful and could be included in the model 3 = percentage of participants who indicated that the statement is unnecessary and should not be included in the model				
19	**THE MAJOR EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE.**				
		ESSENTIAL	**USEFUL**	**UNNECESSARY**	
a	**Curriculum**				
	• You need a formal curriculum	1	2	3	Consensus R1 (92:8:0)
	• Curriculum needs to be well-defined	1	2	3	Consensus R1 (100:0:0)
	• The components of the training programme should be enunciated in great detail	1	2	3	Consensus R2 (92:8:0)
b	**Educational material and resources**				
	• Students need good handouts or educational material to enable them to prepare in advance	1	2	3	Stability (50:50:0)
	• Should make use of the internet	1	2	3	Consensus R2 (83:17:0)
	• Students need a good bibliography, i.e. good books and references to good articles	1	2	3	Consensus R3 (83:17:0)

	• Course content should be linked into other resources, e.g. one needs to ensure access to the library, including online, for non-resident students	1	2	3	Consensus R1 (92:8:0)
	• Students need to be taught how to use online study resources, e.g. PubMed	1	2	3	Stability (75:25:0)
	• There should be continuous guidance available to students with regards to use of resources, e.g. online resources	1	2	3	Stability (33:67:0)
	• Students should have a quick reference manual for each block	1	2	3	Stability (50:50:0)
c	**Learning as an experience**				
	• The content should be interesting	1	2	3	Stability (67:33:0)
	• Attendance should be an enriching experience	1	2	3	Consensus R3 (92:8:0)
	• Students should be inspired	1	2	3	Consensus R1 (83:17:0)
d	**Assessment**				
	• Assignments should be assessed	1	2	3	Consensus R1 (100:0:0)
	• Use a variety of teaching and assessment techniques, e.g. lectures, journal reviews, seminar presentations, examinations, etc.	1	2	3	Stability (67:33:0)
	• There should be some form of assessment on a regular basis to ensure that outcomes have been achieved	1	2	3	Consensus R3 (83:17:0)
	• Should have deliverable assignments	1	2	3	Consensus R1 (100:0:0)
	• Feedback should be given on assignments	1	2	3	Consensus R1 (92:8:0)
	• Assignments should be short	1	2	3	Stability (42:58:0)
	• There should be a final assessment to be able to judge whether course is working and force students to consolidate what they have learnt	1	2	3	Stability (42:50:8)
	• Core knowledge should be assessed in a final assessment	1	2	3	Stability (75:17:8)
	• Make use of peer assessment	1	2	3	Consensus R3 (17:83:0)

	• Competence should be proven, e.g. keeping a logbook and being signed off for certain procedures or skills attained	1	2	3	No stability (8:75:17)
	• Logbooks will allow for auditing	1	2	3	Consensus R3 (0:83:17)
	• Assessment should be authentic, i.e. applied to real-life situations	1	2	3	Stability (67:33:0)
e	**Outcomes**				
	• Outcomes need to well-defined and clearly delineated	1	2	3	Consensus R1 (92:8:0)
	• Outcomes should be measurable	1	2	3	Consensus R1 (92:8:0)
f	**Contact time**				
	• Contact sessions are important	1	2	3	Consensus R1 (92:8:0)
	• Working in small groups is important, with less than ten people in a group	1	2	3	Stability (25:67:8)
	• Sessions with students should be interactive	1	2	3	Consensus R1 (92:8:0)
	• One on one communication or with small groups is very important	1	2	3	Stability (42:58:0)
	• Distance learning components should be built in	1	2	3	Stability (33:67:0)
g	**Forms of learning**				
	• Emphasis should be on the practical issues more than theoretical things unrelated to day-to-day practice, e.g. seeing cases, evaluating blood request forms critically, going to the blood bank laboratory, how to prescribe blood, administer blood, transporting of blood from laboratory to patient, doing a cross-match, Coombs or a blood group	1	2	3	Stability (33:58:8)
	• Make use of case studies and make it problem-based, e.g. learning from real-life mistakes	1	2	3	Consensus R1 (83:17:0)
	• Learning should be integrated	1	2	3	Consensus R3 (92:8:0)
	• Some issues should be taught to give insight, but does not necessarily have to be assessed, e.g. processing of blood, politics and transfusion	1	2	3	Stability (50:50:0)

