A FRAMEWORK
FOR INTEGRATED EMERGENCY CARE EDUCATION
IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES

by

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PROMOTER

Prof M.J. Labuschagne

1 February 2021

DECLARATION

I, Dirk Thomas HAGEMEISTER, declare that the doctoral research thesis and interrelated, publishable manuscripts that I herewith submit for the Philosophiae Doctor in Health Professions Education at the University of the Free State, is my independent work, and that I have not previously submitted it for a qualification at another institution of higher education. Where help was sought, it has been acknowledged.

2 December 2020

_____ _____

D T Hagemeister (Candidate) Date

Quisquid agis, prudenter agas, et respice finem!

Gesta Romanorum 103

DEDICATION

I dedicate this work to my suffering fellow humans,
that we shall be guided in our efforts
by those wise and humble words attributed to William Osler:

To cure sometimes, to relieve often, to comfort always

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LIST OF ACRONYMS AND ABBREVIATIONS

AAMC	**American Association of Medical Colleges**
ASSAf	**Academy of Sciences of South Africa**
AFEM	**African Federation for Emergency Medicine**
CanMEDS	**Canadian Medical Education Directives for Specialists**
CHE	**Council on Higher Education**
CMSA	**Colleges of Medicine of South Africa**
CPR	**Cardio-pulmonary resuscitation**
DOPS	**Direct observation of procedural skills**
ECG	**Electrocardiogram**
EM	**Emergency medicine**
EMS	**Emergency medical services**
EPA	**Entrustable professional activity**
ESMOE	**Essential steps in the management of obstetric emergencies**
FAST	**Focused assessment with sonography for trauma**
FSDoH	**Free State Department of Health**
HEQC	**Higher Education Quality Committee**
HPCSA	**Health Professions Council of South Africa**
HPE	**Health professions education**
ILCOR	**International Liaison Committee on Resuscitation**
MBChB	**Medicinae Bacchalaureus et Chirurgiae Bacchalaureus (5 or 6 year undergraduate medical degree awarded by South African universities)**
MCQ	**Multiple-choice questions**
MMed	**Master of Medicine (medical specialist degree)**
NGT	**Nominal group technique**
OSCE	**Objective structured clinical examination**
PPM	**Programme planning model**
SAQA	**South African Qualifications Authority**
UFS	**University of the Free State**

SELECTED DEFINITIONS AND TERMS

Competence (Frank, Snell, ten Cate *et al.*, 2010: 641)
"The array of abilities across multiple domains or aspects of physician performance in a certain context. Statements about competence require descriptive qualifiers to define the relevant abilities, context, and stage of training. Competence is multi-dimensional and dynamic. It changes with time, experience, and setting."

Competency (Frank *et al.*, 2010: 641)
"An observable ability of a health professional, integrating multiple components such as knowledge, skills, values, and attitudes. Since competencies are observable, they can be measured and assessed to ensure their acquisition. Competencies can be assembled like building blocks to facilitate progressive development."

Competency-based medical education (Frank *et al.*, 2010: 641)
"An outcomes-based approach to the design, implementation, assessment, and evaluation of medical education programs, using an organizing framework of competencies."

Curriculum
"A planned educational experience" (Thomas, Kern, Hughes *et al.*, 2016: 1).
"*An educational plan that spells out which goals and objectives should be achieved, which topics should be covered and which methods are to be used for learning, teaching and evaluation.*" (Wojtczak, 2002: 219)
"*Academic programmes outlining the academic learning, clinical training and development of skills as well as the integration of the students' professional attitude and conduct.*" (Republic of South Africa, Minister of Health, 2009, sec. 1)

Entrustable Professional Activity (ten Cate, 2013)
"EPAs are units of professional practice, defined as tasks or responsibilities to be entrusted to the unsupervised execution by a trainee once he or she has attained sufficient specific competence. EPAs are independently executable, observable, and measurable in their process and outcome, and therefore, suitable for entrustment decisions."

Framework (Bordage, 2009: 312)

"Conceptual frameworks represent ways of thinking about a problem or a study, or ways of representing how complex things work. They can come from theories, models or best practices. Conceptual frameworks illuminate and magnify one's work. Different frameworks will emphasise different variables and outcomes, and their inter-relatedness."

Integration (Prideaux, Ash & Cottrell, 2013: 65)

In the context of this study, integration refers to the coordination of educational efforts across sequential parts of the programme (vertical or longitudinal integration) and across concurrent parts (horizontal integration). This coordination includes, but is not limited to, the determination of overarching educational outcomes and competencies, the allocation of subsets of these outcomes to specific parts of the programme and the referencing of educational efforts in previous, concurrent and future parts of the programme.

Goals and objectives (Thomas, 2016: 50)

"A goal or objective is defined as an end towards which an effort is directed. (…) the term 'goal' will be used when broad educational objectives are being discussed. The term 'objective' will be used when specific measurable objectives are being discussed."

Outcome (Thomas, 2016: 58)

"Outcome objectives (…) refer to health, health care, and patient outcomes (i.e., the impact of the curriculum beyond that delineated in its learner and process objectives). Outcomes might include health outcomes of patients or career choices of physicians. More proximal outcomes might include changes in the behaviours of patients."

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SUMMARY

Key terms: South Africa; emergency care; undergraduate medical education; integration; in-depth interviews; nominal group technique

Competence to manage emergencies is expected from medical practitioners and should be acquired during undergraduate medical training. Since the causes of emergencies can originate from many different systems, both physiological and psychological, a variety of clinical specialities is involved in the teaching of the diagnosis and treatment of emergencies. Bringing various different people and approaches together in undergraduate medical education constitutes a challenge.

The lack of an integrated approach to undergraduate medical education in emergency care was identified as a relevant gap worth investigating in this PhD project. This study was undertaken with the aim to provide a framework for the integration of undergraduate medical education in emergency care with the intention to contribute to the steady improvement of undergraduate medical education and, through this, ultimately, to better health outcomes. Specific objectives of the research included the identification of international and national trends in the field and of current education practices at the medical schools in South Africa, including outcomes, objectives, education strategies and ways of assessment.

A constructivist approach was followed in the sense that the mostly qualitative insights from the different methods are regarded as contributions towards a larger overall framework, but without the epistemological claim to discover an ultimate truth behind the subjective facts. As methods, an extensive review of published literature on emergency care training and of the regulatory environment for undergraduate medical training provided an international background of recent developments and a local context for South Africa. Semi-structured in-depth interviews were held with key people in the established undergraduate medical programmes in South Africa and this promoted a multi-facetted insight into current education practices in the country, into challenges and successes. A three-staged nominal group technique was applied as the second empirical method, to evaluate the current education practice in the undergraduate medical programme at the University of the Free State and to identify needs and make suggestions for improvements. This process collected prioritised statements on strengths and weaknesses from recent graduates and, informed

by these contributions by members, prioritised suggestions by the members of the education team, which were then discussed with academic programme managers.

Results of the methods are presented as five publishable manuscripts, with one manuscript each reporting the findings from a rapid review of the international and national regulatory environment, one on a scoping review of peer-reviewed publications on undergraduate medical education in emergency care over the last decade, one on in-depth interviews conducted at South African medical schools and the nominal group technique at the University of the Free State, with the fifth manuscript suggesting a framework for the training.

Key findings from the regulatory review show that many international bodies explicitly include emergency competencies in their exit outcome objectives, and that the latest trend is towards expressing those objectives in entrustable professional activities. This trend was confirmed in the literature review, which also found that there is, internationally, a growing role being played by emergency medicine, that training is increasingly based on online resources and simulation, and that experiential training typically happens in emergency rooms. The routine standard use of ultrasound in emergency care and the broad integration of ultrasound teaching in undergraduate training was equally significant. The in-depth interviews provided information on an array of issues, with different medical schools sharing the challenges of integrating emergency skills training across modules, reviewing the outcome objectives for curricular renewal, and trying to map such objectives effectively. Increasing student load against a constrained staff basis, complicated further by joint-appointment status, interprofessional teaching and the role of emergency medicine, were found to be relevant. From the nominal group technique conducted at the University of the Free State, the importance of short courses in skills training, the need for integrated and well managed coverage of emergency care, for more in-situ clinical experiential learning opportunities, and for appropriate staff development in the field of health professions education, was re-emphasised.

The proposed framework illustrates the complex interaction between the key factors of high-quality clinical practice, best current educational practice, and the institutional culture, with each of the three factors dependent on additional factors.

In conclusion, the researcher recommends further research to formulate a national set of entrustable professional activities and enabling competencies, and to achieve a comparative mapping of outcome objectives between different medical schools.

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CHAPTER 1 – INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

Undergraduate medical education is the demanding task of equipping future medical doctors with essential knowledge, skills and attitudes to practice their profession successfully. Every clinician, ranging from novice to specialist, first and foremost, needs a solid foundation as a generalist. Generalist competencies will provide the ability to identify the clinical speciality area that a particular patient's complaints originate from, and will guide the decision whether the clinician is able to address this problem him or herself, or needs to seek further assistance. This is particularly true in emergency medical care, as time constraints due to acute suffering or a threat to the patient's 'life and limb' are the very essence of an emergency (Wallis, Reynolds & African Federation for Emergency Medicine, 2013: 4).

Due to historical factors, however, academic medical training is often organised along the lines of medical specialities and sub-specialities, rather than being structured by presenting complaints or symptoms (Amin & Khoo, 2002: 17; University of the Free State - Faculty of Health Sciences, 2017: 10). As a result, the future clinician might be exposed to the teaching of multiple, and often different, approaches to the same clinical problem, depending on the particular discipline the student is being taught. Once an actual patient with real problems presents, it might be difficult for a student who was taught in this manner to integrate the manifold approaches into a meaningful and cost-effective diagnostic strategy (Prideaux *et al.*, 2013: 66).

It was the aim of this research to develop a framework for integrated teaching and learning of emergency medical care for undergraduate medical students. By virtue of its very topic, this research is interdisciplinary. The research focus spans a wide range of clinical disciplines, from surgical specialities, such as orthopaedics, general surgery, urology and trauma, across the medical fields, such as cardiology and endocrinology, all the way to mental health. At the same time, the research was grounded in the field of health sciences education, and a major focus is on the identification of educational best practices.

Data collection entailed the identification of essential learning outcomes and key competencies from a wide range of participants. Outcomes consist of disease entities, clinical emergency situations or therapeutic and interventional skills.

Data collection was, firstly, based on a thorough and wide review of literature and documents. Secondly, the current practice at the eight medical schools in South Africa that have graduated practitioners was evaluated by means of document analysis, in combination with in-depth interviews with key stakeholders at the institutions. Thirdly, nominal-group sessions with young clinicians and academic coordinators who are involved in emergency medical skills training at the University of the Free State (UFS) complemented the data collection and provided a local perspective.

For the framework, the information retrieved in the data collection process was refined and combined into a model. Recommendations regarding education outcomes, such as clinical presentations, diagnostic tools and management plans to be taught, preferred methods for the acquisition of these skills and knowledge, and the mode of assessment, will be included in the manuscripts presented in this thesis and summarised in the concluding chapter, together with wider recommendations regarding setups and the management of programmes.

1.2 BACKGROUND TO THE RESEARCH PROBLEM

The following section will provide a brief overview of the clinical and academic field involved in this research project – the clinical field of emergency medicine – and also covers some theoretical concepts in health professions education and the current practice of emergency care teaching and training at the UFS.

1.2.1 Emergency medicine

Emergency medicine has been described as "the most interesting 15 minutes of every other speciality" combined (Faust, 2014: online). This can be an advantage for the discipline, as it suggests a high degree of excitement in the practice of this speciality. However, it also points to one of the discipline's main challenges: dealing with undifferentiated patients. Clinical problems underlying the patient's emergency presentation might belong to any of the wide variety of clinical disciplines. Accordingly, the emergency clinician might need skills

from a wide range of disciplines, making the field somewhat 'eclectic', and, at the same time, dependent on ongoing updates in all these many disciplines (Wallis *et al.*, 2013: 4).

Emergency medicine shares the challenge of dealing with undifferentiated patients with the discipline of family medicine. While the focus of family medicine is on the relationship with the patient and the need for longitudinal care, emergency medicine focusses on current and potentially life-threatening conditions. Emergency medicine is defined by the Emergency Medicine Society of South Africa (Wallis, 2008: 3) as:

> *A field of practice based on the knowledge and skills required for the prevention, diagnosis and management of acute and urgent aspects of illness and injury affecting patients of all age groups with a full spectrum of undifferentiated physical and behavioural disorders. It further encompasses an understanding of the development of pre-hospital and in-hospital emergency medical systems and the skills necessary for this development.*

The definition of the American College of Emergency Physicians (2015a, online) reads,

> *Emergency medicine is the medical specialty dedicated to the diagnosis and treatment of unforeseen illness or injury. It encompasses a unique body of knowledge as set forth in the "Model of the Clinical Practice of Emergency Medicine." The practice of emergency medicine includes the initial evaluation, diagnosis, treatment, coordination of care among multiple providers, and disposition of any patient requiring expeditious medical, surgical, or psychiatric care.*

Over the past decades, emergency medicine as a discipline has been recognised as a medical speciality in many countries worldwide, including South Africa (Republic of South Africa, Minister of Health, 2004: 3). In line with its development as a clinical speciality, emergency medicine also has evolved as an academic field, with its own specific ideas and concepts.

1.2.2 Science of education

Much like the clinical field of emergency medicine, the field of medical (or health professions) education has established itself as an academic field. This claim is underscored by the creation of centres for medical or health professions education at many tertiary institutions' health faculties (Amin & Khoo, 2002: 21f).

Medical education can, thus, be seen, firstly, as an application of general education principles to the training of future medical practitioners, and, secondly, as a specialised field of education that contributes education concepts specific to the field. Classical examples of such specific practices and concepts are the education practices of bedside teaching or the concept of clinical reasoning. In the following sections, general education principles will be discussed, and followed by reflections on matters specific to the medical education field in general, and medical emergency care education in particular.

1.2.3 Curriculum

Curriculum as a term is derived from the Latin word for running, *currere*. Historically, it referred to a race course. In a figurative sense, it also describes the 'course of life' (the word course has its roots in the same verb, *currere*) (Stowasser, Petschenig, Skutsch *et al.*, 1987: 119f), and the term was later adopted to describe the 'track' an educational activity would have to follow (Booyse, Du Plessis & Booyse, 2014: 2). Curriculum studies is a wide field of scholarly activity (Thomas *et al.*, 2016), and a variety of different types of curricula has been observed in practical application: The 'explicit curriculum' refers to the curriculum as laid out in official documents; its practical implementation might result in the 'enacted (or implicit) curriculum', and this might include a 'covert curriculum', which is part of the intended teaching, albeit not explicitly spelled out. A 'hidden curriculum' influences the learning process, yet, is hidden, as it is it might include elements neither teachers nor learners are consciously aware of, nor intend to implement. Lastly, the 'assessed curriculum' is defined by the content used in the eventual assessment of learning, which might strongly influence the education outcome, as the learners might align their efforts with what will be assessed (Booyse *et al.*, 2014: 5).

1.2.4 Hierarchical models and taxonomies

One of the best-known hierarchical models in the field of psychology is Maslow's hierarchy of human needs. This model is based on psychology studies in the mid-20th century, and it categorises human needs from the most basic, such as food and shelter, to the most complex, of personal self-actualisation (Knowles, 1980: 28). Figure 1.1 summarises Maslow's pyramid of human needs. Even though the classical Latin saying, *Plenus venter non studet libenter* (A full stomach does not like to study) describes the opposite extreme – the empty stomachs of many South African students – the general concept that more basic physical and physiological needs affect the realisation of higher-level functions still applies. Similarly, a threatening environment, constituting a failure to meet the more basic need of safety, might negatively impact on the ability to fulfil needs such as self-actualisation.

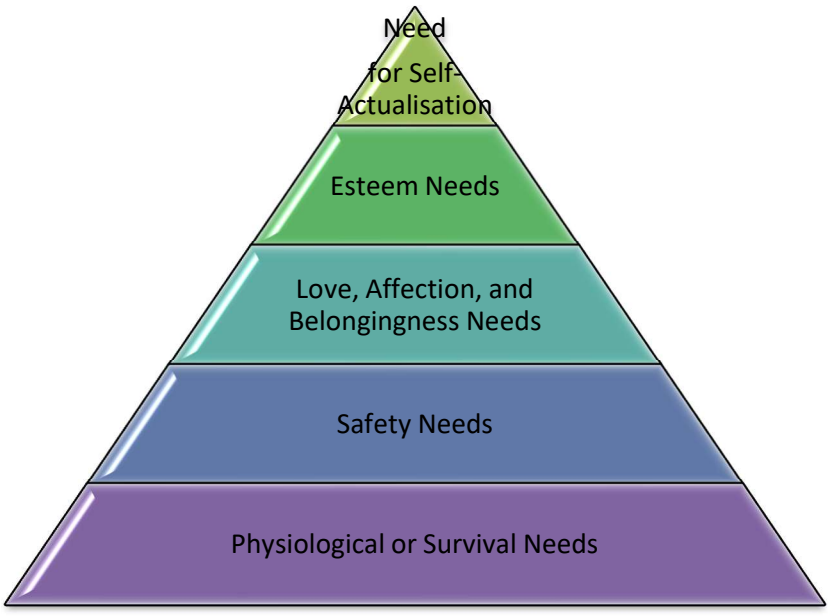

Figure 1.1: Maslow's pyramid of human needs (Knowles, 1980: 28)

In the 1950s, the educational psychologist Benjamin Bloom chaired a committee that developed what would become known as Bloom's taxonomy of educational objectives. A major distinction made by this group was the definition of three domains of objectives, namely, cognitive or knowledge, psychomotor or skills and affective or attitude (Figure 1.2). Two books provided taxonomies for the cognitive (Bloom, Engelhart, Furst *et al.*, 1956) and affective (Krathwohl, Bloom & Masia, 1964) domains. Given the lack of a hierarchy of outcomes for the psychomotor domain of the Bloom group, several models have been published, and the version by Dave (1970) is given in Figure 1.2.

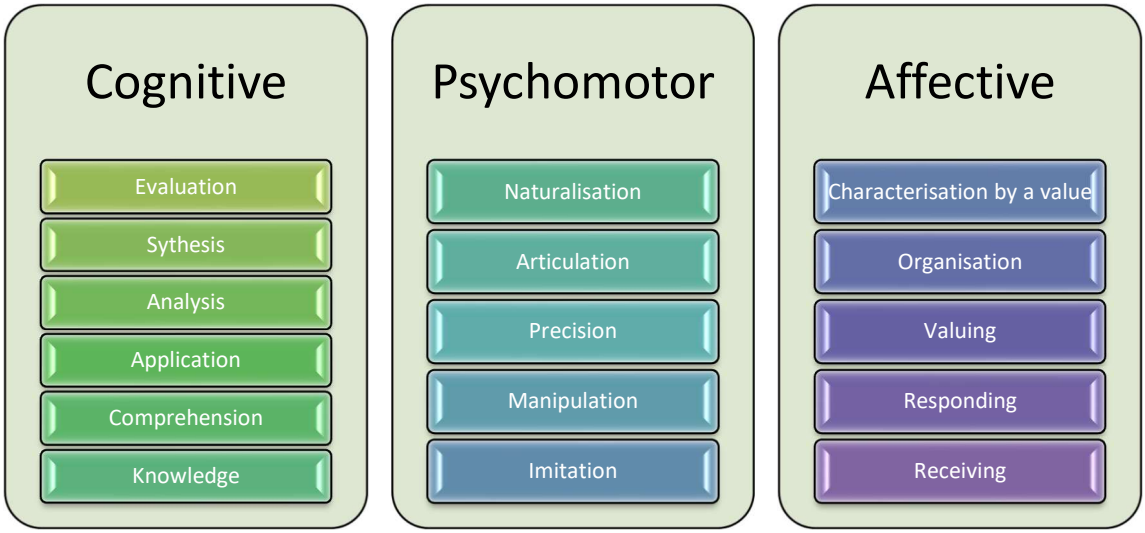

Figure 1.2: Bloom's taxonomy, including the psychomotor domain.
(Bloom *et al.*, 1956: 18; Dave, 1970; Krathwohl *et al.*, 1964)

With a view to assessing complex, integrated competencies that cut across the three domains listed above, Miller introduced another hierarchical pyramid for clinical assessment, which was amended by Cruess, Cruess and Steinert to include professional identity (Miller, 1990: S63; Cruess, Cruess & Steinert, 2016: 181). Figure 1.3 illustrates Miller's amended pyramid.