	• Problem-based learning is important	1	2	3	Consensus R2 (83:17:0)
	• Self-directed learning is important	1	2	3	Consensus R2 (83:17:0)
h	**Teacher**				
	• Lecturers should be people who are actively involved with blood transfusion every day (e.g. trauma surgeons, haematologists, intensivists)	1	2	3	Stability (25:75:0)
	• Avoid using lecturers who have high positions in transfusion medicine, but who "don't have their feet on the ground" and who can't bring the message across	1	2	3	Stability (42:50:8)
	• Having speakers from blood transfusion services may be good in terms of allowing the students to build networks with people in the field	1	2	3	Stability (50:50:0)
	• Lecturers who are local experts should be used in contact sessions	1	2	3	Stability (75:17:8)
	• Lecturers who are national experts should be used in contact sessions	1	2	3	Consensus R3 (83:8:8)
	• Lecturers who are international experts should be used in contact sessions	1	2	3	Stability (33:58:8)
i	**The student as an adult learner**				
	• The course content should be relevant to the adult learner's work environment	1	2	3	Consensus R2 (83:8:8)
	• Learner's existing knowledge should be explored	1	2	3	Stability (50:50:0)
	• Students should know the benefits and rationale of what is being taught	1	2	3	Consensus R2 (83:17:0)
	• Facilitator should provide an environment within which the adult learner feel safe to cooperate and explore	1	2	3	Consensus R3 (83:17:0)
	• The individual learner's attributes, preferences and needs should be accommodated	1	2	3	Consensus R3 (8:83:8)

	• New knowledge should be tied to the learners' previous knowledge and experiences	1	2	3	Stability (33:58:8)
	• Should be given the opportunity to solve problems relevant to their real-life worlds	1	2	3	Consensus R2 (83:17:0)
	• Course content should provide immediacy, i.e. be immediately relevant to the learner's current working environment	1	2	3	Stability (58:42:0)
	• Learning approach should promote adulthood (i.e. independence, responsibility, self-direction)	1	2	3	Consensus R3 (83:17:0)
	• A cooperative learning climate should be created	1	2	3	Consensus R3 (83:17:0)
	• Programme should utilise the adult learner's accumulated experience	1	2	3	Stability (25:67:8)
	• Provide opportunities for interaction with co-learner's in small groups	1	2	3	Consensus R3 (83:8:8)
	• Create experiences that can enhance the construction of meaning (e.g. through role play, case studies, simulations or discussion)	1	2	3	Stability (75:25:0)
j	**Alignment**				
	• The content should be aligned with the needs of the students	1	2	3	Stability (25:67:8)
	• Assessment should be aligned with course outcomes	1	2	3	Consensus R1 (83:17:0)
20	**ANY FURTHER COMMENTS ON THE EDUCATIONAL FACTORS THAT NEED TO BE TAKEN INTO CONSIDERATION IN DEVELOPING A MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE?**				
21	**PLEASE INDICATE BELOW IF THERE ARE ANY OTHER COMPONENTS THAT YOU WOULD LIKE TO SEE INCLUDED IN A MODEL FOR A POSTGRADUATE DIPLOMA FOR TRANSFUSION MEDICINE THAT WAS NOT DEALT WITH OR CONSIDERED IN THIS SURVEY.**				

APPENDIX F

RECOMMENDATIONS MADE WITH REGARD TO THE DIFFERENT ASPECTS INCLUDED IN THE MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE

APPENDIX F

RECOMMENDATIONS MADE WITH REGARD TO THE DIFFERENT ASPECTS INCLUDED IN THE MODEL FOR THE ACADEMIC DEVELOPMENT AND IMPLEMENTATION OF A POSTGRADUATE DIPLOMA IN TRANSFUSION MEDICINE

Recommendations are formulated under the ten areas that are included in the model (cf. 7.1-7.5; Delphi survey layout, Appendix C-2; Interview guide, Appendix A-3).

The following KEY elements (see Figure 7.4) are therefore included in the model, namely:

- The main roles, tasks and functions of a clinician dealing with blood transfusion in the clinical setting. [=R]
- The main skills and competences of a clinician dealing with blood transfusion in the clinical setting. [=S]
- The main areas of clinical knowledge required by the clinician dealing with blood transfusion. [=K]
- The scope of practice of the clinician dealing with blood transfusion. [=P]
- The current challenges faced by clinicians dealing with blood transfusion as well as those they are expected to be faced with in the next five years. [=C]
- The deficiencies in the abilities of clinicians dealing with the transfusion of blood and blood products. [=D]
- The major outcomes for a clinician completing a postgraduate diploma. [=O]
- The major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme. [=F]
- The academic factors that should be taken into account with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. [=A]
- The major educational factors that need to be taken into consideration in developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine. [=E]

Recommendations were derived from the findings of the Delphi survey and categorised according to the weight given to the statements by the respondents. Thus, a statement that was considered essential by the majority (80% or more) is marked in bold. Statements considered essential or useful by 50% or more, but less than 80% of respondents, are also included in the model, but are not marked in bold. Recommendations are listed in order of importance where appropriate, except where the context might be lost if this is done.

R1 ROLES, TASKS AND FUNCTIONS

It is recommended that the leadership and management of the School of Medicine and/or Faculty of Health Sciences take cognisance of the main roles, tasks and functions required of a clinician dealing with blood transfusion in the clinical setting (hereafter referred to as the transfusion medicine clinician):

R1.1 The main functions of a transfusion medicine clinician include:

- **A supervisory function in which he/she should:**
  - **ensure that correct procedures are followed**
  - **recognise the inappropriate use of blood**
  - **ensure that there are no clerical errors**
  - **monitor the clinical use of blood and blood products**

R1.2 The main roles of a transfusion medicine clinician include:

- **A governance role, which include:**
  - **developing policies for blood transfusion in consultation with relevant colleagues**
  - giving feedback to hospital management on the utilisation of blood products in the hospital
  - conducting audits on the use of blood.

- **A training role, which include:**
  - clinical undergraduate teaching
  - training of nursing and laboratory personnel as well as medical students and specialists-in-training
  - postgraduate teaching.

- **A role in scarce resource management, which include:**
  - **using blood appropriately**
  - **limiting the use of blood**
  - **using appropriate alternatives to transfusion**
  - **an awareness of the limitations of the blood supply**
  - **not wasting blood**
  - **using a scarce resource responsibly**

- **A patient management role, which include:**
  - **having adequate knowledge about indications for blood products**
  - **managing the complications of transfusion**
  - **identifying and evaluating the need for transfusion**
  - **obtaining informed consent**
  - **ensuring safe administration**
  - **post-transfusion follow-up.**

- **A role as researcher, which include:**
  - supporting research aimed at better identifying the indications for blood transfusion
  - conducting audits on the use of blood
  - interpreting the literature on blood transfusion.

S1 SKILLS AND COMPETENCES

It is recommended that the leadership and management of the School of Medicine and/or Faculty of Health Sciences take cognisance of the main skills and competences required of the transfusion medicine clinician:

S1.1 The transfusion medicine clinician should have the following skills and competences:

- **Clinical skills, which include:**
  - **clinical examination skills**
  - **skill in judging the need for a transfusion**
  - **competency in the management and follow-up of transfusion complications**
  - **resuscitation skills**

- **Technical skills and competencies, which include:**
  - **competency in the administration of blood products**
  - **skills needed to use the different blood products**
  - **achieving venous access, including placement of central lines**

- **Administrative skills, which include:**
  - **precise note-keeping**

- **Social skills, which include:**
  - **communication skills**
  - **interpersonal skills**

- **The skills and competencies required for integration, which include:**
  - **competency in the appropriate blood transfusion**
  - **problem-solving skills**
  - competency in interpreting activities in the blood bank
  - practicing transfusion medicine in rural areas.

- **Research skills and competencies, which include:**
  - **being able to interpret the blood transfusion literature**
  - auditing skills

K1 KNOWLEDGE

It is recommended that the leadership and management of the School of Medicine and/or Faculty of Health Sciences take cognisance of the main areas of knowledge required of the transfusion medicine clinician:

K1.1 The main areas of knowledge required by the transfusion medicine clinician include knowledge on:

- **Physiology, which includes an understanding of:**
  - **biological components of blood**
  - **fluid balance, electrolytes and fluid replacement**
  - **oxygen transfer**
  - **the physiology of blood**
  - transfusion immunology
  - blood groups.

- **Pathophysiology, which includes an understanding of:**
  - **pathophysiology of diseases where blood products may be indicated**
  - **pathophysiology related to blood loss and blood transfusion**
- **Evidence-based medicine, which includes:**
  - appropriate use of blood products
  - evidence behind appropriate transfusion

- **Haematology knowledge, which includes:**
  - **coagulation and anti-coagulant drugs**
  - **haematology relevant to blood transfusion**
  - **anaemia**
  - haemophilia

- **Blood banking, which includes an understanding of:**
  - **when blood products can be returned to the blood bank if unused**
  - laboratory aspects of transfusion medicine
  - apheresis
  - blood grouping
  - thawing of blood products
  - the principles underlying the issuing of blood
  - cross-matching.