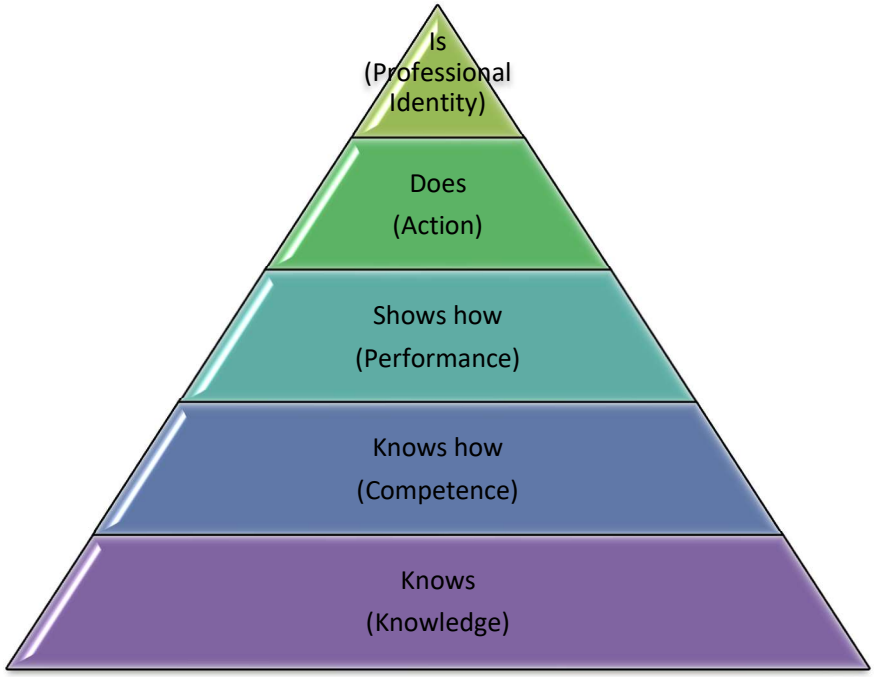

Figure 1.3: Framework for clinical assessment
(Cruess *et al.*, 2016: 181)

1.2.5 Approaches to teaching

Once educational goals and objectives are defined, the way how these can be achieved need to be determined (Thomas & Abras, 2016: 66). Approaches to teaching might be characterised by the location where they take place, or by the chosen educational method. These categories are interdependent, and the following discussion is by no means meant to constitute a full overview.

1.2.5.1 Teaching environment

The term teaching and learning environment is usually associated with the *classroom*. In the medical field, given the need for practical exposure to actual patient care, *bedside teaching* in a *clinical learning environment* is the standard method that complements the classroom-based presentation of theoretical content with the experience of its practical application (Nordquist, Hall, Caverzagie *et al.*, 2019). In accordance with the growing focus on the care of patients in a primary care context, there are projects in place to move some learning opportunities out of academic hospitals, into the community and, occasionally, even into the homes of people, e.g. through home visits or *community-based* projects (World Health Organization, 1987).

In the 21st century, modern information technologies have made the delivery of educational content over vast distances an easily and cheaply achievable activity. Through these developments, the pioneering efforts of *distance-education* institutions have evolved into a vast range of interactive educational activities (Feletti, Malani, Maguire Meservey *et al.*, 2000; Forsyth, Pizzica, Laxton *et al.*, 2010: 15). The rise of the fourth industrial revolution (4IR) and the COVID-19 pandemic fast-tracked these technology-based educational environments (Brady & Pradhan, 2020; Daroedono, Siagian, Alfarabi *et al.*, 2020; Hilburg, Patel, Ambruso *et al.*, 2020; Khamees, Brown, Arribas *et al.*, 2020; Telang, 2019).

1.2.5.2 Educational methods and strategies

Educational methods are often influenced by the location of the training, but there is no strict one-to-one relation between locations and methods (Steinert, Basi & Nugus, 2017: 1241f). In a classroom setting, a classic lecture style presentation by the teacher might occur, with the students being expected to be merely receptive. However, in the same

classroom, a more interactive discussion is possible, as is learning in groups and with a so-called problem-based approach. In the same way, bedside teaching does not necessarily imply active involvement by the student in the same sense of 'service-learning', as the presenting academic might merely use the actual case to give a lecture on a certain topic (Steinert *et al.*, 2017: 1240). Although there is, thus, no strict correlation between location and method of teaching, one might safely assume that educators who venture to move the learning geographically out of the classic environment, might also be more prone to using other methods of teaching (Feletti *et al.*, 2000).

In many high-school and academic environments, the *lecture* presented by the teacher is still the most prevalent teaching method, augmented by audio-visual material of different degrees of sophistication (from chalkboards to live-stream videos) and complemented by homework and -studies (Amin & Khoo, 2002: 105ff). Inspired by the now widely available internet-based modes of instruction, the *flipped-classroom* approach is promoted; in this approach, the actual content acquisition of knowledge is supposed to happen at home, through the use of online media, and the contact time between learners and teacher is used to practise the actual application of this content, resulting in 'flipping' the classical sequence of classroom learning and home practice. This supposedly new approach has been used for ages, especially in the humanities, where reading material is given before a course starts, and the students' insights, based on this reading, are then consolidated and extended in class (McLaughlin, Roth, Glatt *et al.*, 2014: 237).

In an attempt to meet the goals of learner-driven education and applicability, the concept of *problem-based learning* was introduced. The underlying theory is that, providing both (surmountable) challenges and the tools to master such challenges would provide deeper and more lasting learning successes than the mere presentation of theoretical or practical concepts by a teacher and the reception thereof by the learner (Amin & Khoo, 2002: 213ff).

In *experiential learning,* students gain new insights through real-life experience (Amin & Khoo, 2002: 34–38). The model of experiential learning described by Kolb (1984: 21) is displayed in Figure 1.4 – a four-stage cyclical model that describes how knowledge is created through the transformation of experience. The cycle starts with a concrete experience, followed by reflection on the observation, during which students make sense of the experience. During abstract conceptualisation, students construct acquired principles, form an opinion and then assimilate this into their existing knowledge (Yardley, Teunissen

& Dornan, 2012: 104). The knowledge is then tested through active experimentation (Kolb & Kolb, 2017: 12). In health professions education, the exposure of future professionals to the reality of health service provision is one of the basic and most expensive constituents of the training.

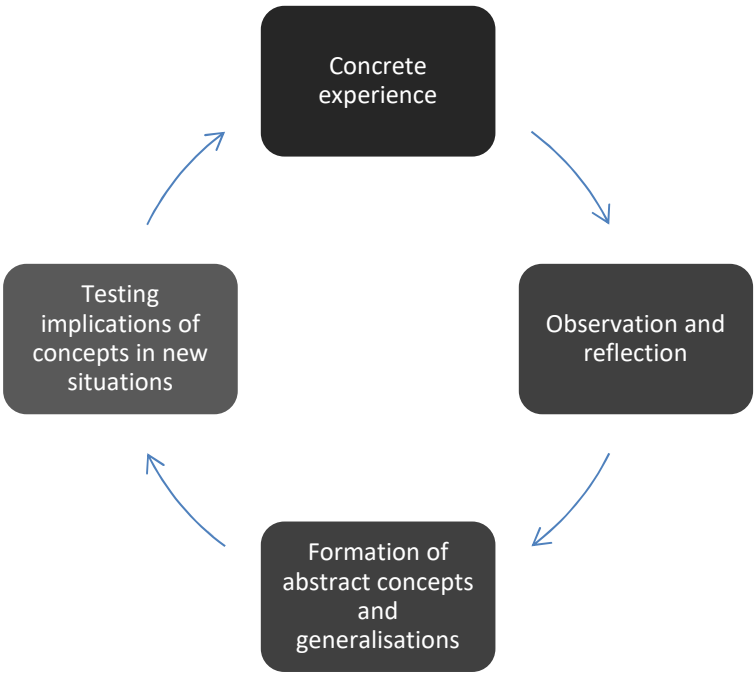

Figure 1.4: Experiential learning model (Kolb, 1984: 21)

The concept of *service-learning* has been formulated with a particular focus on the service delivery aspects of professional practice, and involves students obtaining new knowledge and skills in the very process of delivering an actual service to community members (Osman & Petersen, 2013).

To complement these 'real-life' based methods, especially where the acquisition of new skills in real life is not possible without submitting the individual on which the skills are practised to significant risks of physical harm or suffering (e.g. surgical and other invasive procedures), *simulation-based learning* was introduced. This approach allows the future professional to acquire sufficient skills levels in a safe and non-threatening environment, before a fellow human is subjected to their practice (Bleakley, Bligh & Browne, 2011: 153–170). Simulation-based learning is defined in the Simulation Dictionary as:

> *An array of structured activities that represent actual or potential situations in education and practice. These activities allow participants to develop or enhance their knowledge, skills, and attitudes, or to analyse*

and respond to realistic situations in a simulated environment (Pilcher, Goodall, Jensen et al.*, 2012).*

1.2.6 Assessment

Assessment is an essential part of teaching and learning. Assessment gives an indication, at the end of the education process, of whether certain outcomes have been achieved. In this sense, it provides feedback for both the teacher and the learner. Learners will show signs of having obtained the insights or skills that were intended to be transferred to them, and the teacher, through these signs, has indirect proof of whether the educational methods that were applied facilitated learning successfully. Assessment "drives learning" (Newble & Jaeger, 1983; Krupat & Dienstag, 2009; Wood, 2009; Raupach, Brown, Anders *et al.*, 2013).

Considering the purpose of assessment, *formative* assessment is distinguished from *summative* assessment. Formative assessment is considered to be an ongoing assessment during the training, with the main purpose of correcting the process (Amin & Khoo, 2002: 261f). In the context of the training of cardio-pulmonary resuscitation, the instructor would correct the practical mistakes (e.g. hand-position, compression depth) immediately during practice, to ensure correct 'programming' of the 'muscle memory'. In contrast, summative assessment serves to confirm whether education outcomes have been achieved, and aims to measure whether the trainee can demonstrate specific competencies that were spelled out as goals of the training (Amin & Khoo, 2002: 262f).

With regard to the format of assessment, tests have been set classically in either written (Walsh, 2013: 549) or oral formats. Written tests can be either more structured, such as multiple-choice questions (MCQs), or less structured and open-ended, such as essay-type questions. As it provides written evidence, the written format is often considered to be more reliable. MCQs might take longer to set, but are quicker to mark (possible by means of computerised marking of answer sheets), can cover a wide range of topics, and can also be analysed to measure the quality of the question; on the other hand, MCQs only allow the given choice of answers and do not give the opportunity to consider the reasoning behind the choice of answer (Amin & Khoo, 2002: 283–286). Essay-type questions allow the student to construct a line of argument, but marking this type of question is more labour-intensive and more difficult to standardise (Amin & Khoo, 2002: 299–302). Oral examinations, on the other hand, provide the widest range of flexibility, as questions and

answers can be followed up by clarifications or follow-up questions, though the reliability of this format of assessment has been questioned, due to a wide range of inter-examiner variability (Amin & Khoo, 2002: 309–312). The historically used clinical cases in examinations present a similar challenge with regard to reproducibility and reliability – a challenge that led to the development of Objective Structured Clinical Examinations (OSCEs) in the 1970s (Walsh, 2013: 524). In an OSCE, a specific skill is examined in a standardised context, and with a fairly constant scenario, even over a large number of examinees. Furthermore, hands-on skills are often assessed using simulation techniques, and the testing of communication skills has been facilitated by the introduction of simulated patients (Amin & Khoo, 2002: 317–323; Walsh, 2013: 525).

Reliability as a quality indicator for assessments depends on the number of measurements, or in other words on the sample size. But even a large assessment might lack validity if it is poorly designed and misses the point by assessing wrong or irrelevant items (Van Der Vleuten & Schuwirth, 2005: 311f). In response to the challenges of assessing deeper lying qualities of examinees, such as professional identity (cf. Miller's pyramid – Figure 1.3), more integrated methods have been developed (Walsh, 2013: 500–512). Strong assessment design to ensure reliable and valid assessments requires the selection of a range of appropriate methods while remaining cognisant of the resource implications. Such programmatic assessment which can be achieved following a structured approach (Timmerman & Dijkstra, 2017). One tool for more integrated and broader assessments of a future professional's development is to include longitudinal workplace-based assessments, such as portfolios (Walsh, 2013: 537–548).

1.2.7 Medical education

Medical (and health sciences) education is developing into an own field of academic scholarship and practice, and lies at the intersection of health professions and education. This development could be justified by medical education aiming to 'create' a medical professional, and not merely transferring cognitive and practical skills. Historically, this comprehensive development of a particular professional profile has been achieved through the apprenticeship model, and the training of 'healing professions', such as traditional healers in many cultures, barbers and birthing assistants, which used this approach before more academically structured models created academic programmes for medicine, surgery and midwifery (Burrows, 1958: 29, 66f).

In the 'classical' European university, academic faculties would have covered 'philosophy' and the 'arts' of language use – effectively a basic foundation to teach the future academic logical concepts and the academic lingua franca, Latin, in preparation for the three other, more 'applied' faculties of medicine, law or theology. In theory, the future clinician would have had a foundation in the 'humanities' before engaging in actual medical studies. However, this is certainly an idealised picture of early modern universities – continental European universities were already considered to be in a substantial crisis at the turn from the 18th to the 19th century (Ellwein, 1997: 45ff). The emergence of a wider range of natural sciences, such as biology, physics and chemistry, shifted the focus of the basic training for future medical practitioners in central Europe from the humanities towards a sound 'scientific' foundation. For the North American area, this concept was popularised and elevated as the gold standard through the Flexner report in 1910 (Flexner, Pritchet & Henry, 1910: 20–27). These changes resulted in a significant standardisation and institutionalisation of medical education at academic medical schools (Cooke, Irby, Sullivan *et al.*, 2006: 1341), and was a model adopted in South Africa during the establishment of the country's medical schools in the 20th century.

However, this model does not stand uncontested; it is criticised for both for its geographic centralisation and its scientifically reductionist approaches. With regard to the geographic location of training, a more decentralised approach to training, with a focus on rural and community-based learning platforms, has been proposed, based on, amongst other empirical data, the finding that the patients seen at university medical centres constitute a rare and exotic exception to the patient population (White, Williams & Greenberg, 1961: 890f). The scientifically reductionist approach has been challenged since the early 20th century, by a South African politician and writer through the introduction of the concept of holism (Smuts, 1987: 85). In the field of medicine, a more holistic, bio-psycho-social approach has been suggested to replace the dominant, reductionist biomedical model (Engel, 1977: 131ff). The role of the clinician as a human agent in the clinical interaction, and the possible difficulties on the interpersonal level were addressed by Balint (1957: 11f).

If an approach based on learning theories is used (Taylor & Hamdy, 2013: e1562ff), the Vygotskian idea that learning is both influenced by and geared towards practice in a social context (Kozulin, 1990: 100ff) is certainly worth considering for the academic training of

future professionals. Benatar (1997: 429ff) discusses the meaning (and challenges) of professionalism in medicine against a specific South African background.

Numerous voices have called for the way undergraduate medical education is being taught to be overhauled. Cooke *et al*. (2006: 1341) argue that the overemphasis on science in medical education, at the expense of the humanities, is contrary to Flexner's intentions, and that the exponentially expanding amount of knowledge and the massively changed working environment of academic clinicians require an adjustment of medical teaching in line with the Flexnerian spirit. Frenk *et al*. (2010: 1924), based on a Lancet commission to review health professions training in the 21st century, demand a third generation of reform of the way such training is conducted. Referring to the first generation of reforms introduced for science-based training, which was followed by a second generation, characterised by problem-based learning innovations, they suggest instructional and institutional changes, in order to move towards a systems-based approach.

To illustrate the multiple roles of the medical professional, the Royal College of Physicians and Surgeons of Canada developed the CanMEDS – Canadian Medical Education Directives for Specialists (Frank, Snell & Sherbino, 2015: 14–27; Frank & Danoff, 2007: 644f) – an outcomes-oriented competency framework that is based on seven principal roles of the medical professional, namely, being a medical expert, communicator, collaborator, manager, health advocate, scholar and professional, each with its own range of related key competencies.

This short overview demonstrates that medical education is, on the one hand, clearly guided and influenced by the dominant education principles of its time, whether it is the emergence of science, the implementation of problem-based learning, or the restructuring of educational activities around outcomes and competency frameworks. On the other hand, medical education, by virtue of its aim of training future medical professionals, has certain traits that clearly distinguishes it from the general education field. In particular, the task of providing competent doctors who can meet the requirements of the 'art and science' of health care for other human beings constitutes a persistent challenge in the fast-changing professional environment of the 21st century.

1.2.8 Disciplines, organ systems and integrated clinical education

As mentioned previously, medical education was historically based on an apprenticeship model, characterised by a small number of students and even fewer clinical teachers, and clinical teachers covering a wide range of topics (Papa & Harasym, 1999: 154f). At European universities before the full development of pre-clinical science studies, lecturers at the medical faculty would cover not only the clinical field, but many of the basic clinical sciences, too (Ellwein, 1997: 88ff). In the absence of dedicated science teachers, the 'academic' medical practitioner would have to teach medical students core foundations in botany and 'pharmaceutical chemistry' (before the advent of a dedicated profession of pharmacists), in anatomy, physiology and pathology. This unity of pre-clinical and clinical teaching (although often of poor quality) literally 'dis-integrated' when the amount of specific knowledge increased exponentially, and the different academic fields established themselves. At the science-based Flexnerian medical schools, a growing number of medical students were taught by a growing number of academic staff with a growing diversity of academic backgrounds, giving rise to the discipline-based model (Papa & Harasym, 1999: 155ff). An example of topics in a discipline-based approach is presented in Figure 1.5.

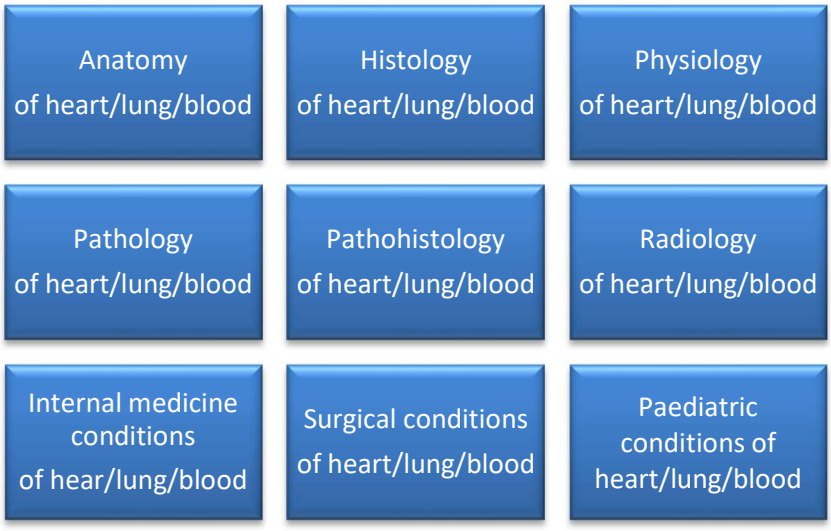

Figure 1.5: Topics in a discipline-based approach

In practical terms, this change resulted in the disjunction between the teaching of microscopic anatomy, macroscopic anatomy, physiology, pathophysiology, radiographic signs and the clinical disease patterns of a organ system. Instead of teaching all that is known about the organ, e.g. the heart, medical students learned about the histology of the heart muscle together with the histology of the liver or the lung. Then, they were taught

the macroscopic anatomy of the heart, together with the anatomy of the skeleton, etc. Later, they would encounter the heart, again together with other organs, in pathology, radiology, internal medicine or surgery courses. In some instances, the shortfalls of this approach (which accommodates more the administrative needs of academic departments than the learning needs of students) have been recognised, and the old 'discipline-based' teaching has been replaced by integrated 'organ-system-based' teaching, of which an example is illustrated in Figure 1.6 (Papa & Harasym, 1999: 157f).

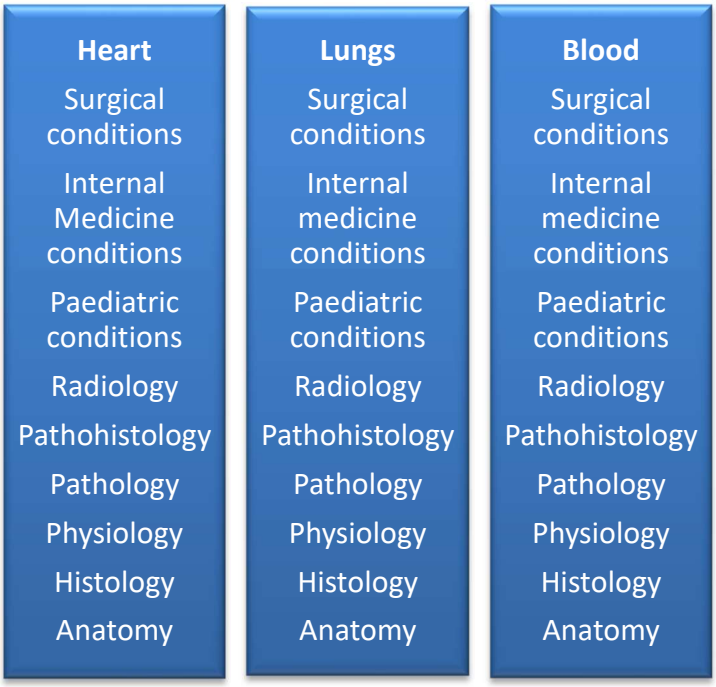

Figure 1.6: Topics in an 'organ system' approach

However, since a patient in a clinical context presents as a holistic entity, and not as a single (or multiple) diseased organ-system(s), the systems-based approach was criticised for its lack of context. The next step in the development was, thus, the introduction of a problem-based approach, where the teaching (ideally in small groups) aimed to develop the critical reasoning skills of the students through exposure to clinical problems. Eventually, this process led to the introduction of clinical-presentation-based curricula, in which a certain number of clinical presentations provided the backbone structure of education (Papa & Harasym, 1999: 160ff; Woloschuk, Mandin, Harasym *et al.*, 2004: 117f). Topics in a clinical presentation approach are summarised in Figure 1.7.

Figure 1.7: Topics in a 'clinical presentation' approach

While evaluation of clinical-presentation-based curricula suggests that this approach holds educational advantages, including better memorisation and recall of relevant concepts, the implementation of such an integrated curriculum is not without challenges. If the institutional organisation and the delivery of content follows the classical discipline-based models, the implementation of clinical-presentation-based education requires work to integrate the longitudinal (disciplines taught sequentially, e.g. physiology first, then pathophysiology, then clinical medicine) and transversal (disciplines taught concurrently, e.g. surgery and internal medicine) dimensions.

1.2.9 Emergency medical care training and education

In line with the above-mentioned educational approach, which presents the content in a format that starts from the clinical presentation the future clinician is likely to encounter, the concept of cardinal presentations was adopted in emergency medicine. In one of the standard works of reference, *Rosen's Emergency Medicine* (Marx & Rosen, 2014: 119–284), 24 typical signs and symptoms are used as a starting point for a structured workup of possible differential diagnoses, as causes for the emergency. In an African adaptation, this approach is used in the African Federation for Emergency Medicine's (AFEM) *Handbook of Acute and Emergency Care* (Wallis *et al.*, 2013: 30–81), which presents 26 rapid assessment protocols. This differs strongly from a more classical approach that considers disease

entities as they are taught by other specialities. Confusion in a patient, for instance, can be the result of such diverse causes as hypoglycaemia (internal medicine), head injury (trauma), psychosis (psychiatry), stroke (vascular surgery) or dementia (neurology). In the classical approach, a student of medicine is taught specific disease entities (such as problems with blood sugar) with all their related symptoms. However, the cardinal presentations approach goes in the opposite direction, looks at specific symptoms, and then links all the possible underlying causes/diagnoses that apply. From the practical perspective of seeing acutely distressed patients with clinical presentations, the latter approach certainly has advantages both for clinical practice and for its teaching. Table 1.1 provides a summary of cardinal symptoms and rapid assessment protocols.

Table 1.1: Cardinal symptoms and rapid assessment protocols (Marx & Rosen, 2014: 119ff; Wallis *et al.*, 2013: 29)

Rosen's cardinal presentations	**AFEM rapid assessment protocols**
Fever in the adult patient	Abdominal pain in children
Weakness	Abdominal pain in adults
Cyanosis	Altered mental status in children
Syncope	Altered mental status in adults
Depressed consciousness and coma	Anaphylaxis and angio-oedema
Confusion	Back pain in adults
Seizures	Burns
Dizziness and vertigo	Chemical exposure
Headache	Chest pain in adults
Diplopia	The crying or irritable infant
Red and painful eye	Dehydration in children
Sore Throat	Difficulty in breathing in children
Haemoptysis	Difficulty in breathing in adults
Dyspnoea	Oedema in children
Chest Pain	Oedema in adults
Abdominal Pain	Emergency delivery
Jaundice	Fever in children
Nausea and vomiting	Fever in adults
Gastrointestinal bleeding	Gastrointestinal bleeding in adults
Diarrhoea	Headache
Constipation	Toxic ingestion
Acute pelvic pain in women	Ischaemic limb
Vaginal bleeding	Seizure in children
Back pain	Seizure in adults
	Syncope
	Weakness in children

A similar approach is applied in the standardised short courses (0.5–2.5 days) on emergency medical skills offered by organisations such as the American Heart Association, which offers

basic life support (BLS), advanced cardiovascular life support (ACLS) (American Heart Association, 2017), paediatric advanced life support (PALS)(American Academy of Pediatrics & American Heart Association, 2016) and advanced neonatal life support (ANLS) courses to address respiratory and cardio-circulatory emergencies, or the advanced trauma life support (ATLS)(American College of Surgeons, 2012) courses of the American College of Surgery. The major advantage of these courses is that they introduce standardised terminology, algorithms and protocols in emergency situations. This allows health care professionals from different institutions (and even different countries) to communicate and interact effectively when assisting patients in life-threatening emergencies. In the case of the American Heart Association courses, the international standardisation is promoted further by regular (5-yearly) large international scientific consensus meetings of the International Liaison Committee on Resuscitation, where the American Heart Association and its partner organisations from other parts of the world (Europe, Australia, southern Africa) review the latest scientific data on resuscitation to formulate international consensus recommendations (Hazinski, Nolan, Aickin *et al.*, 2015: S6ff).

With regard to curriculum content, the American College of Emergency Physicians is rather unspecific when it states:

> *The curricular basics can be accomplished by a specific curriculum designed by emergency medicine faculty, or by incorporating essential topics of emergency medicine into the existing curriculum. The emergency medicine environment places a premium on focused history and physical exam skills, functioning as part of a healthcare team, and diagnostic reasoning and critical thinking. These skills are essential for students entering any clinical specialty.*
>
> *The general educational objectives for all graduating medical students include general assessment skills for the undifferentiated patient, recognition and stabilization of life-threatening illnesses, injury prevention and disease identification, unique content areas, management of the healthcare system and basic procedural competency.*
>
> *An appropriate curriculum incorporates these six elements to create a progressive learning environment over the entire undergraduate*

> *educational experience from the pre-clinical to the clinical years. The exact format of teaching emergency medicine to medial students can take a variety of designs and should be tailored to local abilities, resources or curriculum needs (American College of Emergency Physicians, 2015b: online).*

More specific is the International Federation for Emergency Medicine, pursuant to its vision, "To create an international model curriculum for medical student foundation training in emergency medicine" (Hobgood, Anantharaman, Bandiera *et al.*, 2009: 350). Key competencies that this model curriculum lists include fundamental knowledge in basic sciences related to emergency situations, clinical examination and procedural skills and abilities in self-management, management and auditing, and in multi-disciplinary teamwork. The document suggests specific learning outcomes for resuscitation and communication skills and defines unique content areas and lead role areas for emergency medicine in the foundation phase. It also provides an extensive list of more generic skills, as well as specific speciality-specific ones.

1.2.10 Regulatory framework in South Africa and emergency care training at the University of the Free State

Training of medical students – that is, professional training to qualify future graduates to practice medicine as registered practitioners – is often regulated by the responsible statutory registration authority in a country. In South Africa, this leads to dual oversight of the academic medical programmes by two government departments, namely, the Department of Higher Education and Training (DHET) for the academic programme aspect and the Department of Health through the statutory Health Professions Council of South Africa (HPCSA) for the aspects relating to registering the graduate as medical practitioner. The Department of Higher Education and Training is the government authority that, by virtue of South African legislation, has oversight of tertiary education at universities and universities of technology. The statutory body responsible for this is the South African Qualifications Authority, SAQA (Republic of South Africa, 1997). Academic programmes, thus, need to be accredited by SAQA for universities to be able to award academic degrees. For the health professions, this process is complemented by accreditation through the HPCSA, to ensure that graduates of such programmes will be able to register as health professionals in a specific category (e.g. medical practitioner) in the country (Republic of

South Africa, 1975: 23f; Republic of South Africa, Minister of Health, 1976, 2009: Chapter 2). While the regulations regarding the undergraduate curriculum describe a profile of the graduate (Section 4) and spell out outcomes for knowledge, skills and attitudes (Section 4 (4) – (6)), they do not make any reference to specific competencies, knowledge, skills or attitudes needed to manage medical emergencies (Republic of South Africa, Minister of Health, 2009).

Since opening its doors to undergraduate medical students in 1971, the medical curriculum at the UFS has generally followed a Flexnerian approach, with a foundation of basic medical sciences in the initial years, followed by clinical training in medical specialities and sub-specialities, mainly in a tertiary hospital setting. However, from its very beginning in the early 1970s, there has been ongoing, intensive efforts to include new concepts, such as integrated learning and assessment, in the programme (Retief, 1971: 1034–1036, 1974: 5, 1978b,a).

Currently, the Faculty of Health Sciences offers a five-year undergraduate medical curriculum, structured into three phases. Phases I (semester 1) and II (semesters 2–5) largely constitute the pre-clinical time, with very limited exposure to clinical cases, while Phase III (semesters 6–10) accommodate the clinical disciplines (University of the Free State - Faculty of Health Sciences, 2017). There is no specific module dedicated to the field of emergency medicine, but large amounts of emergency care and trauma content are covered in the clinical skills module (MCLI – semester 5), the surgical modules (MSUR – semesters 6; 7 or 8; 9 or 10) and the family medicine module (MFAM – semester 9 or 10) (University of the Free State - Faculty of Health Sciences, 2017: 10). The faculty is expanding its clinical training platform to sites such as Trompsburg (University of the Free State, 2014: online) and Botshabelo, to increase the annual intake of undergraduate medical students in line with national needs and demands (Republic of South Africa, Department of Health, 2011: 139).

1.2.11 Summary

To summarise the above overview, it can be said that the field of emergency medicine and emergency medical care has developed into a speciality field in its own right, with an ever-increasing body of literature and a range of best-practice guidelines that are evidence-based and reviewed regularly. In order to provide future medical practitioners with a sound theoretical and practical foundation for managing clinical emergencies in their professional

careers, it will be essential to integrate these insights fully into undergraduate medical education. This can and should be facilitated by applying techniques and insights from the equally rapidly developing field of medical education. Well documented concepts of teaching to facilitate effective and lasting learning need to be utilised, starting with clearly formulated competencies as intended outcomes for the education journey, and complemented by an appropriate set of corresponding assessments to ensure successful acquisition of such competencies. Institutional realities at the UFS and applicable national regulations constitute the environment for this to happen.

1.3 PROBLEM STATEMENT

When they graduate as medical practitioners, medical students must be competent in managing medical, surgical, obstetric and paediatric emergencies. As the clinical teaching is provided by different clinical departments, training in the management of clinical emergencies is fragmented. Emergencies, however, do not respect boundaries of disciplines, e.g. an acute abdomen might be a general surgical, vascular surgical, gynaecological, internal medical or urological problem. Unfortunately, approaches taught by different departments differ, occasionally to such extent that they contradict each other.

It is essential for the future medical practitioner to acquire efficient approaches to common emergency situations, such as basic life support techniques and pathways, to differentiate between clinical conditions relating to different organ systems clinically presenting in a similar manner. The problem that has been identified is the absence of an integrated curricular approach to the training of emergency care skills in the undergraduate medical programme at the UFS and possibly at other medical schools in South Africa. This research intended to facilitate a collaborative platform to bring the clinical departments and specialities involved in the teaching of emergency skills together and to find integrated ways of teaching the required skills and algorithms.

1.4 OVERALL GOAL OF THE STUDY

The overall goal of this study was to further strengthen, through integration and coordination of training, the clinical emergency skills of MBChB graduates of the UFS and other medical schools, as a contribution to better health outcomes.

1.5 AIM OF THE STUDY

The aim of this study was to develop a framework for integrated emergency care education in South African undergraduate medical programmes.

1.6 RESEARCH QUESTIONS

The overall research question was,

> *What educational strategies should be used to enhance the emergency care curriculum by means of an integrated undergraduate clinical emergency care programme?*

The following research questions were addressed by the specific objectives of the study:

Research question 1:
What are the essential outcomes/competencies in the field of emergency care to be achieved during undergraduate medical education?

Research question 2:
What are the educational approaches and methods to achieve these outcomes?

Research question 3:
What are the assessment criteria for the integrated emergency care programme?

Research question 4:
What organisational framework is required to facilitate the achievement of these outcomes?

1.7 OBJECTIVES OF THE STUDY

The following objectives were addressed to answer the research question:

I. (a) To gain a comprehensive understanding of current national and international trends in the teaching of emergency care to undergraduate students of medicine, and

(b) To identify existing examples of outcomes and competencies to be achieved in integrated emergency care curricula, based on the information obtained from key role players at South African medical schools.

These objectives addressed research questions 1 and 2 and were covered by the literature review and document analysis, and by the in-depth-interviews.

II. To collect evidence on the educational approaches currently in use, and content and structures that facilitate the acquisition of emergency medical care competence in undergraduate medical programmes at universities in South Africa.

This objective addressed research questions 2, 3 and 4 and was covered by the literature review and document analysis, and by the in-depth-interviews.

III. To identify strengths and weaknesses of the existing programme and to formulate appropriate outcomes, educational approaches and assessment criteria for improvement, based on information obtained from local key role players at the UFS.

This objective addressed research questions 1, 2, and 3 and was covered by the literature review and by the nominal group technique.

IV. To develop a framework for the integrated emergency care curriculum, using the results from Objectives I–III.

This objective addressed research question 4 and was covered by an integration of the findings from the research methods.

1.8 RESEARCH DESIGN

Mouton (2001: 46) explains that empirical research follows a general logical sequence of elements in the research proposal, starting off with a *pro*blem, which is addressed by an appropriate research *d*esign, followed by the collection of *e*mpirical data, which are then used to reach *c*onclusions (ProDEC). He compares the research design with the blueprinting of a house, which starts with vague ideas of the future home owners, while research methodology is more comparable to the detailed plans, after which the contractors build the eventual building (Mouton, 2001: 55).

This section will, first, discuss general considerations on the nature of the phenomena being investigated (epistemology) and the way they can be observed and understood (research design). After this clarification, an argument will be made for the chosen technical approaches to the research (methodology). The actual methods will be described in the next section.

1.8.1 Epistemological considerations and the research paradigm

This study investigated the real-life problem of conveying essential skills during health-professions education at higher-education institutions. It, therefore, touches aspects of clinical-medical, educational, managerial and interpersonal or psychological nature. Each of these fields has their own body of scholarship and their own scientific paradigms and research cultures.

Most of the variables investigated are of a qualitative nature, as is the case for education outcomes, interpersonal and institutional obstacles, and enablers, such as resources and required interventions. As it is a real-life setting, these qualitative factors exist within a certain *Lebenswelt* (life world). In practical terms, this implies that factors such as legal requirements and regulations, but also historical, political and sociological factors, have a bearing on the actual context. For example, the clinician-educators in the clinical disciplines might be influenced in their expectations and concerns by a multitude of individual factors, such as their personal background and upbringing, prior experiences, staff shortages or even medico-legal aspects.

Only a minor part of the data collected was of quantitative-descriptive nature, such as some of the descriptors of existing academic programmes in South Africa in the 'mapping' part, e.g. the duration of rotations and number of sites. However, even for the models used at other medical schools, it holds true that the specific local situations of the higher education institutions might add valuable insights into the reasons for different models and implementations (although this is beyond the scope of this study).

In the theory of science and in epistemology ('the theory of knowledge'), certain extreme positions have been formulated, even though the actual reality is often rather different, and represented by shades of grey, and not black-or-white. The different positions might be

characterised by the ontological (ontology, literally 'the theory of being', is the philosophical term used to describe the mode or nature of being of entities) character ascribed to aspects such as research findings or the interaction of the researcher and the research subject. For purposes of clarification, *positivism* and *constructivism* will be afforded a brief consideration.

A strictly positivistic concept of research would ascribe an own reality to the research findings, which are truths that lie hidden and get discovered and unveiled by the researcher. The researcher him- or herself in this context is considered to be independent from the research finding and without influence on the research finding's true (positive) being. Similarly, human research subjects are regarded merely as "vessels of answers" (Holstein & Gubrium, 1995: 7). The interaction between the interviewer/researcher and the interviewee/subject is considered to be a neutral one, with the researcher (ideally) not interacting with the research findings at all, but just 'excavating' them. In line with this concept, elements of the research method, such as an interview guide, would be idealised as an inert tool that does not influence the findings.

Since these concepts and assumptions are obviously not really in line with lived reality, an opposing concept of social constructivism evolved. Here, the relationship between the researcher and the research subject is regarded as dynamic and relevant to the findings. The research findings, albeit valid, are considered not to exist independently of the researcher-subject interaction, and are, in fact, constructed in the process of this interaction. A typical example for such a construction one might see evolving is the response to an interview question such as, What was your best (or worst) experience with …, or even What is your favourite …. Few of us has already made up our minds that a specific event was the 'best' or 'worst ever' until we are asked a question about it. In the moment of answering, we are deciding on a specific example that we present as best/ worst/ favourite, however, without the reflection process stimulated by the interview question, we would probably never have chosen (or constructed) this statement.