- **Clinical medicine, which includes:**
  - **judging the need and indication for a transfusion**
  - **the different blood products and their use**
  - **the use of blood in renal failure**
  - **knowledge of the relevance of co-morbid disease in patients that need a blood transfusion**
  - **knowledge of appropriate transfusion practice**
  - **the use of blood in surgery**
  - intensive care issues related to blood transfusion.

- **Emergency medicine, which includes:**
  - **resuscitation and the use of blood**
  - **using emergency blood**
  - **management of allergic reactions and anaphylaxis**

- **Blood conservation, which includes:**
  - **alternatives to blood transfusion**
  - autologous transfusions
  - platelet-refractoriness
  - blood conservation methods.

- **Blood administration, which includes:**
  - **deciding on the amount of blood product that needs to be transfused**
  - **administration of blood products.**

- **Blood safety, which includes:**
  - **knowledge of the complications of blood transfusion**
  - **contra-indications for blood transfusion**
  - **haemovigilance**
  - **allo-immunisation**
  - **transfusion-transmissible infections**

P1 SCOPE OF PRACTICE

It is recommended that the leadership and management of the School of Medicine and/or Faculty of Health Sciences take cognisance of the scope of practice of the transfusion medicine clinician:

P1.1. The scope of practice of a full-time specialist in transfusion medicine differs from that of the clinician dealing with transfusion on an *ad hoc* basis and includes, *inter alia*, the following:

- **Clinical knowledge, which includes:**
  - **having knowledge about transfusion in transplantation medicine**
  - **knowing how to manage allo-immunisation**
  - **dealing with a wider spectrum of patients**
  - **having a broader knowledge of disease related to transfusion medicine**
  - **having an in-depth knowledge of the pre-transfusion interview**
  - **having an interest in new developments in the field**
  - dealing with more coagulation problems

- **Blood banking, which includes:**
  - **covering the whole are of apheresis, including stem cell transplantation**
  - having a deeper understanding of the laboratory testing for transfusion-transmitted infections
  - being involved with quality control in blood bank
  - dealing with blood donors
  - being involved in the running of the blood bank
  - being involved with the administrative aspects of blood banking, including tracking and retrieval of blood and computerisation.

- **Teaching and training, which include:**
  - **supporting activities centered around appropriate use, reducing use and optimising use of blood and blood products**
  - **functioning as a tutor to his colleagues.**

- **Leadership and consultative roles, which include:**
  - **functioning as a link between the clinical setting and the laboratory**
  - **supporting colleagues across a range of specialties**
  - having sufficient stature to be able to advise, help and lead new developments
  - a coordinating role within the hospital.

P1.2. The scope of practice of the clinician dealing with transfusion on an *ad hoc* basis includes, *inter alia*, the following:

- **Clinical knowledge, which includes:**
  - **being able to apply knowledge in local setting**
  - **having knowledge of transfusion basics, e.g. the indications for blood products**
  - being more clinically orientated than specialist
  - being of practical assistance by the bedside

- **Blood banking, which includes:**
  - **knowing the concepts and principles underlying apheresis**
  - being able to do basic cross-matching, blood grouping, blood smear review and urine testing

- **Teaching and training, which include:**
  - being able to assist with transfusion medicine training of doctors, students, paramedical staff and nurses

- **Leadership and consultative roles, which include:**
  - that he/she can be consulted regarding transfusion in a big department

C1 CHALLENGES

It is recommended that the leadership and management of the School of Medicine and/or Faculty of Health Sciences take cognisance of the current and future challenges faced by the transfusion medicine clinician:

C1.1 The challenges <u>currently</u> faced by clinicians include challenges in the following areas:

- **Quality and safety, which include challenges regarding:**
  - **the safety of blood products**
  - **the effects of the HIV epidemic on transfusion medicine**
  - **the management of side-effects of blood transfusions**
  - **limiting unnecessary transfusions**
  - **sampling errors**
  - patients requiring repeated blood transfusion
  - the limiting of TTIs
  - clerical errors
  - the quality of blood products
  - West-Nile virus

- **Lack of knowledge and training, which include challenges regarding:**
  - **knowledge of indications for different blood products**
  - **lack of training in transfusion medicine on an undergraduate level**
  - **knowledge of the management of transfusion-related complications**
  - **appropriate use of blood**
  - **knowledge of the value of blood products**
  - knowledge of the individual blood products, their methods of preparation, storage life and contents
  - clinician knowledge on coagulation and anticoagulants
  - knowledge of the pathophysiology of transfusion-related complications
  - knowledge of practical issues relating to blood use, e.g. thawing, administration, irradiation
  - knowledge of the pre-analytical and analytical phase of blood sample processing.

- **Cultural perceptions and understanding, which include challenges regarding:**
  - public fear of the blood supply, e.g. risk of contracting HIV
  - cultural perceptions of blood transfusion.

- **Access and availability, which include challenges regarding:**
  - **adequate blood supply**
  - **inappropriate use of blood**
  - **access to blood**
  - **effects of the HIV epidemic on transfusion medicine**
  - patients requiring repeated blood transfusion
  - increasing demand for blood in specialised medical care, e.g. leukaemia and cancer treatment
  - development of anti-platelet antibodies and subsequent platelet refractoriness
  - decreasing donor pool
  - finding enough platelet donors
  - lack of rare blood groups in the donor pool
  - increasing demand for blood due to novel medical techniques requiring blood, e.g. increasing need for exchange transfusion for patients with sickle cell anaemia immigrating to Europe
  - restrictions on donors and increasing donor deferral

- **Ethical and medico-legal challenges, which include challenges regarding:**
  - **informed consent issues**
  - ethical issues pertaining to blood transfusion
  - physician responsibility for a product delivered to him/her by a third party
  - refusal of blood products for religious reasons
  - issues flowing from breach of anonymity between recipient and donor.

- **Cost-effectiveness, which include challenges regarding:**
  - appropriate use of blood
  - limiting unnecessary transfusions
  - cost-effective use of blood.

C1.2 The challenges transfusion clinicians are expected to face in the next five years, include challenges in the following areas:

- **Lack of knowledge and training, which include challenges regarding:**
  - lack of academic input regarding use of blood in the private sector.

- **Quality and safety, which include challenges regarding:**
  - **the safety of blood products**
  - **limiting TTIs**
  - **the effects of the HIV epidemic on transfusion medicine**
  - the quality of blood products
  - changing profile of TTIs, e.g. more bacterial pathogens, variant Creutzfeld-Jacob's disease (vCJD)
  - increase in GVHD

- **Access and availability, which include challenges regarding:**
  - **adequate blood supply**
  - **access to blood**
  - increased demand for blood due to HIV epidemic
  - shrinking donor pool due to HIV epidemic
  - increasing disparity in terms of the availability of different products between state and private sector.

- **Ethical and medico-legal challenges, which include challenges regarding:**
  - informed consent issues
  - ethical issues pertaining to blood use
  - increasing disparity in terms of the availability of different products between state and private sector.

- **Cost-effectiveness, which include challenges regarding:**
  - cost-effective use of blood.

- **Managing change, which include challenges regarding:**
  - managing change in the field of blood transfusion
  - keeping up with new developments
  - changing profile of TTIs, e.g. more bacterial pathogens, vCJD.

D1 DEFICIENCIES

It is recommended that the leadership and management of the School of Medicine and/or Faculty of Health Sciences take cognisance of the deficiencies that need to be addressed in clinicians dealing with the transfusion of blood and blood products.

D1.1 The deficiencies that need to be addressed in clinicians dealing with the transfusion of blood and blood products, include deficiencies in:

- **Knowledge, which include:**
  - **knowledge of the correct indications for transfusion**
  - **knowledge of available products**
  - **knowledge of transfusion triggers and their application**
  - **knowledge of transfusion in general**
  - **knowledge of complications of blood transfusion**
  - **Knowledge of coagulation and haemostasis.**

- **Skills, which include:**
  - **skills to correctly administer blood products**
  - **skills required to obtain venous access, including central line placement, e.g. in shocked patient**
  - **incorrect handling of the product**
  - application of clinical skills - clinicians too focused on laboratory values and not enough by the bedside

- **Evidence-based medicine, which include:**
  - **inappropriate use of blood and blood products**
  - **lack of guidelines on blood transfusion**
  - **inappropriate selection of blood products**
  - **transfusing patients unnecessarily**
  - non-adherence to guidelines and recommendations
  - resistance of clinicians against changing behaviour despite being given guidelines
  - cross-matching and keeping blood unnecessarily, esp. in surgery and anesthesiology