It is important at this point to emphasise that this is not meant to argue the case of empirical agnosticism or methodological anarchy. To the contrary, these reflections merely intend to achieve a deeper understanding of the research process. It needs to be remembered that, even in quantitative research, the units of assessment are not necessarily as clearly defined as one would wish. A researcher wanting to quantify the colour preferences of car buyers will have to make a judgement of whether an orange or maroon a car might still be

considered a red car – the assessments in clinical medicine and education are even more 'operator-dependent'. Instead of falling into despair and giving up on the possibility of research, one should embrace the ontological fact that findings do not exist without a finder, and apply scientific methodology accordingly.

In line with these considerations, a constructivist approach was pursued in this research project. Many factors affecting the teaching of emergency care are of a qualitative nature, with manifold attitudes, personal skills, interpersonal dynamics or demographic attributes playing as important roles as epidemiologic considerations and consensus guidelines. A researcher does not exist outside of these realities and contexts, e.g. in the health services, at the academic institution, and in the local geographic context. However, this does not need to be seen as a disadvantage, since possible contamination of the data (which might happen even with the most uninvolved researcher) will be more than compensated for by the advantage that an intimate knowledge of the local dynamics, policies and processes provides prime opportunities to contribute to a thick description of the research findings.

1.8.2 Research design

As stated above in the problem statement (Section 1.3), this research addressed the practical educational challenge faced by providing effective and consistent emergency care training to undergraduate medical students at the UFS. All the objectives listed in Section 1.7 yielded mainly qualitative data – the current body of scholarly knowledge, the existing models of emergency care training in South Africa, the outcomes and competencies of the clinical training, and the preferred assessment techniques fall largely into this category.

The study, therefore, applied a qualitative, constructivist research paradigm. Henning, Van Rensburg and Smit list a number of different design types ('research genres' in her terminology), namely qualitative case studies, ethnographic studies, ethnomethodological studies, discourse (and narrative) analysis, historiographic studies, biographies, grounded theory studies, action research, and more (2004: 36ff). There exist many hybrids of the designs, and the researcher will try to illustrate how this study contains aspects of various designs.

Firstly, one might consider this research a case study. A specific challenge (the integrated training of emergency care skills) is the case, and this study set out to describe, at least

partially, the path that should be taken to conquer the challenge. The ways of communication and the interactions between distinct role players means this study shares certain characteristics with ethnographic studies. Ethnographic studies describe the 'ways of life' of specific groups of people, and academic institutions, as well as public sector health care and health management institutions, are certainly valuable subjects for such research. Ethnomethodological studies analyse how specific groups construct reality by using tools such as conversation analysis. Again, integrated emergency care training is a valuable cause for such an analysis: How does the group of academic clinicians construct the reality of emergency care?

Aspects of grounded theory were applied during the analysis of the empirical data of this study, when the intention was to derive themes and concepts from data, such as interview transcripts, in an inductive process, rather than to deduct preformed categories from the literature and 'force' the data in the construct.

Lastly, even certain aspects of action research might be seen in the process, even though this study did not follow the structured iterative process that proper participatory action research requires (Meyer, 2000; Mash, 2014). The qualitative approach followed in this study aimed at constructing a cohesive and appropriate implementation framework, by considering a thick description of the qualitative data gathered.

1.8.3 Methodology

Gathering data to address the objectives and to answer the research question required the application of different approaches for the different objectives. Ritchie and Spencer list four categories of objectives for qualitative research in applied policy research: Contextual, diagnostic, evaluative and strategic (1994: 174). With regard to emergency care training of undergraduate medical students, aspects of all four categories might come into play. The initial focus was to evaluate the context for the training, which involved a thorough evaluation of the regulatory framework for such training, locally, of key stakeholders and resources, national legislation and regulations and 'best-practice' examples of other institutions and international recommended curricula, and regulatory documents. Somewhat linked to the contextual aspect is the diagnostic category, which explore the reasons for an existing situation. In this research, historical contingencies, for example, offer an explanation why training is organised in a specific way. The evaluative category

aims at assessing appropriateness of an existing approach, and identifying the strengths and weaknesses of the existing programmes constitutes such objectives, while the strategic objectives outline plans for new programmes or the acquisition of new resources (Ritchie & Spencer, 1994: 174).

In a practical sense, the contextual aspect of this study was covered by a structured literature review. The description and interpretation of the academic discussions on emergency care training for undergraduate medical students had to start from a structured literature search in relevant databases. To contextualise the African, and South African setting, in particular, was not that easy using only the standard international databases and search engines. Many publications that are more applicable to the local context of the developing world might be published in the 'grey literature' of local or regional journals, rather than in high-impact (factor) literature. This is particularly true for 'case study' publications on undergraduate medical curricula implemented in the South African or southern African context. Yet, these more narrative, qualitative pieces provide invaluable insight into the local context and its challenges, much more so than the 'glossy' examples from North America or the United Kingdom, with its vastly different health systems and academic environments, regulatory frameworks and 'life worlds' in general. In writing up the conceptual background for this study, it was of paramount importance to include enough insight into the epidemiological, socio-political, legal and educational situations that define the local context. Information on these external factors are accessible, to a certain extent, through document analysis – another form of qualitative research. The same holds true for documentary evidence of existing academic undergraduate medical programmes in South Africa.

A thorough search of the relevant web pages of existing medical programmes provided some programme-related information, but mainly assisted in identifying the key stakeholders for the in-depth interviews. While Henning *et al*. (2004: 5f) state that there are three main data sources for qualitative research, viz observation, artefact and document studies, and interviewing, this research included only the latter two.

The research focus of the second phase of this study was current practices at the other medical schools in South Africa, and trying to identify both education objectives set for the programmes, and the means that are being used to achieve the objectives. The best way to access data was through interviewing techniques. The format of these data is qualitative,

and even though some of the facts might have been expressed in a more formal way, e.g. in module guides, much of the relevant information was not available in a comprehensive document. Even though it might have been interesting to foster discussions on these matters in focus groups with representatives of the different universities, due to the role and position of these key informants, it would have been too difficult to set up such a focus group discussion. Individual in-depth interviews provided opportunities to explore the situation at a specific academic institution in depth. Insights from both the document review and the in-depth interviews enabled the researcher to identify general approaches to the matter of emergency care training in undergraduate medical programmes.

The third phase of the research addressed emergency care training of undergraduate medical students in the local context at the UFS. To use the above categories of Ritchie and Spencer (1994) again, a degree of *contextual* and *diagnostic* objectives was involved in understanding what is happening in the local context, and why. There is also a constant need to *evaluate* the existing framework for teaching medical students at the UFS, and, lastly, the suggestions regarding training approaches provided *strategic* objectives for planning.

The nominal group technique (NGT) was used as a tool to evaluate course content and curricula in undergraduate medical programmes (Chapple & Murphy, 1996; Lloyd-Jones, Fowell & Bligh, 1999; Lancaster, Hart & Gardner, 2002; Dobbie, Rhodes, Tysinger *et al.*, 2004). Allen *et al.* and Jones and Hunter list the NGT as one of the consensus techniques commonly used in health care, together with the Delphi technique and consensus conferences (Allen, Dyas & Jones, 2004: 110; Jones & Hunter, 1995: 376).

In their seminal paper, often credited as the introduction of NGTs, Delbecq and Van de Ven (1971) describe a multiphase approach to programme development, which they refer to as the Program Planning Model (PPM). The model starts off with a NGT amongst clients, to identify priority needs. In our context, these clients were recent graduates from this medical programme who had entered professional life as medical practitioners. They are said to have a clearer and reasonably fresh experience of where the strengths and possible weaknesses of the existing programme lie. In its second phase, the PPM engages scientific and organisational specialists, to address identified priority needs and to provide well-informed insights into existing approaches and potential additional requirements; in this

study, covered by academic clinicians and health education specialists with insight into local realities.

The third phase of engagement is with resource controllers, to present the priority needs and possible solutions as identified in the first two phases, which this study covered by engaging senior managers of academic programmes to explore the viability of the approaches identified in the preceding phases. Final phases in the PPM are the actual programme development (Phase 4) and a critical review of the final product with all the main stakeholders (Phase 5). The latter two phases of the PPM were beyond the scope of the current research, and remain to be addressed in further steps of planning the actual implementation of the suggested changes.

The fourth phase and last phase of this research comprised the development of an integrated framework. This process brought together the findings of the three phases mentioned above. Major factors or dimensions that were identified in the literature and empirical data that had been collected were combined and described in their complex interrelatedness. Recommendations derived from this framework include directions for further research, and also structural and procedural suggestions to be implemented for the promotion of integrated emergency care training in undergraduate medical programmes in South Africa.

1.9 DESCRIPTION OF THE METHODS

This study mainly used qualitative methods. An extensive literature study/review of the scholarly body of knowledge and of the regulatory environment, in-depth interviews with key informants at eight medical schools in the country, and the NGT, to identify challenges and possible solutions in the local context with recent graduates, were undertaken.

1.9.1 Phase I: Extensive literature and document study

Mouton (2001: 87) and Henning *et al.* (2004: 27) emphasise the importance of a thorough literature study, as a first step of the research project. Mouton suggests rather referring to a scholarship review, as the published body of scholarly knowledge enables the researcher to define key concepts in the field, gives an insight into scientific discoveries in the field and allows the researcher to localise his/her own research by addressing a gap or niche in the

existing body of knowledge. An extensive study of the available literature was performed as the first step of the modelling a framework for integrated emergency care training.

A first search aimed to outline the regulatory environment for emergency care training of undergraduate medical students. Guidelines and regulations for undergraduate training of medical students in South Africa and abroad were searched and the exit-level outcomes for the South African undergraduate medical programmes that are registered on the database of SAQA were reviewed for emergency-care-related content. Identified outcomes as requested by the registration authorities or recommended by professional associations in the field will be presented in Manuscript 1 (Chapter 2).

A second, comprehensive literature study focussed on publications that presented scientific evidence in relation to best educational practice in the field of training and assessment of emergency skills, such as studies on the quality of skills transfer and retention by using certain educational methods. The systematic search was conducted on EbscoHost, using the databases Medline, Africawide, Academic Search Ultimate and ERIC,s and on Web of Science, using Medline only. The search term "("medical student"* or (medical and undergraduate*)) and emergency and (training or curriculum)" was identified after discussion with a librarian, and it yielded a sufficiently wide and specific selection of publications. Findings from this scoping review were written up for publication and will be presented in Manuscript 2 (Chapter 3).

In addition to the general search of scientific databases and the internet, more detailed written information that might not be available via open access/internet searches was requested from South African medical schools in preparation for the in-depth interviews to review the specific local models.

1.9.2 Phase II: In-depth interviews

This phase of the study was the empirical, inductive part of the research. It sought input from national key informants overseeing and coordinating undergraduate medical training at the medical schools in South Africa.

1.9.2.1 Target population

There are currently eight established medical schools at universities in South Africa, with a ninth one having enrolled but not yet graduated undergraduate students, and two additional ones planned. This study identified the factors that influence undergraduate medical training in emergency care, and for this reason, the data collection was limited to academic institutions with established programmes. Table 1.2 lists the South African medical schools with their geographic location, duration of their programmes and the year of their establishment.

Since there is no standardised undergraduate medical curriculum in South Africa, and the regulations from the South African Department of Health are providing only a framework (Republic of South Africa, Minister of Health, 2009), it is assumed that there are significant differences between the existing medical programmes, in general, and with regard to emergency care training, in particular. As medical schools are complex organisms with many historical and local contingencies, it was anticipated that well positioned key informants would be able to provide enough insight into the specific contexts of their respective medical schools.

Table 1.2: Medical schools in South Africa

UNIVERSITY	PROVINCE	YEAR MEDICAL SCHOOL WAS ESTABLISHED	DURATION OF MBCHB PROGRAMME (YEARS)	DEPARTMENT/ DIVISION OF EMERGENCY MEDICINE	SOURCE
University of Cape Town (UCT)	Western Cape	1912	6	Yes (previously combined with US)	www.health.uct.ac.za/
University of the Witwatersrand	Gauteng	1919	6	Yes	www.wits.ac.za/health/
University of Pretoria (UP)	Gauteng	1943	6	Yes	www.up.ac.za/school-of-medicine
University of KwaZulu-Natal (UKZN)	KwaZulu-Natal	1947 (as University of Natal)	6	Yes (Division)	chs.ukzn.ac.za/Homepage.aspx
University of Stellenbosch (US)	Western Cape	1956	6	Yes (previously combined with UCT)	www.sun.ac.za/english/faculty/healthsciences/
University of the Free State (UFS)	Free State	1969 (as University of the Orange Free State)	5	No	www.ufs.ac.za/som
Sefako-Makgatho Health Sciences University (SMU)	Gauteng	1976 (as Medical University of Southern Africa – MEDUNSA)	6	No	www.smu.ac.za/schools/medicine/
Walter Sisulu University (WSU)	Eastern Cape	1985 (as University of the Transkei - UNITRA)	6	No	www.wsu.ac.za/waltersisulu/index.php/health-sciences/
University of Limpopo (UL)	Limpopo	2016 (after 'de-merger' from SMU)	6	No	www.ul.ac.za/index.php?Entity=Medicine
Nelson Mandela University	Eastern Cape	2021 (planned)	6	?	health.mandela.ac.za/
North-West University (NWU)	North West	?	?		health-sciences.nwu.ac.za/

Modified from (Pillay, 2019; Seggie, 2010)

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1.9.2.2 Survey population and sampling

A range of sampling techniques has been described for qualitative research using interviews. Henning *et al.* (2004: 71) list theoretical sampling, snowball sampling and convenience sampling as common approaches, and add purposive sampling to these. Theoretical sampling identifies a supposedly representative sample of a larger (theoretical) population, while snowball sampling uses the contacts of the first member of the sample to identify additional participants, and convenience sampling uses what is conveniently available, which might be easily accessible or easily identifiable, as participants. Purposive sampling puts the emphasis on the outcome of the qualitative research and aims to identify desirable participants, i.e. people who might add particular knowledge and insight and would, thus, be particularly valuable sources. Mays and Pope (1995: 110) state that, "(t)he purpose is not to establish a random or representative sample drawn from a population but rather to identify specific groups of people who either possess characteristics or live in circumstances relevant to the social phenomenon being studied".

Representative key informants from the currently active undergraduate programmes in South Africa constituted the sample. These individuals, one from each university or programme, were identified in a purposive sampling process by inquiries at the respective institutions. Medical schools were contacted telephonically and in writing and requested to identify a suitable person at the respective institution. Alternative approaches included directly contacting key stakeholders from certain medical schools at national health education conferences to identify potential interviewees. Criteria that were applied included that the person holds a role in the undergraduate medical training programme, has insight into emergency care training, has been in the position for at least 6 months and was willing to be interviewed. Since the focus was on the integration of teaching and curriculum in the programme and across the disciplines, care was taken to achieve a mix of health educationalists with diverse backgrounds, rather than exclusively sampling clinical emergency medicine specialists.

1.9.2.3 Pilot study (exploratory interview)

Unlike quantitative studies, qualitative studies do not require a strictly separated pilot study on a different but comparable sample to test the instrument (Botma, Greeff, Mulaudzi *et al.*, 2015: 291). Nevertheless, it was beneficial to schedule an exploratory interview before

the other interviews were organised. This served to pilot the logistical and technical setup, the interview guide or questions and the practical execution of the interview by the researcher. It also provided an idea of the time required for individual in-depth interviews. The exploratory interview was performed at the medical school of the UFS in Bloemfontein, with the undergraduate programme director. Unlike quantitative research, the data from this interview yielded interesting and relevant insights, and did not need to be excluded from the data analysis.

1.9.2.4 Data gathering

Qualitative data were gathered through eight in-depth interviews with key informants. Each of the interviews was set up at venues convenient for the interviewees. This was typically the workplace (medical school) of the interviewee, unless other circumstances (e.g. work commitments) required the interview to be conducted at a different site. Audio-recording equipment with backup was brought along to the interview venue by the researcher. Due to the vast geographic distances, it was not possible to have a research assistant moderate the actual interviews, therefore, the researcher conducted the interviews and took fieldnotes concurrently.

The interview guide for the semi-structured in-depth interviews is attached as Appendix A5.

1.9.2.5 Data analysis and interpretation

All audio data were transcribed verbatim. Content analysis of the emerging themes was done using Atlas.ti (Scientific Software Development, version 8.4.24.0). Henning *et al.* (2004: 127) state that "(d)ata analysis in qualitative research is an ongoing, emerging and iterative or non-linear process". The basic principle is that the researcher familiarises him/herself with the data and then tries to find structure or patterns in the data. Ritchie and Spencer (1994: 178) list the five steps of familiarisation by identifying a thematic framework, indexing, charting, and mapping and interpretation. In the coding process (Henning *et al.*, 2004: 104ff; Saldaña, 2013: 3ff), after becoming familiar with the full set of data, the researcher identifies smaller fragments of the data set that express specific ideas, and then searches for relationships between ideas. This process should, however, not fall victim to a positivistic approach, by trying to apply 'quasi quantitative' methods to the data without taking the internal context of the fragments or the possible external

context into account. Henning *et al.* (2004: 62) express this well by stating that, "in a standardised interview-based inquiry (…) 'content is king' (…) In discursive work, 'context is king'."
In line with the concept of respondent validation (see Section 1.10.5 below), the transcripts of the interviews were sent to the interviewees for verification. At a later stage of the process of data analysis, the interviewees were again given an opportunity to review the draft interpretation of the data and co-occurrence tables from the thematic analysis for comment, before the manuscript reporting the research was finalised.

Results of this phase were written up for publication and will be presented in Manuscript 3 (Chapter 4).

1.9.3 Phase III: Nominal group technique

The NGT is credited with allowing greater creativity, by being more successful at limiting the influence of dominant group members and giving quieter members space to express their ideas (Delbecq & Van de Ven, 1971: 472; Gallagher, Hares, Spencer *et al.*, 1993: 78). The nominal group technique was applied in accordance with the PPM, to facilitate the identification of both challenges and possible solutions in the local context of the UFS's School of Clinical Medicine.

Delbecq and Van de Ven (1971: 469) describe the phases of the process as, firstly, engaging "clients" to explore the problem, secondly, involving "external resource people and internal specialists" in knowledge exploration, thirdly, "key administrators and resource controllers", to prioritise and adapt locally, fourthly, "organisational staff", to develop a programme proposal and, lastly, "all constituencies" for final approval and evaluation. In the context of this research, the first two phases were conducted using a NGT session approach, with recent medical graduates working as medical interns representing the clients (medical students) in the first phase, and the local technical experts contributing in the second phase. The next phase of the PPM (engagement with resource controllers) involved a discussion of suggested approaches with the programme director and phase chairs. Developing the framework constituted part of the actual programme development phase of the PPM. The final part of application in the organisation, and critical evaluation, is beyond the scope of the investigation, and will constitute postdoctoral work.

1.9.3.1 Target population

In line with the above-mentioned PPM, a three-step NGT approach was applied. In a first step, the clients (medical interns) were asked to express their experiences with the existing programme. This group of recent (one or two years prior) graduates of the UFS undergraduate medical programme had had the opportunity to test their acquired skills in real-life medical practice as medical interns. All medical graduates of the UFS who experienced emergency care training constituted the research population for the first round of the NGT.

For the local technical experts for the second step, the academic clinical staff on the joint staff establishment of the School of Medicine, together with affiliated lecturers in the clinical disciplines and university staff of the School of Medicine (e.g. programme director, departmental teaching and learning coordinators, academic staff of the simulation and skills unit) constituted the total research population.