- **Scarce resource management, which include:**
  - awareness of costs
  - lack of auditing systems

- **Human resources, which include:**
  - lack of clinicians with an overview of all aspects of transfusion
  - lack of time for participating in educational activities related to blood transfusion

- **Attitude, which include:**
  - transfusion seen as an insignificant part of patient care

O1 OUTCOMES

It is recommended that the leadership and management of the School of Medicine and/or Faculty of Health Sciences take cognisance of the major outcomes of a Postgraduate Diploma in Transfusion Medicine.

O1.1 The major outcomes of a Postgraduate Diploma in Transfusion Medicine should include:

- **Basic sciences outcomes, which include:**
  - **having a proper knowledge of physiology related to blood transfusion**
  - **having a basic knowledge of pathophysiology related to blood transfusion.**

- **Blood banking outcomes, which include:**
  - **knowing the different blood products and their component**
  - **having an awareness of apheresis and its applications**
  - knowing about leukodepletion in laboratory and by bedside
  - knowledge of laboratory aspects of transfusion medicine
  - knowing about blood collection and the different types of collection systems
  - knowing about quality assurance in blood banking
  - knowing how cross-match testing is performed
  - knowing about blood processing
  - understanding antibody identification procedures
  - knowing about the new issues facing blood banking
  - knowing how blood typing is done
  - knowing about donor selection and donor-related issues

- **Haematology outcomes, which include:**
  - **knowledge of relevant aspects of haematology**
  - **knowledge of haemostasis in transfusion medicine**

- **Clinical medicine outcomes, which include:**
  - **knowing the indications for blood products**
  - **applying knowledge practically in the clinical setting**
  - **being able to use blood appropriately**
  - **knowing how to administer blood**
  - **knowing the ethical aspects concerning the use of blood and blood products**
  - **a change in practice, whereby the quality of the transfusions by a clinician doing the diploma should increase, e.g. less complications and wastage of blood products**
  - **an understanding of transfusion in hemolytic anaemias**
  - **an understanding of the management of the transfusion-refractory patient**
  - **knowing about sampling of blood**
  - a change in practice, whereby the use of transfusions by a clinician doing the diploma should decrease
  - being able to discuss the indications for stem cell transplantation

- **Blood conservation outcomes, which include:**
  - **knowing about transfusion alternatives and blood conservation procedures, e.g. cell saving, erythropoietin, etc.**
  - **having an understanding of the context of the issues and problems with the blood supply**
  - knowing about cost-effectiveness in transfusion medicine

- **Blood safety outcomes, which include:**
  - **knowing about blood safety**
  - **knowing about immunosuppression related to transfusion**
  - **knowing about TTIs**
  - **being able to diagnose and manage complications of blood transfusion**
  - **knowing the contra-indications for blood products**
  - **understanding allo-immunisation and how to manage that**
  - **knowing about GVHD**
  - **understanding and being able to manage transfusion-related iron overload**

- **Social skills outcomes, which include:**
  - **being able to explain to a patient what a transfusion or transfusion-related procedure entails**
  - communication skills

- **Research outcomes, which include:**
  - having an understanding of the need for clinical trials in transfusion medicine
  - being able to participate in clinical research related to transfusion medicine

F1 SUSTAINABILITY FACTORS

It is recommended that the leadership and management of the School of Medicine and/or Faculty of Health Sciences take cognisance of the major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme.

F1.1 The major factors that make a Postgraduate Diploma in Transfusion Medicine a sustainable programme include factors related to:

- **Programme content and outcomes, which include that:**
  - **the course should be relevant to clinical practice**
  - **the course should be applied to clinical practice**
  - **the curriculum needs to be organised in an integrated way**
  - **outcomes need to be defined**
  - **the course should cover a broad spectrum of clinical issues**
  - **the individual topics need to be well-structured**
  - **the curriculum needs to be clearly defined, e.g. with well defined start and end**
  - **the curriculum has a problem-based component using case studies where people can learn from mistakes**
  - **there should be practical sessions that are relevant to clinical practise**
  - **there should be good programme and educational material**
  - there should be exposure to the actual blood bank
  - the course should not be too specialised
  - th course should not be too intensive.