Delbecq and Van de Ven's (1971: 482) statement regarding the importance of the "juxtaposition of pure scientific personnel and applied organizational specialists", translates, in the context of academic medicine, into including people with both an educational focus, and those with a clinical focus. Delbecq and Van de Ven (1971: 479) also emphasise the need for specialists to be "idea men", not representatives. Jones and Hunter (1995: 378) emphasise the selection of experts for participation in the NGT as one of the key steps in the process, with a huge potential influence on the outcome of the study.

Findings of these first two steps of NGT sessions were presented as a draft manuscript and recommendations to the chairpersons of the pre-clinical and clinical phases and the undergraduate programme director, for a discussion about available resources and options for implementation.

1.9.3.2 Description of sample and sample size

In a purposive sampling approach, participants were recruited for the two separate phases (graduates and technical experts). Participants were sampled from recent graduates of the undergraduate medical programme, who had completed their studies between one and three years ago, were working as medical interns (first two years after graduation) and

community-service medical officers (third year after graduation). The nominal group for these participants was conducted at the end of the calendar year, thus, ensuring that the graduates had gained a full year of clinical experience in the first year of internship, and second-year interns were about to complete their internship. Interns and community-service medical officers who had graduated from the UFS and served at the Bloemfontein Hospital Complex were requested to participate. Appropriate representation of clinical experience from primary health care, district hospital and referral hospital sites was achieved, with participants having rotated through the different clinical fields.

The technical experts were recruited through direct personal and written requests to the individuals and the heads of academic departments. Based on the concept of purposive sampling (Henning *et al.*, 2004: 70f), teaching and learning coordinators in the clinical disciplines were approached as primary target group and a good representation of clinical disciplines and of professional functions (academic clinician/academic manager/educational specialist) was aimed for when recruiting the participants for the second stage of the NGT process.

The size of the groups for the NGT was recommended as 6 to 9 as smaller parts (desks) of larger groups (Delbecq & Van de Ven, 1971: 470), or as 9 to 12 participants for a single group, allowing for a sufficient range of opinions while being a manageable group size (Allen *et al.*, 2004: 111; Jones & Hunter, 1995: 377).

1.9.3.3 Data gathering

Because of the type of research, this part of the study provided qualitative data, ordered in a hierarchical manner as result of the NGT processes. This kind of data is sometimes referred to as semi-quantitative (Dobbie *et al.*, 2004: 402).

The data addressed the third objective, namely,

- strengths and weaknesses of the current approach; and
- available and potentially available resources and approaches to address identified challenges.

NGT sessions follow a structured process to allow for the generation of ideas and for the ranking of those ideas by the group. The stages of this process are shown in Table 1.3:

Table 1.3: Steps of nominal group technique (NGT)
(modified from (Gallagher *et al.*, 1993: 79))

1	Introduction
2	Silent generation of ideas in writing
3	Listing of ideas on flip chart (round robin)
4	Discussion of ideas on flip chart*
5	Ranking to select the individual's 'top-five' ideas*
6	Voting on 'top-five' ideas*
7	Break
8	Discussion of vote
9	Re-ranking and rating revised 'top-ten' items
10	Conclusion of nominal group

*** These steps might be repeated with the whole group**

In the introduction, the researcher introduced himself and the facilitators and explained the purpose of the study, before allowing the participants to introduce themselves. Participants then were asked to silently write down issues that came to mind in response to the research task.

In this research, the tasks for the first stage of the NGT with the recent graduates were, *Write down what you valued the most in the emergency care training during your undergraduate medical training at the UFS*, and, *Write down suggestions on how to improve the emergency care training during undergraduate medical training at the UFS*. In the second stage, with the technical experts, the questions were, *Write down suggestions, given current resources and based on the comments of the students, what you think can be done to improve the emergency care content and delivery in the undergraduate medical programme at UFS*, and *Write down suggestions what additional resources and structures might be needed and how these would influence the delivery of the content*. The individually created items were collected one by one, giving each participant, in turn, the opportunity to add one of their items (round robin, separate for the different tasks).

The group was asked whether other participants had the same item, which was marked on the flip chart, where the items were clustered by themes. Once all items had been collected, the group had the opportunity to discuss the ideas on the flip chart and to rank the top five ideas. The participants then voted for their individual top five ideas by assigning points from 5 to 1 to a selection of five of the listed ideas. The following break was used to count the votes for each idea. Another discussion of the voting results in the full group followed. In the case of multiple desks/small groups, the small groups' ideas were combined at this stage, and the previous process repeated (Dobbie *et al.*, 2004: 404; Gallagher *et al.*, 1993: 79).

Findings from the graduate NGTs were captured and made available to inform the next stage of NGTs with the technical experts.

As some of the discussion of ideas in the NGT could contain insightful arguments that were not reflected in the suggestions written down on the flip charts, the discussions were audio-recorded, with the consent of all participants.

The facilitator's guide for the NGT is attached as Appendix A6.

1.9.3.4 Data analysis

Raw data were available on 'sticky notes' and were grouped into themes during the round-robin process in the NGT. The resulting flip chart sheets with the clustered notes were photographed and collected.

The themes or identified items were rewritten on a flip chart sheet and coded with letters for the subsequent ranking vote, which asked participants to list the letters for the five most important items, assigning from 5 to 1 marks to them. Votes were counted for each item. The item with the highest marks was regarded as the most important one, with the others ranked according to the number of marks obtained.

In case relevant ideas had been mentioned in the group discussion without reflecting in the final results, the audio-recorded discussions were transcribed verbatim and reviewed to support clarification of the concepts and ideas as represented in the ranked lists on the flip charts at the end of the sessions. Fieldnotes taken by the researcher during the discussion process aided the identification and inclusion of such additional information.

In line with the concept of respondent validation (see Section 1.10.5 below), the results of the NGT (including possible combinations of ranked lists, if more than one group addressed the same questions) were made available to the participants for verification and comments.

It remains important to remember that this is qualitative or, at best, 'semi-quantitative' research, and that the classical quality concepts for quantitative research, such as reliability and validity, might not be appropriate. The data collected in this study, even though

numerical values might be assigned to them, first and foremost constitute ideas and concepts, i.e. qualitative data.

Results from this three-step NGT were written up for publication as Manuscript 4 (Chapter 5).

1.9.4 Phase IV: Framework development

A theoretical or conceptual framework typically brings domains or factors that interact in a field and influence an outcome into a certain structure. This structure describes the relative importance or position of these factors, as well as their potential interaction and mutual influence.

Numerous frameworks have been developed and published in the field of education. Examples of such frameworks address the competencies of medical doctors (Frank *et al.*, 2015), the development of cultural competence in undergraduate nursing education (Garneau, 2016), diversity and inclusion in medical education (Nivet, Castillo-Page & Schoolcraft Conrad, 2016), sustainability in academic programme development (Wiek, Withycombe & Redman, 2011), teaching competencies in higher education (Tigelaar, Dolmans, Wolfhagen *et al.*, 2004) and the design of group learning activities in higher education (De Hei, Strijbos, Sjoer *et al.*, 2016). The methodology applied in the process of framework creation is described in the papers as typically including literature reviews, theoretical reflections, action research and the Delphi technique.

In this study, the framework was constructed using factors identified from both the literature and factors identified during the empirical data collection (in-depth interviews and NGTs) and was written up as Manuscript 5 (Chapter 6).

1.10 QUALITY IN QUALITATIVE RESEARCH

The main consensus amongst authors on quality in qualitative research seems to be that it is not appropriate to uncritically take over the concepts of validity, reliability, objectivity or generalisability (Guba, 1981; Mays & Pope, 2000; Golafshani, 2003; Henning *et al.*, 2004; Steinke, 2004). These concepts originated in a quantitative context and were developed against the background of quantitative research approaches, epistemology and methodologies. However, most authors also agree that some criteria for quality are needed

for qualitative research, and different sets of such criteria have been presented. Guba suggests replacing each of the four terms from quantitative research by a new term covering a comparable aspect (credibility, transferability, dependability and confirmability) (Guba, 1981: 80). Mays and Pope (2000: 51) consider an approach of subtle realism, which would allow the use of the concepts of validity and reliability in an adjusted manner, as does Golafshani (2003: 601), while Henning *et al.* (2004: 146ff) discuss main concepts, such as "good craftsmanship" all under validity. Steinke lists a number of core criteria for quality, such as *intersubjektive Nachvollziehbarkeit*, *Indikation des Forschungsprozesses,* and *Empirische Verankerung* (2004: 324ff). The following sections will address quality aspects in detail.

1.10.1 Craftsmanship

Henning *et al.* (2004: 146ff) present good craftsmanship as a central pillar in their discussion of validity, and quote Steinar Kvale: "Validation depends on good craftsmanship in an investigation, which includes continually checking, questioning, and theoretically interpreting the findings". The competence of the researcher ensures that the right methodology is applied in the correct manner, and the interpretation is done thoroughly. For Henning *et al.* craftsmanship requires precision, care and accountability. This overlaps with Steinke's "indication of the research process", when she asks whether the choice of methods and the procedural decisions were justified (Steinke, 2004: 326f). These considerations come closest to validity in the quantitative paradigm.

1.10.2 Communication/traceability

Henning *et al.* demand "open communication throughout the research process" (2004: 151). While quantitative research should, in principle, be reproducible through repetition of the investigation under similar conditions (reliability), this is not the case for qualitative research. Instead, one should expect to be able to follow the course of the research on the track of the researcher (*Intersubjektive Nachvollziehbarkeit* , or intersubjective traceability (Steinke, 2004: 324)). This can be achieved through conscious documentation of the iterative steps and processes during data analysis.

1.10.3 Triangulation

Triangulation refers to the idea to use more than one independent method or set to describe the same phenomenon. The term is borrowed from geometric and geographic concepts. In the qualitative field, this approach might encounter difficulties, as the different methods might be specific for different types of data or research questions, and, thus, using a second method might not be appropriate for the issue under investigation (Flick, 2004: 316f). However, in this project, the complementarity of documentary evidence from the literature search and the different undergraduate medical programmes, and detailed information from in-depth interviews, served as an example of triangulation. In the same sense, themes from the discussions at the other medical schools might emerge in the local context, again casting light on the same matter from a different 'triangulating' angle.

1.10.4 Reflexivity

The researcher is the central 'research tool' in qualitative research. Separate from the researcher, qualitative research is impossible. However, to reduce the potential for subjective bias brought in by the individual, it is emphasised that researchers must be aware and cautious about their role in the process of data collection and interpretation (Mays & Pope, 2000: 51; Steinke, 2004: 330). Due to time and resource constraints, it was not possible to have the coding of the in-depth interviews performed by two independent people, and the researcher, therefore, had to be thorough in ensuring that identified themes and categories were supported in the content and context, and had not been introduced as external structures by the coding process.

1.10.5 Respondent validation

In a further attempt to reduce the bias brought in by the researcher, the results of the analysis of the research data (e.g. of an interview) can be presented back to the people the data were collected from (e.g. interviewees), to confirm that they agreed with the processed results (Mays & Pope, 2000: 51). In this study, respondent validation was applied in both empirical qualitative methods. Transcripts of the in-depth interviews were sent to the interviewees after editing by the researcher, to verify the authenticity of the transcribed content and to clarify terms and names that might have been misconstrued. At a later stage in the process of analysing the in-depth interviews, the drafted report, together with a list

of the codes and information on which codes occurred at which frequency in the respective interview, were communicated with the interviewees. Feedback and comments received were used to review the manuscript, and resulted in certain categories being revised and amended. In the NGT, the process of identifying and refining themes and items in the group itself constituted a process of validation by the group. The subsequent voting to rank the identified themes contributed further to de-emphasising irrelevant outliers and emphasising relevant key aspects. Further reflection on the matters by additional stakeholders through the staged approach with subsequent discussions around the findings from previous sessions, strengthened this aspect further.

1.11 ETHICAL CONSIDERATIONS

1.11.1 Approval

Approval for the overall research proposal was obtained from the UFS Health Sciences Research Ethics Committee, with the ethical clearance number UFS-HSD2017/1547/2801. Permission to conduct the study was requested from and granted by the dean of the Faculty of Health Sciences at the UFS, as well as the vice rector, Academic, at the UFS (appendices B1.1-1.5).

Heads of academic departments in the School of Clinical Medicine at the UFS were contacted in their academic roles and as potential interview subjects, and the module coordinators in those departments were informed via their workgroup.

For the in-depth interviews at the other medical schools in South Africa, approval was sought and obtained from the respective ethics committees and authorities of each of the seven academic institutions, as required. Letters regarding ethics approval and communications confirming institutional permission are attached as appendices (Appendices B2-B9).

1.11.2 Informed consent

Everybody involved as contributor in the data collection – academic managers in the in-depth interviews and medical interns, academic clinicians and other academic staff in the

nominal groups – was asked to sign an informed consent form before the data collection started.

An information leaflet and consent form containing a brief but comprehensive description of the research project, its objectives, the data collection and analysis process and describing what was expected of the participants was handed to each participant (Appendices A1-A4).

The participants were informed explicitly:

- That the interviews would be audio-recorded and that additional field notes would be taken;
- That they had the right to withdraw from the interview process at any time. However, once a participant had taken part in a nominal group discussion, it would only be possible to exclude specific statements from the data analysis, while the complete withdrawal of a participant's contribution was not possible, due to the interaction with the other participants; and
- That no clear names would be used in the data analysis, however, descriptors of roles and functions might be linked to the statements (e.g. module coordinator, teaching and learning coordinator or consultant in the department of …), so that full anonymity cannot be guaranteed.

This applied to all empirical methods of data collection that were used, namely, the individual in-depth interviews and the NGT.

1.11.3 Right to privacy

For obvious logistical reasons, participants in the in-depth interviews and in the nominal groups are known by name to the researcher, as the interviews needed to be organised. The participants signed informed consent with their full names. However, the identity of speakers during the interviews was coded, and no quotes or statements are linked to an individual interviewee in the research report or publications. However, it needs to be understood that the position of the interviewee plays an important role in the interpretation and contextualisation of statements for the purpose of thick descriptions. It would, therefore, from a methodological point of view, have been counterproductive to avoid giving at least partial descriptions, such as module leader in a surgical discipline, or academic

programme manager. Care was taken to avoid using unique identifiers in this regard, but it might not always be possible to ensure confidentiality, since certain individuals might be identifiable by details given on their roles and the comments they expressed.

1.11.4 Anticipated risks

There were no physical risks anticipated from this research. Some of the participants might be concerned about their statements or opinions being linked to them in public. This could, at least theoretically, result in career disadvantages or other forms of victimisation. This risk was minimised by the measures to maintain confidentiality and, thus, to protect the individual participant's privacy. However, given the circumstances, namely, that specific details in the description of situations and opinions might be unique enough to enable the identification of individuals or institutions, complete confidentiality or even anonymity cannot be guaranteed.

The risk of participants becoming offended by being linked to statements or interpretations that they do not share was minimised through participant validation measures to ensure trustworthiness, as described above.

1.12 SCOPE OF THE STUDY

This study was registered in the field of health professions education and lies in the domain of academic programme development and management. The study is interdisciplinary, as it reaches across between health professions education, academic management and clinical (emergency) medicine.

This study identified essential outcomes and competencies, and provides a framework how to achieve these, based on information from academic managers and clinicians at South African medical schools.

1.13 BACKGROUND AND MOTIVATION OF THE RESEARCHER

The researcher is a trained medical doctor with postgraduate qualifications in family medicine, public health and bioethics. He is employed jointly by the Free State Department of Health and the UFS. In this position, he is responsible for clinical service delivery at the emergency centre of the district hospital in Bloemfontein (National District Hospital), where

he works as a clinical consultant overseeing the delivery of emergency care and the in-service training of staff.

At the UFS, he coordinates the emergency care part of the clinical skills module for undergraduate medical students. This module is taught during the fifth semester of the undergraduate medical programme, i.e. at the beginning of the students' clinical training. During the fifth and final year, he is involved in the teaching ward rounds at the emergency department of the hospital, and organises the basic life support courses and defibrillator skills training for this group of students.

Over the last few years, he has established a training centre for basic and advanced resuscitation courses at the simulation unit of the UFS, where he teaches instructor (train-the-trainer) and other classes.

He has a strong interest in (health) education matters and has been involved in under- and postgraduate teaching for more than 10 years. At the UFS, he has been part of the team that established a new community-based training platform.

Facilitating the skills acquisition of future clinicians, with a focus on generalist skills for a rural or underserviced context, is one of his greatest motivations in academic medicine.

1.14 SCHEMATIC OVERVIEW OF THE STUDY

Figure 1.8 provides a schematic overview of the study.

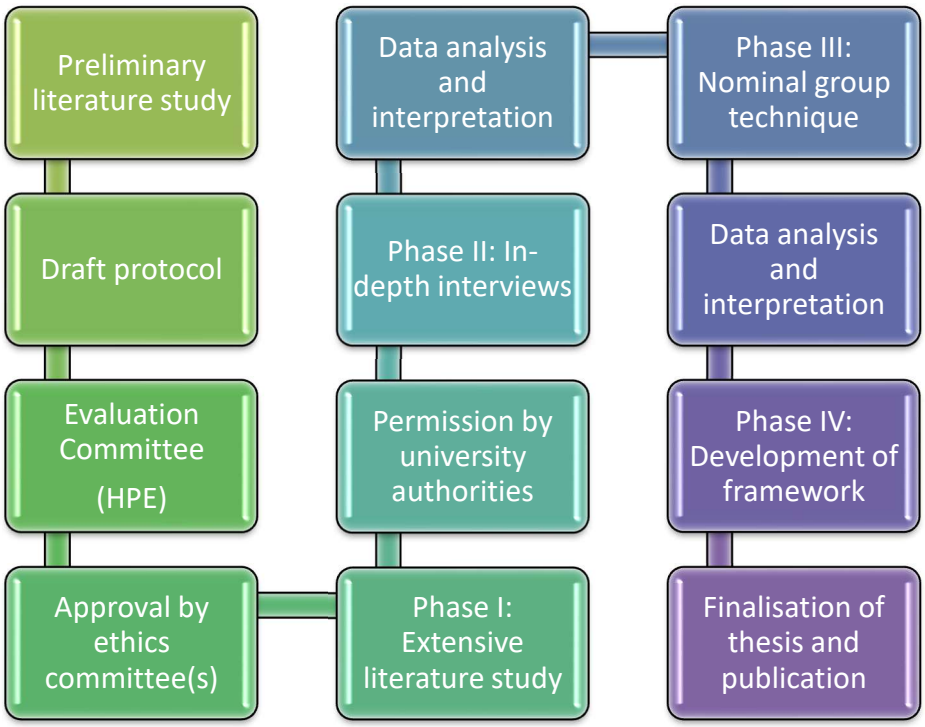

Figure 1.8: Overview of the study

1.15 ARRANGEMENT OF THE THESIS

This thesis was conceptualised and written in accordance with the requirements of the UFS and, more specifically, the PhD in Health Professions Education.

Chapter 1 provided an orientation to the study. An introduction to the research was followed by an overview of basic concepts that inform the study, covering emergency medicine, educational concepts, a basic introduction to the field of health professions education and undergraduate medical education in South Africa.

Following the problem statement, the research study's aim, research question and objectives were introduced, and the chosen methodology was discussed. Each of the methods applied in this study (literature review, in-depth interviews, NGT and the development of a framework) were discussed, followed by considerations regarding the quality of the research process and ethical aspects. Aspects of dissemination of the results and the layout of the thesis concluded this chapter.

Each of the next five chapters will present a publishable manuscript edited for submission to the particular journal specified in the chapter.