- **Networking, which include:**
  - getting input from a variety of role players
  - getting buy-in from the private sector

- **Value creation, which include that:**
  - **the Diploma should have value to the person who does it**
  - **that enough people should want to do it, i.e. there should be a need for the course**
  - **there should be value in obtaining the qualification**
  - the course should empower the students to go back and research relevant issues in their clinical environment
  - blood banks should require that their doctors have a formal qualification in transfusion medicine
  - there should be a follow-up programme after the Diploma, e.g. where students can come back annually for refresher courses
  - doing the course should allow the students to do certain extra things not otherwise part of their job description
  - people should be sponsored to attend on a meritorial basis

- **Academic staff, which include:**
  - **having properly qualified staff that runs the programme**
  - **clearly defined roles for team members**
  - **the need for a dedicated team**
  - **good guidance for the students**
  - exposing students to a broad spectrum of lecturers from different backgrounds
  - using different lecturers at different times
  - using part-time staff to compensate for an insufficient number of full-time staff members

- **Structure and organisation, which include:**
  - **appropriate infrastructure/facilities for running the course**
  - **dedicated administrative support, e.g. secretarial services, paper, printing**
  - **defined blocks of contact time**
  - **that it needs to be well organised**
  - **that logistics to present course are in place**
  - **it should be a part-time programme, i.e. doctor should be able to do it from his/her practice**
  - that course should not be too long or take too much time
  - that course can be short and full-time, but also reasonable to have a part-time course with intensive contact sessions

- **Financial viability, which include:**
  - a revenue stream/funding
  - sponsorship from the private sector, e.g. private laboratories

- **Assessment, which include:**
  - **feedback to students on assignments**
  - **that there should be deliverable assignments**
  - **evaluating the practice and knowledge of the students**
  - self-assessment programmes.

- **Recognition of the programme, which include:**
  - **that the diploma should be recognised by the relevant governing bodies**
  - **CPD accreditation of programme**
  - **that programmes should be certified according to certain criteria**
  - **there should be a certifying agency**
  - a regulatory framework that requires certification in transfusion medicine

- **Continuous improvement, which include:**
  - **that outcomes and new developments achieved by the students who have qualified should be fed back into the course**
  - **one should obtain feedback from participants**
  - one should diversify and broaden the interest in order to remain sustainable despite medical and technological advances

- **Career-path creation, which include:**
  - job opportunities for research in transfusion medicine
  - that job possibilities need to be created, e.g. posts for doctors who take responsibility for clinical transfusion practice and the transfusion committee in a hospital

A1 ACADEMIC AND IMPLEMENTATION FACTORS

It is recommended that the leadership and management of the School of Medicine and/or Faculty of Health Sciences take cognisance of the major factors from an academic point of view that need to be taken into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

A1.1 The major factors from an academic point of view that need to be taken into consideration with regards to the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine, include factors related to:

- **Quality assurance, which include that:**
  - **there should be an appropriate standard with internal and external moderation**
  - **the final assessment should be externally moderated**
  - **the training programme should be documented**
  - **the programme needs to be standardised**
  - the programme should be peer-reviewed according to accepted criteria
  - record should be kept of which students attend each session
  - a recertification process, be it correspondence or attendance-based refresher courses will ensure that those who qualified stay up-to-date and it can be a source of revenue
  - the certification needs to be limited in time, i.e. continuous professional development credits need to be obtained on an annual basis to maintain certification to ensure that those who qualify remain up-to-date

- **Programme development, which include:**
  - **researching and defining the actual skills and knowledge required**
  - **going through the necessary channels of approval**
  - looking at what other institutions are doing internationally and adapt what is useful to local circumstances
  - that people involved with programme need to have academic standing to give prestige to the project and the content of the curriculum so that it will inspire confidence in the end-product
  - tailoring objectives of the course to the actual needs of the students, i.e. to the problems relevant to their settings

- **Programme structure, which include:**
  - **proper structure**
  - **that the duration of the diploma needs to be fixed in advance**
  - **that the duration should not be more than two years**
  - **that it should be done part-time if run over a period longer than 18 months**
  - the duration of each component should be set out in great detail
  - taking into account that students will not complete the course if it is too long

- **Admission criteria and recognition of prior learning, which include:**
  - that applicants for Diploma should have a basic medical degree and do not need to be specialists

- **Academic culture, which include that:**
  - **a culture of critical thinking should be fostered**
  - **a spirit of inquisitiveness should be fostered**
  - **there should be a culture of continuous learning and updating your knowledge**
  - there should be regular journal reviews and seminars related to transfusion medicine.