Chapter 2 comprises the manuscript, *Emergency care training for undergraduate medical students: A rapid review of regulations and recommendations from a South African perspective*, which was prepared for and submitted to the *African Journal of Emergency Medicine*. Its methodology is based on a targeted, 'rapid' review of national and international regulations from statutory authorities governing undergraduate medical training in their respective geographic areas. Online resources identified through a database of governing bodies were searched for outcomes relating to emergency care training. For the South African setting, exit-level outcomes of undergraduate medical programmes available online from the national regulator of academic programmes were reviewed for such outcomes. Recommendations for undergraduate curricula of professional societies in the field of emergency medicine complement these data. The researcher and promoter are the authors of the manuscript.

Chapter 3, *Undergraduate medical education on the management of emergencies: A review of literature published 2009–2019*, will present the results of an extensive literature scoping review covering the previous decade. The manuscript was prepared according to the submission guidelines for *AEM (Academic Emergency Medicine) Education and Training*. A systematic search was conducted using EbscoHost (databases Medline, Africawide, Academic Search Ultimate and ERIC) and Web of Science (Medline only) and the search term "("medical student"* or (medical and undergraduate*)) and emergency and (training or curriculum)". Abstracts of identified titles were reviewed against inclusion and exclusion criteria. Full texts for 480 relevant publications were included in the data analysis. Publications' topics were coded for themes and categories, and the publications were further categorised by country of origin and type of study. Results are presented according to themes of *For what?* (teaching goals), *What?* (content), *How?* (current approaches and teaching methods), *When?* and *Where?* (timing and location of the training) and *Who?* (educators and their skills development). The researcher, the promoter and previous co-promoter are the authors of the manuscript.

Chapter 4, the manuscript, *'Integration, integration, integration in the sense that we see: Patients don't read the textbooks' - Views on undergraduate medical emergency care education from South African Medical Schools* presents the findings of the in-depth interviews conducted with key informants at the eight South African medical schools. The manuscript was drafted according to the submission guidelines of *Medical Teacher*. Audio-

recorded interviews were transcribed and coded to analyse the wealth of material for themes and categories. Major themes presented in the paper are *Curriculum and educational science*, *Content and methods*, and *Reality of teaching*. The researcher and promoter are the authors of the manuscript.

Chapter 5, *Assign specific roles to students to avoid them being 'not serious'! A nominal-group-technique review of undergraduate medical students' training in emergency care, based on experiences of recent graduates,* contains the manuscript formatted for submission to the *African Journal of Health Professions Education* and presents the results of the second empirical method, the nominal group technique. Recent graduates in their internship years at the time of the study contributed feedback on the strengths of the existing undergraduate training on emergency care at UFS and provided suggestions for improvement. Clinical educators reflected on these suggestions and presented ideas for improving the teaching with existing resources, and what further resources might be needed. The researcher and promoter are the authors of the manuscript.

Chapter 6 contains the manuscript, *A Framework for South African undergraduate medical education in emergency care*, which was prepared for submission to the journal, *Higher Education.* In this manuscript, the findings of the previous phases of the study, as presented in the preceding four chapters, are consolidated into a framework. The three major components of this 'ecosystem of medical education' are evidence-based clinical practice, best current education practice, and institutional culture. Factors contributing to these components and their mutual interconnectedness will be discussed. A section with tools for improving management of this complex system will conclude the discussion. The researcher and promoter are the authors of the manuscript.

Chapter 7 will present the conclusions drawn from this research study in response to the research question and objectives outlined in Sections 1.6–1.7. To this end, a brief overview of the findings of the study will be followed by a step-by-step discussion of the objectives. Implications and limitations of the study will be discussed.

1.16 PUBLICATION AND DISSEMINATION PLAN

Results and findings of the study were written up and formatted as publishable articles, in keeping with the requirements of a PhD in health professions education, and were combined

for submission to the Faculty of Health Sciences in dissertation format, as outlined in Section 1.15. This dissertation contains a framework to guide the education process for undergraduate medical training at the UFS.

Submission to journals will be done in a phased manner in order to be able to reference the first two manuscripts as published review articles in the other three manuscripts.

Findings of this study will be presented at appropriate platforms at the university, such as the faculty research forum, phase 3 (clinical phase) committee meeting, and workshops or retreats on the curriculum for undergraduate training.

Findings of this study will be presented at appropriate academic conferences as oral paper presentations or posters, e.g. at the South African Association of Health Educationalists (SAAHE) or Emergency Medicine Society of South Africa (EMSSA) conferences.

CHAPTER 2 - MANUSCRIPT 1

THE REGULATORY FRAMEWORK AND BEST PRACTICE RECOMMENDATIONS FOR THE TEACHING OF EMERGENCY CARE SKILLS IN THE UNDERGRADUATE MEDICAL PROGRAMME IN SOUTH AFRICA

This manuscript was prepared for journal submission as detailed below:

Submission guidelines used	African Journal of Emergency Medicine
Attached as	Appendix D1
Title for submission	The regulatory framework and best practice recommendations for the teaching of emergency care skills in the undergraduate medical programme in South Africa
Short title	Rapid review regulations EC training medical undergraduates
Submission date	12 November 2020 (Appendix D1.1)

Type of contribution: Review article

Title of the article

Emergency care training for undergraduate medical students: A rapid review of regulations and recommendations from a South African perspective

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Word count: 219 (abstract); 3 039 (text, excluding tables, figures and references)
Table count: 1; Figure count: 0

Abstract

Introduction: Emergency care skills are an important part of the skills set of medical graduates and need to be acquired during the academic training. As such, they are regulated by statutory bodies and guided by national and international recommendations.

Methods: To provide background information for a research project on undergraduate emergency care training in South Africa, a rapid review based on a targeted internet search was performed to identify relevant guidance documents from national regulators of medical education and professional organisations.

Results: An in-depth review of the South African regulatory context is contrasted with national regulations from the United Kingdom, the European Union, Germany, Australia, Canada, the United States of America and Nigeria. These documents demonstrate a wide variability in the way emergency skills training is required in medical education in those countries. Recommendation by professional organisations provide valuable guidance on curricular content.

Key recommendations: The absence of an explicit focus on emergency care in the South African regulations for undergraduate medical training is in contrast to the practice in many other jurisdictions, and results in only one of eight medical programs in the country having included emergency care skills in the exit level outcomes. National regulations should address this field to ensure that the necessary competencies are included in programme outcomes and covered in curricula for medical training.

Keywords: Curriculum, undergraduate medicine, emergency medicine, education

African relevance

- Competence in managing clinical emergencies is essential for all medical practitioners, but the more so in resource constraint and rural environments
- Health systems, population structure and pathologies in Africa differ significantly from those in other parts of the world, resulting in different types of clinical emergencies (e.g. obstetrics and malnourishment) and different challenges when managing such emergencies
- Best practice examples from European and North American organisations might provide good general guidance, but examples from other low- and middle-income countries with comparable social and geographical challenges certainly need to complement the models

Emergency care training for undergraduate medical students: A rapid review of regulations and recommendations from a South African perspective

Background: Emergency care training in undergraduate medical programmes[1]

Training of future medical practitioners needs to convey a wide range of abilities. Classical clinical skills such as taking a history, performing a clinical examination, ordering and interpreting tests or formulating a management plan, are nowadays complemented by 'soft' (or 'non-technical') skills such as dealing with cultural diversity, respecting patient autonomy or working collaboratively with other health professions. These educational goals are described in a variety of formats, from Bloom's well-known taxonomy [1], which uses the three categories of knowledge (cognitive), practical skills (psychomotor) and attitude (affective) outcomes, to Miller's pyramid of clinical competence and its modifications [2,3]. Competency-based medical education sets the benchmark of a 'competent' clinician through the assessment of competences or 'entrustable professional activities' and is scaffolded along milestones.

A particularly challenging situation for any health professional, but the more so for the novice, is facing a dire clinical emergency, which typically comes with the threat of losing 'life or limb'. Managing emergencies requires cognitive direction in the form of algorithms ('a structured approach to …') as well as specific psychomotor skills such as airway management. Emergency scenarios usually require goal-orientated decision-making under serious time constraints and stressful conditions.

Aim

Approaching from a South African medical education perspective, this article aims to provide an overview of relevant regulations in the local and international context as well as recommendations from professional bodies and clinical societies regarding the training of undergraduate medical students in managing emergencies. This article is based on a targeted online search, which departed from the international register of statutory medical bodies [4] and document analysis of the regulations retrieved from the webpages of these bodies,

[1] NQF = National Qualifications Framework; SQAQ = South African Qualifications Authority; GMS = General Medical Council; NKLM = Nationaler kompetenzbasierter Lernzielkatalog Medizin; LCME = Liaison Committee on Medical Education; AAMC = American Association of Medical Colleges; EPA = entrustable professional activities

complemented by findings from a structured literature search performed as part of a doctoral research project.

Regulatory framework by national and supranational statutory bodies

In the following section, existing regulatory documentation from a number of bodies with oversight functions over undergraduate medical education is analysed for guidance on the training for emergencies. The current situation for South Africa is described in depth. An overview over the different international documents is given in Table 2.1.

Table 2.1: Comparison of regulatory framework by national and supranational statutory bodies for undergraduate emergency care (EC) training

Country/ Organis-ation	Issuing body	Document	Type of outcomes	EC topic	Details of emergency care outcomes	Ref(s)
South Africa	Minister of Health	Regulations	Graduate attributes: Skills Knowledge Attitudes	no	N/A	[6]
United Kingdom	General Medical Council (Statutory authority)	Standards for medical education	Graduate attributes: Skills Knowledge Attitudes	yes	The newly qualified doctors must be able to: • give immediate care to adults, children and young people in medical and psychiatric emergencies (Outcome 16) • recognise when a patient is deteriorating and take appropriate action (Outcome 17) This includes to: • assess the severity, • diagnose and manage acute medical and psychiatric emergencies, • provide immediate life support and • provide cardiopulmonary resuscitation	[21]
European Union	Academic committee	Recommendations	Competences	yes	Level 1: provide immediate care of medical emergencies, including First Aid and resuscitation Level 2: recognise, assess and treat acute medical emergencies, provide basic first aid, basic life support and cardiopulmonary resuscitation (CPR), advanced life support and trauma care according to current European guidelines	[23,24]
Germany	Council of Medical Faculties	Consensus	Competences	yes	• Out-of-hospital care, medico-legal aspects, in-hospital care and disaster medicine, monitoring, diagnosing and non-technical skills, basic and advanced life support, airway and trauma management, emergency drugs and anaesthesia, paediatric and mental health emergencies • Presentations to be able to assess: reduced level of consciousness, neurological deficits, shortness of breath, chest pain, bleeding, shock, abdominal pain, cardiac dysrhythmias, psychiatric disorders, colic pains, fever, headache and oncological emergencies	[26]
Australia	Australian Medical Council (Statutory authority)	Accreditation standards for medical education		yes	• Recognise and assess deteriorating and critically unwell who require immediate care • Perform a common emergency and life support procedures, including caring for the unconscious patient and performing CPR	[27]
Canada	Commission on Accreditation of	Accreditation standards for medical education	Administrative standards	no	N/A	[30]

Country/ Organis-ation	Issuing body	Document	Type of outcomes	EC topic	Details of emergency care outcomes	Ref(s)
	Canadian Medical Schools					
	Royal College of Physicians and Surgeons of Canada	Physician Competency Framework CanMEDS	Competences	no	N/A	[28]
USA	Liaison Committee on Medical Education	Accreditation standards for medical education	Administrative standards	no	N/A	[31]
	American Association of Medical Colleges	Guide on program outcomes	Competences	yes	• Ability to recognise patients with immediately life threatening cardiac, pulmonary, or neurological conditions regardless of aetiology, and to institute appropriate initial therapy • Ability to recognise and outline an initial course of management for patients with serious conditions requiring critical care	[32]
		Recommendations for skills curricula	Skills	yes	ECG, basic CPR, defibrillation, advanced cardiac life support, burn management, simple joint dislocation reduction, basic airway management, assessment of suicidal risk	[33]
		Guide on core entrustable professional activities	Entrustable professional activities (EPAs)	yes	Recognise a patient requiring urgent or emergent care and initiate evaluation and management Examples: chest pain, mental status changes, shortness of breath and hypoxemia, fever, hypotension and hypertension, tachycardia and arrhythmias, oliguria, anuria, urinary retention, electrolyte abnormalities and hypo-/ hyperglycaemia	[34,35]
Nigeria	Nigerian Medical and Dental Council (Statutory authority)	Guideline on Standards for medical education	Administrative standards and competences (with detailed curricular content)	yes	Internal medicine: CPR proficiency, ability to manage medical emergency cases involving any body system including coma, hyperpyrexia, cerebral seizures, shock, sickle cell crises, ischaemic heart disease, pulmonary embolism, pneumothorax, bleeding disorder, acute thrombosis, hypertension, myocardial infarction, cardiac failure, massive haemorrhage, severe anaemia, fulminating infection, tetanus, anaphylaxis and erythroderma Surgery: acquisition of appropriate skill to act objectively in emergency situations, which includes trauma management. Obstetrics: Ectopic pregnancies, peripartum haemorrhages and hypertensive disorders in pregnancy are mentioned Mental health: psychiatric emergencies	[36]

South Africa

Medical education in South Africa is regulated mainly by two national government departments through the legislation and regulations they promulgate, namely the Department of Health and the Department of Higher Education and Training. Training requirements as pre-requisites for the registration as medical practitioner in South Africa are defined under the Health Professions Act [5], and are spelled out in detail in the regulations relating to the registration of students, undergraduate curricula and professional examinations in medicine [6]. Updated in 2009, these regulations follow a Bloomian structure in listing knowledge outcomes (section 4(4)), skills outcomes (section 4(5)) and values and attitudes outcomes (section 4(6)). While these regulations cover the common concepts of foundations in medical knowledge (normal function, pathophysiology - s4(4)(a)&(b)) and consultations skills (history, clinical examination, diagnosis, management plan – s4(5)(a)(I)-(IV)), and add important aspects such as health promotion and prevention (s4(3)(b)), communication skills (s4(5)(d)), leadership skills and multidisciplinary team[s] (s4(5)(f)), emphasising the importance of community health, primary health care and community oriented care (s4(6)(a)&(b)), nowhere in the document is any specific focus on the care for hyperacute and emergency cases. The closest the regulations come to covering essential emergency skills is to mention 'skill in basic medical procedures' (s4(5)(b)) and the mandate for students to develop their clinical skills by using skills, laboratories, simulated patients, models for practical procedures and ultimately patients, while proficiency in skills shall be rigorously assessed (s6(2)).

The Department of Higher Education and Training oversees the higher education sector in South Africa. Academic programmes are accredited by the Council on Higher Education, established by the Higher Education Act [7] and functioning as the 'Quality Council' for higher education as per section 25 of the National Qualifications Framework (NQF) Act [8]. Accredited programmes are registered with the South African Qualifications Authority (SAQA), which was created under the SAQA Act in 1995 [9] and confirmed by the NQF Act in 2008. Registered qualifications are searchable [10], and the search for the term 'medical' and [≥] 4-year national first qualifications on the NQF level 8 of 'professional degrees' revealed a total of nine programmes [11–20], with eight of them listed as currently accredited. The available documentation for these programmes contains exit level outcomes, which naturally have to talk to the curricular guidance found in the above mentioned regulations from the Minister of Health as to enable the graduates of such programmes to

register as medical professionals in South Africa. In keeping with the content of these regulations, only one (University of Cape Town) of the eight medical programmes mentions the handling of medical emergencies: ‘The learner will: (…) recognise acute life-threatening emergencies and initiate appropriate treatment or refer’ [11].

United Kingdom

When looking at the emergency care training on an international level, the General Medical Council (GMC) in the United Kingdom, as statutory registration authority for medical practitioners, the equivalent of the Health Professions Council of South Africa, with the authority to direct training for the profession has updated its outcomes for graduates, previously known as ‘Tomorrow’s doctors’ in 2018 [21]. This document lists outcomes in Bloom’s three categories for professional values and behaviours, professional skills and professional knowledge, covering a wide range of clinical and interpersonal abilities. Under the ‘skills’ section, outcomes 16 and 17 speak explicitly to the management of emergencies. [21]. The section on values and behaviours interestingly includes an outcome ‘Dealing with complexity and uncertainty’ regarding diagnosis and treatment outcome, a matter of particular importance in the emergency context [21]. The GMC outcomes document is complemented by a ‘Practical skills and procedures’ supplement published in 2019, which maps the psychomotor skills medical graduates need to display on three competence levels [22]. While the GMC lists the assessment of vital signs, venous and arterial blood sampling, ECG and application of injections, infusions and supplementary oxygen, it is eerily quiet on matters such as airway management, chest compressions or the use of a defibrillator.

European Union

Within the European Union, the mutual recognition of professional qualifications and the movement towards a harmonisation of academic training known as the ‘Bologna process’ motivated a consensus project on outcomes for academic programmes known as ‘Tuning Project’. The resultant document for medicine [23,24] lists a set of twelve level 1 competencies, one of which reads as ‘provide immediate care of medical emergencies, including First Aid and resuscitation’, which is detailed by level 2 competencies. A separate level 1 competency is to ‘carry out practical procedures’.

Germany

In Germany, the regulations regarding registration as medical practitioner ('Approbationsordnung für Ärzte') only mentions the requirement for first aid training (§1(2)2/§5) and that the prescribed modules in which credits need to be earned include emergency medicine (§27(1)), however, as emergency medicine is not an independent speciality in Germany, this is listed as a 'Querschnittsbereich' ('transversal area') [25]. A national catalogue of competence-based outcomes (Nationaler kompetenzbasierter Lernzielkatalog Medizin - NKLM) published by the German medical faculties, at 346 pages ten-times as voluminous as the GMC document, has a full chapter of seven pages on 'Notfallmassnahmen' (Emergency measures) [26].

Australia

The Australian Medical Council provides a list of outcomes in its 2012 guidance document for primary medical programmes, organised in the four domains of science and scholarship, clinical practice, health and society, and professionalism and leadership. Recognition and management of emergencies are explicitly listed under the clinical practice outcomes [27].

Canada

The Canadian Physician Competency Framework CanMEDS by the Royal College of Physicians and Surgeons of Canada, a trendsetter in the field of medical competence frameworks, originally was targeting postgraduate specialist training but has since been widely adopted and adapted for primary medical training. In the latest 2015 revision, the 'medical expert' as the central of the seven roles, besides communicator, collaborator, leader, health advocate, scholar and professional, lists 'Plan and perform procedures and therapies for the purpose of assessment and/or management' as one of the 'medical expert's' key competencies, and this includes the enabling competence to prioritise a procedure or therapy, taking into account clinical urgency and available resources [28]. It does, however, not explicitly refer to the management of emergencies as a specific competence. Based on the earlier 2005 CanMEDS version, a Delphi study among Canadian Academic Emergency Medicine educators determined a core competency list to be achieved during the emergency medicine clerkships. Following the structure of the seven CanMEDS roles, competences under the 'medical expert' role, which constitute the majority of the 62 competencies, were divided into general skills (mainly the recognition and prioritisation of urgency), presenting problems skills ('an approach to …'), technical skills performed and technical skills

interpretation [29]. For the formal accreditation of a medical school, the respective Canadian committee issues revised standards every year, but much like its counterpart in the United State of America, these do not detail specific clinical content [30].