- **Research, which include that:**
  - the course should empower the students to go back and research relevant issues in their clinical environment
  - research done should be appropriate for the country
  - a research component should be included in the programme
  - the staff should be involved in the research programme which will keep them up-to-date and current
  - research and education should go hand in hand

- **Continuous improvement, which includes:**
  - **that the outcomes and new developments achieved by the students who have qualified should be fed back into the course**

E1 EDUCATIONAL FACTORS

It is recommended that the leadership and management of the School of Medicine and/or Faculty of Health Sciences take cognisance of the educational factors that need to be taken into consideration with regards to developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine.

E1.1 The educational factors that need to be taken into consideration with regards to developing a model for the academic development and implementation of a Postgraduate Diploma in Transfusion Medicine, include factors related to:

- **Assessment, which include:**
  - **that assignments should be assessed**
  - **deliverable assignments**
  - **feedback on assignments**
  - **assessment on a regular basis to ensure that outcomes have been achieved**
  - that core knowledge should be assessed in a final assessment
  - the use of a variety of teaching and assessment techniques, e.g. lectures, journal reviews, seminar presentations, examinations, etc.
  - authentic assessment, i.e. applied to real-life situations
  - short assignments
  - a final assessment to be able to judge whether course is working and force students to consolidate what they have learnt
  - making use of peer assessment
  - that competence should be proven, e.g. keeping a logbook and being signed off for certain procedures or skills attained
  - logbooks which will allow for auditing

- **Contact time, which include:**
  - contact sessions
  - interactive sessions with students
  - face-to-face communication or in small groups
  - distance learning components
  - working in small groups (less than 10 people)

- **Forms of learning, which include:**
  - **an integrated way of learning**
  - **problem-based learning**
  - **self-directed learning**
  - **the use of case studies**
  - that some issues should be taught to give insight, but does not necessarily have to be assessed, e.g. processing of blood, politics and transfusion
  - that emphasis should be on practical issues more than theoretical things unrelated to day-to-day practice

- **Curriculum, which include:**
  - **that the curriculum needs to be well-defined**
  - **the need for a formal curriculum**
  - **that the components of the training programme should be enunciated in great detail**

- **Educational material and resources, which include:**
  - **that course content should be linked into other resources, e.g. one needs to ensure access to the library, including online, for non-resident students**
  - **making use of the internet**
  - **a good bibliography**
  - that students need to be taught how to use online study resources, e.g. PubMed
  - good handouts or educational material
  - a quick reference manual for each block
  - continuous guidance to students with regards to use of resources, e.g. online resources

- **Learning as an experience, which include that:**
  - attendance should be an enriching experience
  - students should be inspired
  - the content should be interesting

- **Outcomes, which include that:**
  - **outcomes need to be well-defined and clearly delineated**
  - **outcomes should be measurable**

- **Teacher-related factors, which include that:**
  - **lecturers who are national experts should be used in contact sessions**
  - lecturers who are local experts should be used in contact sessions
  - having speakers from blood transfusion services may be good in terms of allowing the students to build networks with people in the field
  - one should avoid using lecturers who have high positions in transfusion medicine, but who "don't have their feet on the ground" and who can't bring the message across
  - lecturers who are international experts should be used in contact sessions
  - lecturers should be people who are actively involved with blood transfusion every day

- **The student as an adult learner, which include:**
  - **that the course content should be relevant to the adult learner's work environment**
  - **that students should know the benefits and rationale of what is being taught**
  - **that the facilitator should provide an environment within which the adult learner feel safe to cooperate and explore**
  - **that students should be given the opportunity to solve problems relevant to their real-life worlds**
  - **that the learning approach should promote adulthood (i.e. independence, responsibility, self-direction)**
  - **that a cooperative learning climate is created**
  - **opportunities for interaction with co-learners in small groups**
  - experiences that enhance the construction of meaning (e.g. through role play, case studies, simulations or discussion)
  - that course content should provide immediacy, i.e. be immediately relevant to the learner's current working environment
  - that learner's existing knowledge is explored
  - that new knowledge is tied to the learners' previous knowledge and experiences
  - that the programme should utilise the adult learner's accumulated experience
  - that the individual learner's attributes, preferences and needs should be accommodated

- **Alignment, which include:**
  - **aligning assessment with course outcomes**
  - aligning course content with the needs of the students