United State of America

For the whole of North America, the Liaison Committee on Medical Education (LCME) provides the accreditation of primary medical (MD) programmes. The LCME standards for MD programmes address more technical educational aspects and provide only minimal guidance with regards to content. One of the 12 standards, Standard 6 requires the medical schools to define the competencies and outcomes for knowledge, skills, behaviour and attitudes and to design the programme accordingly. Standard 7: 'Curricular content' lists a number of areas, from biomedical to behavioural and societal, and includes references to preventive, acute, chronic, rehabilitative, and end-of-life care, but gives no further details [31]. Such details are however provided by one of the mother bodies of the LCME, the American Association of Medical Colleges (AAMC). A guide on the learning objectives for Medical Student Education published in 1998 includes the recognition and initial management of critically ill patients [32]. This was complemented in 2005 by recommendations for clinical skills curricula, which list skills according to physiological systems, owing to the contributions made by many different specialist disciplines [33]. In keeping with recent developments, 2014 saw a publication on 'Core Entrustable Professional Activities' by the AAMC, which includes EPA 10: Recognize a patient requiring urgent or emergent care and initiate evaluation and management [34,35].

Nigeria

As another example from the African continent, the Nigerian Medical and Dental Council's minimum standards for medical education give a very detailed breakdown to the level of syllabi for individual clinical disciplines. Due to this structure and in the absence of emergency medicine as independent discipline, the document shows the hands of many different contributors, and emergency-related outcomes are found under the different disciplines [36].

Recommendations by clinical societies

But not only registration authorities and academic councils have a say on the training of undergraduate students in emergency care. Clinical societies and specialist associations, especially those representing Emergency Medicine and the Emergency Physicians, contribute to this field. The American College of Emergency Physicians has 'Guidelines for Undergraduate Education in Emergency Medicine' on their webpage. According to the document itself, its first version was adopted in 1986, and on one page it emphasises the importance of training medical students to identify and manage urgent cases. While it lists the options to either have emergency medicine teachers designing a specific curriculum or to include key topics of emergency medicine into an existing curriculum, it suggests that six general educational objectives need to be achieved by all medical graduates, namely general assessment skills for the undifferentiated patient, recognition and stabilisation of life threatening illnesses, injury prevention and disease identification, unique content areas, management of the healthcare system, and basic procedural competency [37].

To provide a guide on the inclusion of emergency medicine topics in undergraduate medical training internationally, the International Federation for Emergency Medicine in 2009 published a 'model curriculum' based on a committee consensus [38]. True to its mandate, this curriculum is fairly non-specific in its approach as to allow adoption in undergraduate medical programmes of different structure. Part of its mission statement is that every graduating medical student should be able to provide care in an emergency situation, and certain generic professional competencies are listed as fundamentals, such as basic science, clinical examination, diagnosing and managing, basic procedural skills, prioritisation, systems understanding and multidisciplinary work as well as an awareness of own limitations. Learning objectives for emergency medicine include the recognition of critically ill patients, diagnosing and managing common acute problems and stabilising shocked patients, a comprehensive assessment of the undifferentiated patient, proficiency in basic emergency clinical skills such as airway management, vascular access, CPR and AED use, trauma management principles and wound care. The model curriculum gives a more detailed example for one learning outcome to show how the actual curriculum could be structured in 'spiralling' over the years of studies. It closes with speciality-specific outcomes in 37 sections, mainly covering the different physiological and anatomical systems.

South African organisations in the field of emergency care training such as the Emergency Medicine Society of South Africa or the Resuscitation Council of Southern Africa do not provide specific guidance regarding undergraduate medical training in the field, although the above mentioned model curriculum was re-published in the African Journal of Emergency Medicine on behalf of the Africa Federation for Emergency Medicine [39]. The College of Emergency Medicine as part of the Colleges of Medicine of South Africa only concerns itself with postgraduate training, starting at the level of a (postgraduate) Diploma in Primary Emergency Care.

Discussion

Among the statutory registration authorities guiding the training of future medical practitioners, the specific matter of identifying and managing emergency cases is not addressed consistently. In Europe (United Kingdom, Germany, European Union) and the United States there appears to be a greater tendency to include this specific focus, compared to other jurisdictions (South Africa, Canada). Due to the absence of such an outcome in the respective South African regulations, only one out of eight South Africa medical programmes explicitly mentions this competency in its exit level outcomes.

There is a wealth of work available on the skills and competencies required to competently manage medical emergencies. Educational goals have been defined in a range of formats from the broad EPAs of late over more or less detailed competency catalogues to lists of (more technical) skills.

A good guidance for more detailed specification of learning outcomes might be taken from the available textbooks in the field, such as ‘Rosen’s’ or - closer to home - the ‘AFEM Handbook of Acute and Emergency Care’ [40,41]. Introductory, general competencies such as ‘identifying an emergency’ are followed by sections that offer algorithmic approaches to basic live-threatening conditions (cardiocirculatory arrest, respiratory failure, shock) as well as to common presenting complaints/ cardinal symptoms such as ‘altered mental state’ or ‘abdominal pain’ and basic trauma management. This ‘scaffolding’ would be complemented by more specific descriptors of individual systems and disease entities on a lower, more detailed level. A list of essential clinical practical skills would further facilitate the operationalisation of the broader learning outcomes.

Limitations

As a rapid review of regulations, this paper discusses examples of regulatory approaches to the topics by a range of international bodies considered relevant for the South African context. It does not aim to be exhaustive and cannot evaluate the evidence and decision processes underlying the listed regulations.

Conclusion and Recommendations

Given the inherent high urgency of medical emergencies and the general expectation from a registered medical practitioner to competently intervene in such a case, it might be necessary to explicitly list the ability to handle emergencies in the national regulations on undergraduate medical training. This would be on a high level of generalisation, e.g. as EPA or competency (depending on the format of the document) to ‘identify and manage common emergencies’.

This should resonate on the academic programme level through the inclusion of such competencies in the lists of exit level outcomes when the programmes are reviewed for accreditation. Within the specific curriculum of the individual academic medical programme, care should be taken that these outcomes are broken down into finer, more specific enabling competencies. Overall, these enabling competencies will have to include generic clinical and communication skills and more specific emergency care skills. The former will often be covered in the general programme (examination, consultation, prioritisation, hand-over, etc.), but some of the general competencies might be of particular

relevance in the emergency context, e.g. prioritisation or hand-over of patients. For the emergency care specific competencies, clear and explicit guidance should be given in sufficient detail to cover the more basic matters (identification of deterioration/ need for urgent care, management of cardio-circulatory and respiratory arrest, approach to the trauma patient, shock management), but also to spell out which common conditions the graduate needs to be able to handle. In this sense 'an approach to shortness of breath' or 'an approach to abdominal pain' e.g. will most likely be included without being contested, while 'an approach to vaginal bleeding in pregnancy' or 'an approach to snake bites' might be regarded as less important based on health systems factors (availability of obstetricians) or prevalence of emergencies (absence of poisonous snakes in the United Kingdom). To facilitate the educational process, a detailed list of skills to be acquired, both procedural and non-technical, is an essential tool. A thorough mapping of the educational setup with specific outcomes linked to learning opportunities during individual modules or rotations, taking into account the prevalence of certain conditions, will ensure optimal acquisition of competencies by the learner.

To serve as a benchmark in this process, a national consensus on emergency skills of medical graduates, possibly based on a Delphi project comparable to the one conducted for the emergency medicine clerkships in Canada, would be excellent [42].

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Authors' contributions

Authors contributed as follows to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: DTH contributed 80%, MJL contributed 20%. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

Conflict of Competing Interest

The authors declare no conflict of interest.

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CHAPTER 3 - MANUSCRIPT 2

UNDERGRADUATE MEDICAL EDUCATION ON THE MANAGEMENT OF EMERGENCIES: A REVIEW OF LITERATURE PUBLISHED 2009-2019

This manuscript was prepared for the journal as detailed below:

Submission guidelines used	AEM Education and Training
Attached as	Appendix D2
Title for submission	Undergraduate medical education on the management of emergencies: A review of literature published 2009-2019
Short title	Literature review undergraduate medical emergency care training
Submission date	not yet submitted

Undergraduate medical education on the management of emergencies:
A review of literature published 2009-2019

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Running title: Literature review undergraduate medical emergency care training

Abstract

Objectives: The objective was to identify and categorise journal publications from the last decade on the emergency care training of medical students.

Methods: Databases were searched using a search term, abstracts of identified papers were screened for inclusion and exclusion criteria and full texts retrieved. Relevant publications were identified by country of origin, type of educational study and topical themes.

Results: We identified 480 relevant publications from 52 countries. Most papers described educational interventions as case discussions (56), educational cohorts (141) or random-controlled studies (58). Surveys (118), consensus statements (21) and reviews (25) accounted for much of the remainder. While a wide range of topics were covered from curricula and educational methods to faculty development and clinical skills, ultrasound skills and simulation as training method stood out in number of publications.

Conclusions: There is a wealth of publications on undergraduate medical education on emergency care available. However, higher-level studies testing complex educational concepts are rare.

1. Introduction

Because physicians are expected to assist in clinical emergencies, undergraduate medical education has to ensure that graduates acquire these emergency care skills. As part of a research project in health professions education, a literature review was conducted to identify the scope of and pertinent matters related to undergraduate emergency care training. This paper will discuss undergraduate medical training for the management of medical emergencies in any context, whether in-patient or out-of-hospital, in general practice, in emergency departments, or emergencies specific to a clinical discipline.

2. Methodology

Given the wide scope of the review, a 'mapping' or 'scoping' approach was followed[1]. Scoping reviews are differentiated from systematic reviews by, among others, the lack of formal assessment of the strength and quality of the evidence[2,3]. This review involved a large number and diverse range of publications, which used different methodologies, thus, the review did not evaluate the evidence provided. The process of identification and selection of literature followed the PRISMA steps, but, as it is not a systematic review, not all the items of the PRISMA concept[4] are incorporated in the reporting.

The main aim of the review was to map scholarly knowledge related to undergraduate medical education on emergency care. Specific objectives for the review were mapping the

literature for geographic origin and methods, and identifying teaching goals and content ('For what' and 'What') of current approaches and teaching methods ('How'), of discussions about the timing and location of the training ('When' and 'Where'), and of best practices regarding the educators and their skills development ('Who').

A systematic search was conducted using EbscoHost (databases Medline, Africawide, Academic Search Ultimate and ERIC) and Web of Science (Medline only). After consultation with a librarian, the search term "("medical student"* or (medical and undergraduate*)) and emergency and (training or curriculum)" was used. Abstracts were assessed for relevance. Inclusion criteria were relevance to undergraduate medical education, availability of the full text in English, German, French or Dutch, and a publication date between 2009 and the review date in November 2019. Exclusion criteria were 'no abstract available' (Medline only), exclusive focus on other health professions (nursing, dentistry, paramedics), exclusive focus on other stages of medical training (internship, registrarship/recidency) and the unavailability of full text in the languages above. Papers covering both under- *and* postgraduate students, or students of medicine *and* of other health professions were, however, included, as were studies undertaken amongst recent graduates, if they explicitly addressed undergraduate training. Full texts were retrieved and imported into ATLAS.ti version 8.4 for thematic analysis. Papers were categorised by country of origin and methodology used, and inductive coding was used to categorise the topics[5].

3. Results

In total 1 631 publications were identified and, after removal of duplicates, 976 abstracts were screened for relevance. All but one of the 489 relevant full texts were obtained; text analysis excluded seven papers, with 480 papers finally included (Figure 3.1).

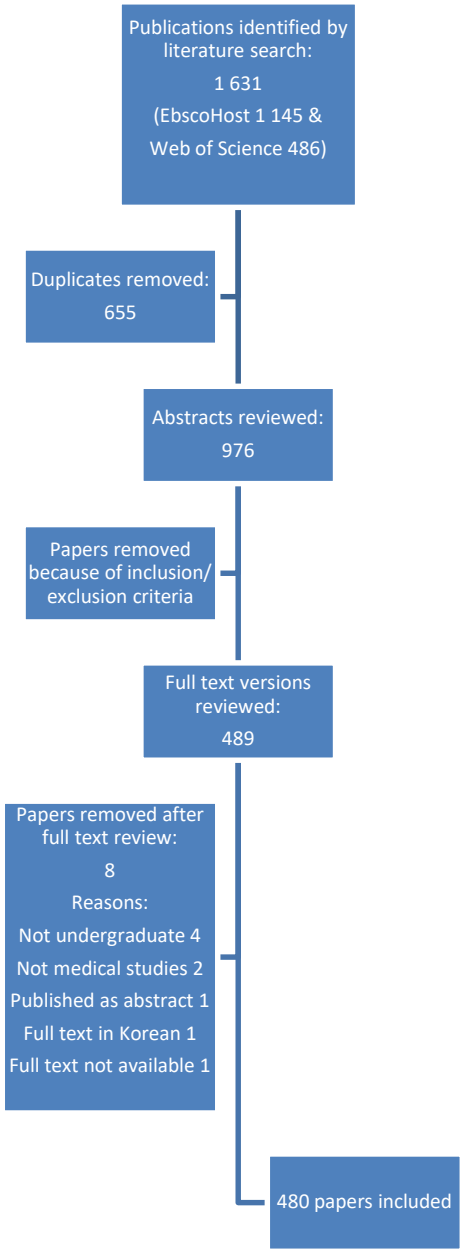

Figure 3.9: Selection of publications

In the following sections, these 480 papers will, first, be characterised by geographic origin and research methodology used in the paper. A detailed presentation by topic will follow the themes mentioned above: of educational goals ('For what'), content taught ('What'), teaching methods ('How'), location ('Where') and timing ('When') of the training, and the persons doing the teaching ('Who').

3.1 Descriptors of papers

3.1.1 Country of origin of the publications

Publications originated from 52 different countries; Table 3.1 provides a list of the countries.

Table 3.1: Countries of origin

Country of origin	Number of publications
United States of America	224
United Kingdom	43
Canada	32
Germany	31
Australia	16
'International'	10
India	8
Brazil, Turkey	7
France, Ireland, Malaysia, Switzerland	6
Iran	5
Italy, Japan, Netherlands, Pakistan, Saudi Arabia, Sweden	4
Belgium, Ethiopia, South Korea	3
Israel, Kenia, New Zealand, Norway, Poland, South Africa, Spain, Taiwan; Thailand; UAE	2
Austria; Botswana, Chile, China, Egypt, Finland, Ghana, Greece, Haiti, Jamaica, Lebanon, Portugal, Romania, Russia, Rwanda, Singapore, Sri Lanka, Syria, Tunisia, Zimbabwe	1

3.1.2 Methodologies in the papers

Most papers report on educational interventions in undergraduate medical education or on a diverse range of inventions, such as simulation models or assessment tools. Intervention studies describe either the introduction of educational processes, or of entire curricula, either with or without impact assessment. If assessed, this impact might be measured as educational achievement (e.g., pass rates), student satisfaction (often on a Likert scale), or even thematic analysis of qualitative data, such as student comments. Of the intervention studies, 56 were classified as educational 'case reports' (merely describing a development or intervention), 141 as cohort studies (one or more groups exposed to a certain intervention and assessed more than once) and 58 as random-controlled or quasi-experimental studies (comparing two or more groups that have been exposed 'randomly' to various interventions). A summary of the topics can be found in Table 3.2. A certain overlap exists between concepts such as educational 'case reports', cross-sectional surveys (assessments using structured questionnaires), educational 'cohort studies' or random-controlled (or quasi-experimental) studies. Among the observational (non-interventional) papers, 105 were categorised as cross-sectional, and a further 13 as retrospective surveys. Reviews were published in 25 papers, and consensus statements in 21 papers, often, but not always, following a Delphi process. Four papers present modelling of certain concepts. Of the studies using mainly qualitative methods, seven used interviews and three mixed

methods, with an additional four papers reporting on thematic analysis of other qualitative material. Reflections on topics and developments are presented in 15 papers.

Table 3.2: Topics of interventional papers

Topic area	Topic	Case study	Cohort	RCT or quasi-experimental
Psychomotor skills	BLS/CPR training	6–8	9	10–16
	Advanced life support	17	18–22	23–25
	Airway skills		26	27,28
	Ultrasound	29–34	35–61	62–68
	Diagnostic skills		69,70	
	Clinical skills	71	72–83	
Non-technical skills	Consultation and referral	84	85–90	91–93
	Breaking bad news		94,95	96
	Self-efficacy		97	98–100
	Clinical reasoning		101–103	104
	Crew resource management/IPE		105–111	25,112–114
	Patient safety and satisfaction		115,116	
Teaching	E-learning/dual/blended learning	117	118–123	16,124–132
	TV series		133	
	Models/task trainer	134		62,66,135
	Standardised patients		136	137,138
	Simulation	139–141	38,40,79,97,102,106,107,140,142,142–156	23,98,131,157–163
	Clinical scenario	164–167	168–172	
	Competition and gaming	30,31,173	101,174,175	
	Spaced skills training			24,176
	4-step skills training	177		178
	Peer-group size			11,179
	Apprenticeship/team		180–185	186
	EBM/research	187,188	189	
	Professional role/pre-hospital		190,191	
	Train-the-trainer/staff development		192	
Assessment	E-portfolio		57,193,194	
	National exam	195	196	
	Competency assessment	197–199	103,200–206	
	Standardised letter of evaluation	207		
Teaching staff	Faculty development			208,209
	(Near) Peer educators/ examiners	210	152,211–213	63,214,215
	Staff requirement new curriculum		36	
Curriculum		32,187,216–222	58,59,85,142,223–228	158
Course/ programme development		6,191,229–242	60,72,142,147,191,243,243–254	

BLS: Basic life support; CPR: Cardiopulmonary Resuscitation; EBM: Evidence-based medicine; IPE: Interprofessional education; RCT: Random-controlled trial

3.2 For what? Competencies of future clinicians

Responsibilities in emergency care are characterized by high-stakes and short-decision-times. Discussions cover competencies that are required for successful transition into such clinical responsibility[143,244,255–258]. Articles[207,259] model formalised communication for an 'educational handover' of the graduate, from medical school to the subsequent clinical supervision, on patients' clinical handover from one clinician to another, which assists to select graduates for emergency medicine (EM) careers[183,196,223,250].

Competency-based training aims to achieve milestones during EM clerkship[198,205,223,259,260], or CanMEDS competencies[252,261,262], with the concept of Entrustable-Professional-Activities (EPAs)[198,217,263,264] gaining traction in the field. Need for specific institutional 'competency committees' is expressed[199].

3.3 What? Content and structure

3.3.1 Overall curriculum structure and content

In 2009, a working group of the International Federation for Emergency Medicine (IFEM) published a model curriculum for medical student education in emergency care[265]. A joint task force of the Academy of Clerkship Directors in Emergency Medicine and of the Association of Academic Chairs of EM in the United States (US) called for an EM presence in the undergraduate medical curriculum[266]. Emergency care teaching in US medical schools was evaluated by a survey to the EM clerkship directors in 2014. A similar survey was done in Germany in 2009, and again in 2012, with a focus on anaesthesia – the discipline covering EM in Germany[267–269]. A survey of knowledge, attitudes and preferences of medical students was performed in Canadian medical schools[270], and a Delphi process was used to determine EM core competencies under the seven CanMEDS categories[271,272]. An integrated, longitudinal approach to teaching is suggested for the training of emergency skills[220,273]; papers from the United Arab Emirates[274], China[275], Botswana[226] and Ethiopia[276] describe local settings. Curricular development is exemplified by courses on disaster medicine[219,222] and communication[85].

Basic medical training is entered either immediately after high school in Europe, the United Kingdom (UK) and much of the Commonwealth and usually lasts 6 years, while, in the US, it is a 4-year programme after college. Starting off with a 'concept paper'[255] for the fourth (final) year of the US programme, general discussions about curricular renewal have focused on the transition to internship and beyond[216,223,244,277]. After an initial survey of current teaching practice[278], curriculum is suggested[279,280] for the third and penultimate year

in the US. While faculty might want to use a 'structured approach to' first, students prefer 'hands-on' management of real cases[281].

3.3.2 What? - Clinical content:

Major topics for clinical care and diagnostics include the use of ultrasound (71 publications), basic (44) and advanced life support (23), trauma and burns (30) and disaster medicine (26).

3.3.2.1 Ultrasound

Ultrasound has become one of the main diagnostic tools for medical emergencies. The wealth of papers covering the topic underlines this. The specific topics are listed in Table 3.3.

Table 3.3: Topics of ultrasound-related papers

Category	Topic	References
Review or position statement	Current state of the art	282–288,29
Ultrasound curricula	Development and implementation	36,39,289,290,44,49,250,291,292,58,60,33,32,224
	Integration into undergraduate curriculum	29,32,33,39,42,57–59,172,282,285,288,289,291,292
Acquisition of basic skills	Anatomy and clinical examination skills	42,54,58,59,293,294
Investigations	Focused Abdominal Sonography for Trauma (FAST)	52,56,295,296
	Cardiac	297
	Abdominal aorta	61,298
	Inferior vena cava	35
Clinical reasoning/ differential	Hypotension	35,172
	Acute respiratory distress	34
	Neck pathology	55
	Urinary retention	68
Ultrasound-guided skills	Vascular access	45,62,64,65,299
	Peripheral nerve blocks	81,300
Ultrasound training methods	Blended learning with a web-based component	44,55,60,65,131
	Peer teaching	63
	'Tele-present' teaching (telemedicine)	56
	Game-like competitions	30,31
Objects/setting for ultrasound training	Simulation	37,38,43,45,62,65–67,81,131,292,300
	Fellow students	50,66,136
	Cadavers	40,299
	Real-life cases (Emergency room)	34,46,51,60,250
Assessment	Digital portfolio of ultrasound	57
	Objective assessment tool for PoCUS skills	301

Ultrasound in emergency care is typically 'Point-of-Care' ultrasound[53] (PoCUS, or bedside ultrasound), rather than referral for investigations elsewhere. Given the number of papers and the clinical importance, ultrasound training certainly warrants an own literature review.

3.3.2.2 Basic and advanced life support

Basic 'mechanical' cardiopulmonary resuscitation (CPR) and advanced, algorithm-based scenario-management skills are essential for the management of unstable patients[302]. Medical students' resuscitation skills were assessed in studies in China[14], the UK[303], US[304], Saudi-Arabia[305], Ethiopia[306], Sri Lanka[307], Pakistan[308] and India[309–312], including their retention of knowledge and skills after initial training[313]. The teaching practice of these skills was surveyed in the UK[314], as were the attitudes of instructors towards current CPR guidelines in Finland[315]. Prior CPR training improved performance[316], but CPR constituted one of the self-reported skills gaps of graduates entering residency in the US[317] and in India[318]. Community-based first responder roles for medical students, the introduction of a CPR elective and the longitudinal integration of teaching are means to increase acquisition and retention of skills[6,7,9].

Feedback in instructor-led training improves education outcomes, with group size playing a less important role[11,15,179]. Peers[10] or 'near-peers'[212] might provide resuscitation training, or training can be self-directed[12,15,16]. Teaching of different bag-mask-ventilation techniques was compared[27], and a new ventilation device was found to have no advantages[13]. The use of Naloxone in basic resuscitation of opiate overdose victims was addressed in the US[8,319].

The role of simulation in the acquisition of advanced scenario ('code') management skills was emphasised by both a review[320] and through studies[19,38,150,157,161], and simulation-based assessment was compared favourably to written testing[201]. Exposing medical students to structured, intensive advanced cardiovascular life support (ACLS) courses improves their skills[18,21,221] – a 'spread out', longitudinal format might be beneficial[24]. In addition to technical skills, communication and leadership/teamwork skills can also be developed through these interventions[25,112–114]. Video-assisted real time simulation (VARS) was suggested as an effective educational tool[23], and a competitive 'simulation olympics' has been used as a motivational tool for simulation-based scenarios[174].

Neonatal resuscitation has been combined with a correlating obstetric emergency simulation[171], specific paediatric scenarios, such as the 'fitting neonate'[165] or non-accidental injuries[169] have been suggested and, in Australia, a locally developed course for advanced paediatric life support has been introduced[22].

A comprehensive 'emergency in the office short course' for podiatric students includes basic CPR and managing certain other emergencies[239].

3.3.2.3 Trauma and burns

Internationally, the Advanced Trauma Life Support (ATLS)[321] course is well established and often regarded as the gold standard; it has been used to train student interns[20]. Other types of trauma short courses have been introduced in Thailand and Malaysia[83,147] and, with a focus on 'combating terror', in Israel[144]. The state of trauma and burns training for undergraduate students has, however, been decreed as insufficient by both students in the UK[322] and faculty in the US[323]. Specific trauma topics include sports concussions[324], using tourniquets[148] and managing burn wounds[325,326].

Catastrophic scenarios necessitate training in triaging, which comes into play when patient numbers exceed the available resources[80,155,163,240,327,328].

3.3.2.4 Disaster medicine

Medical students' competencies in disaster medicine were surveyed in Belgium, Germany, the Netherlands and Italy[329–332]. Many authors describe the development and implementation of disaster medicine components into an undergraduate medical curriculum, either within a local academic context[222,243,246,247,253,333], or as a national development[219], while some have a community-based focus[218,245], a focus on hazardous materials[233] or on 'terror medicine'[254]. Modes of content delivery range from disaster drills[170,228] and mass casualty scenarios with manikins[241] or high-fidelity, multi-actor scenarios[240,242], to a board game[334] and online course[110].

Five papers addressed emergency and mass casualty training for military students of medicine as they face disaster-type scenarios in their field[111,145,235,248,329].

Related to trauma and EM in special environments are 'wilderness medicine'[154,335,336] and 'in-flight' emergencies[17,234,251,337].

3.3.2.5 Clinical topics and disciplines

EM dominates the papers, but other clinical disciplines are represented. Anaesthesiology, which includes EM in some European countries[113,269,338–340], covers airway management[26,28,83,341,342] jointly with EM, and topics such as regional anaesthesia[81,300] and malignant hyperthermia[166]. Internal medicine is often present in the general adult cases managed in emergency centres, with some papers explicitly referring to internal medicine learning outcomes[260,343] or sub-specialities, such as respiratory medicine[344].

Paediatric EM is, similarly, covered by paediatrics and EM. Teaching has been surveyed in Canada[345], the use of simulation-based training in paediatrics in the US[346], and a neonatal curriculum in Zimbabwe[347]. A US medical school suggests a 'deliberate apprenticeship' in paediatric EM for third-year students[186], and specific educational techniques have been studied in the paediatric emergency environment[23,128]. Paediatric scenarios presented

include pyridoxin-dependent epilepsy, marijuana ingestion and asthma exacerbation[160,165,167], and obtaining a consult or breaking bad news[84] and identifying non-accidental trauma in children[169,348].

Radiology 'shares' sonography with EM, and also provides other emergency diagnostics. Teaching practice of radiology clerkship directors was surveyed and a curriculum suggested in the US[349,350], and clerkship outcomes were defined through a Delphi process in Pakistan[263]. Exposure through electives[185], or even as paid triage assistants[238], was recommended. Asynchronous training[123], perceptual training[70], the use of 3D-printed vasculature in interventional radiology training[82] and the role of assessment in learning[206] were presented. Proper terminology in reporting on imaging is covered[90] , as is emergency CT scans of the brain[124], ankle[351] and hip x-rays[70]. A single US paper in radiation oncology, on a new multi-institutional curriculum, includes aspects of emergency care [227].

In obstetrics and gynaecology, obstetrics receives the most attention. A nationwide content analysis was done on Turkish clinical curricula[352], and, in South Africa, the importance of emergency obstetric training to reduce maternal mortality was emphasised[229]. Using simulation in obstetric training in general[353], a simulated case of shoulder dystocia[171], an objectively structured assessment tool for obstetric skills[197] and the impact of stress on learning in the maternity ward[354] have been studied.

For surgery, surveys of undergraduate teaching were done in the UK[355,356], while, in the US, undergraduate students were surveyed[357] and in India, gaps in surgical skills were analysed[358]. An intensive bootcamp[75], international undergraduate masterclasses[77], surgical interest groups and 'olympiads' might improve surgical skills[173]. General and orthopaedic surgery are involved in trauma management, and in the use of ultrasound, as mentioned above. A 'senior peer-led' module has been suggested to improve students ability to manage fractures[210], and the field of 'musculoskeletal' medicine reportedly is underrepresented in US and Saudi-Arabian undergraduate curricula[359,360], with a curriculum consensus for Southern Africa proposed[361]. Undergraduate urology teaching is advocated[362], and acute ischemic priapism serves as a teaching case[134].

Mental health emergencies are rarely addressed, and opiate and other substance abuse are the main topics[8,88,319,363]. Approaches to a reduced level of consciousness and delirium[153,364], and the assessment of cognitive impairment[365] are seen as important, complemented by pharmacology and toxicology knowledge[149,366].

Dental problems have been addressed in children as part of trauma management[367] and in trekkers as part of travel medicine[335]. Ear, nose and throat knowledge and skills in doctors

have been described as deficient in the UK[342,368], and teaching practice in Canada has been surveyed[369], with a recommendation to prioritise key ear, nose and throat topics in the available teaching time, with epistaxis[370] being an example; online resources are suggested as educational tools[126,371]. A needs analysis for undergraduate ophthalmological training was performed in India[372], clinical placements in this discipline are recommended in the UK[373], and teaching of eye examination techniques are discussed[69,177,374]. Stroke[123,375] and seizures[120] are key neurological emergencies, and a US core curriculum guide for neurology has been published[376]. Education in neurosurgery was discussed, from both student[377] and faculty points of view[378]. Dermatology teaching was surveyed at Australian medical schools[379] and in the UK[380], the preparedness of graduates has been assessed in the UK[381], and core curricula for the discipline identified through Delphi methods in Malaysia and Spain[382,383], while a German emergency centre analysed two years of out-of-hours dermatological consultations[384].

Specific topics receiving attention were electrocardiogram (ECG)[119,204,385,386], pain management skills of faculty and students[387–389], sepsis[151,161], transfusions[390] and diabetic ketoacidosis[164].

3.3.2.7 Procedural skills

A comprehensive set of skills is required to handle emergencies. Many of these are mentioned above (Tables 3.2 & 3.3), including cardiopulmonary resuscitation, vascular access, airway management, obstetric skills, management of wounds and haemorrhage, immobilisation and lumbar puncture[391]. US and Portuguese graduates feel underprepared regarding clinical skills[392,393]. Integrated programmes and workshops have been suggested to acquire these skills[72,273], and a Delphi study was conducted to explore the 'future of practical skills in undergraduate medical education'[394]. However, there seems to be controversy between specialists regarding the skills that are needed[395].

3.3.2.8 Generic and non-technical skills

Communication is one of the major non-technical skills healthcare professionals need to master. Medical students must be trained in communication skills, and this review also emphasises it.

Table 3.4: Generic and non-technical skills

Field of skills	Specific skill	Reference
Generic skills	Clinical reasoning	102,103,117,121,396–398
	Prescribing	146
	Completion of death certificates	399
	Dealing with occupational exposure	400
	Role as expert witness	401

	Coding and documentation of clinical findings	89,402,403
Self management	Prioritisation	141
	Confidence and professional formation	190,404
	Motivation to learn	107,405
	Evidence-based medicine	406
	Self-efficacy	98
	Self-reflection	407
	Coping with 'death on the table'	340
Communication and team skills	Teamwork	114,408,409
	Request an expert opinion	84,85,87,90,91,93,99,410
	Handover/handoff	411–413
	Communication with nursing staff	79
Consultation and patient interaction	Consultation with patients and family	88,365,414–416
	Consultation over the phone	86,92
	Shared decision making	417
	Dealing with intellectual disability	418
	Consultations in other (Spanish) language	419–421
	Interaction with deaf patients	422
	Caring for the dying and breaking bad news	84,94–96
	Disclosing error	423
	Brief motivational interviewing	88
	Use of 'procedural touch'	138
Systems skills	Dealing with ethical dilemmas	424
	Defensive medicine	425
	Patient safety	115
Attitudes of students towards	Discipline of emergency medicine	426,427
	Patient safety	107
	Specific teaching techniques	118
Attitudes of staff towards	Teaching	428
	Homeless people	429
	Substance-abusing patients	363

Interestingly, the key skills required and the health challenges encountered in non-Western parts of the world are presented from a Western, 'developed world' perspective under the theme of 'global health'[140,249,252,430]. This approach is mirrored by an emphasis on geographic factors when common skin conditions in Malaysia are addressed[382].

3.4 Where to train?

Locations for training can be grouped into four major clusters: pre-hospital, emergency departments, other clinical environments and site-independent simulation.

For more than a century, prospective medical practitioners have been providing emergency response in their communities[237]. Medical students receive either certified first-responder

training[7,190,236,431,432], or practice under the direct supervision of emergency care providers[191,231]. Gains for students include not only clinical exposure, but acquiring an understanding of acutely distressed patients[433] and insights into socioeconomic determinants of health in communities[431,434]. Military field training constitutes another type of 'out-of-hospital' exposure[145].

Some innovative approaches to skills acquisition include the following: paid triage assistants in radiology[238], research assistants[188], student assistantship to junior doctors[435]/deliberate apprenticeship[186], and students as 'models, learners and teachers' for ultrasound[136]

For clinical clerkships[186,225,232,436] or electives[184,252], the emergency department is the 'natural' environment for emergency 'learning moments'[122], but consistent achievement of learning outcomes needs to be ensured[125,193,226,437–440]. Team placement might be more gainful than a one-on-one attachment with staff[180], and a 'simulated emergency department' provides a safe non-threatening environment to prepare students[441] more effectively. Interestingly, a study on the ideal duration of clerkship showed no significant decline in achievements after reducing the duration by 25%[442]. Emergency department exposure impacts positively on students' career choices[183] and learning motivation[405]. On the other hand, student presence has a complex impact on the clinical workplace, with both positive and negative outcomes reported[116,443–448].

Airway and vascular access skills are often acquired during anaesthetic rotations[26,338]. An elective in emergency radiology during the early clinical phase might improve imaging utilisation[185].

Some of the other innovative ways to expose students to the emergency care environment include multimedia preparatory modules[79,142], simulated 'night-shifts'[97] and bootcamps, which can be presented to ensure clinical competence of graduates[74–76,84,217].

3.5 How? – Teaching methods

Simulation-based learning (SBL) is another 'elephant in the room', with a total of 166 papers addressing simulation in emergency care training – many of these studies are mentioned in the other sections. An overview of SBL-related topics is given in Table 3.5.

Table 3.5: Simulation-based learning topics

Field	Topic	Reference
SBL State-of-the-art	Educational guide	AMEE[449]
	Role in clinical disciplines	MedEd[450–452]; EM[453,454]; paediatrics[346], obstetrics[353], trauma[455]
	Curriculum	158,261
SBL in Basic sciences		149,156

Management of conditions	Emergencies	shock[161]; sepsis[151]; surgical[134,159], anaesthetic[166], obstetric[171] and paediatric emergencies[165,167,169]; altered mental state[153]; diabetes and ketoacidosis[164,168]
Disaster medicine		[163,242]
Skills	Basic procedures	[139,150]
	Ultrasound	[37,38,43,45,62,65–67,81,131,292,300]; ultrasound-guided procedures[131,300]
	Advanced life support	[19,21,38,150,157,161]
	Team dynamics & CRM	[408]
Technical aspects of SBL	Standardised patients	[86,95,97,137,138,239,416,423]; 'large-scale' scenarios[76,242,441]
	Cadaver models	human[40,299]; animal[135]
	Procedural task trainers	[134,300]
	Debriefing	[11,96,143,209,408]; video-assisted[23]
	Emotional stress and learning	[98,100]
	Cognitive load	[162,202,203]
Assessment using simulation		[71,197,200,203]
Students' views on SBL		[456]

Electronic media, especially videos, are used to complement clinical teaching and to supplement or replace preparatory reading[130] in a flipped-classroom[132,457], or blended learning approach. Typical applications are resuscitation skills[12,15,16,24], procedural and ultrasound-guided skills[55,60,65,72,127,131,178], and fields such as leadership and crew resource management[25,114], consultation skills[93], clinical reasoning[117,121], ECG interpretation[119], seizure diagnosis[120] and disaster medicine[219]. Online material can be used during the actual patient encounter (synchronous)[126], or asynchronous support of the learning[118,123], possibly with a 'patient-teacher-tutorial' sequence[128]. Patient video cases could substitute for real-life exposure[458]. 'Multimedia' skills courses employ video-material, interactive online cases, simulation and standardised role players (patients and staff)[79,151].

The difference made by animated and interactive videos was demonstrated[129], and appraisal scores were developed to assist students to select online sources[459]. A 'dual learning approach' emergency department clerkship complements cases of specific presenting complaints with small group tutorials[125,187], and educational techniques included the use of TV series[133], theatre[460], a maze[175], gaming[101,334] and competitions[30,31,174].

Integration of teaching was covered by 39 papers, e.g. integration of ultrasound skills[29,32,33,39,42,57–59,172,282,285,288,289,291,292], integration of basic medical sciences and clinic[54,156,293,461], integration of referral skills[90], and integrated summative assessment[198]. Interprofessional education is delivered through simulated scenarios with mixed professional groups[105,106,108,174,452,462–464], as interprofessional emergency department and ward placement[109,409,465], or as an online course in disaster medicine[110].

3.5.1 'How' students learn (and forget)

'Perceptual' training has been suggested for diagnosing fractures[70], and pattern recognition for triaging[155]. Several papers utilised Peyton's four-step approach to perceptual training[63,127,177,178]. Spacing of content might improve learning[24,176]. Students' IT skills were studied to guide IT utilisation in the curriculum[466]. Interesting theories of learning are students' diagnostic and therapeutic 'thresholds'[104] and 'script-concordance' as representation of clinical reasoning[103,397]. In the delivery room, high levels of emotional stress are not conducive to learning, and need to be managed[354]. Students' educational needs (e.g. presentation skills) were identified from clerkship self-assessment narratives[404], as were interpersonal themes (spending time with patients, respect, cynicism)[467]. Student mistreatment has been identified as an obstacle to learning[468], and the effect of exposure to a major natural disaster on learning has been described[469]. Skills retention declines significantly after 6–12 weeks[73,80,313], but might be improved by integrated training[9,38].

3.6 'How much?' – assessment

The role of assessment for learning ('assessment drives learning') is emphasised[206]. Inclusion of student evaluations into the emergency department's electronic tracking system improves evaluation[194]. An emergency department clerkship evaluation tool could be reduced from ten to four items, because of strong correlations between items[470]. In the US, a nationally standardised examination for the final year EM assessment was introduced[195,196,471,472]. Self-assessed student skills correlated well with passing emergency department rotation[473]. A scoping review analysed evidence on the use of Mini-CEX[474] for workplace-based assessment. Assessment of practical skills is done with direct observation of procedural skills (DOPS)[475], or with objectively structured clinical examinations (OSCEs)[204] – also to assess trauma-ultrasound skills (eFAST – extended focused abdominal sonography for trauma)[50] and ultrasound-assisted procedures[476]. For longitudinal tracing of skills development in ultrasound, a sonographic digital portfolio has been developed[57], and for the EM clerkship, an electronic portfolio has been suggested. Global summative competency

assessment might be done using core EPAs[198]. A 'simulated night on call' has been used to assess the students against a set of EPAs[71].

3.7 Who? – Teachers and their training

In countries where EM is recognised as a speciality, the discipline takes ownership of most emergency departments and of emergency care training[266], with the other clinical specialities covering some of specialty-specific emergencies, as outlined above[161,186,357]. Multidisciplinary teams in, for instance, trauma take responsibility for the training[147]. Multiprofessional teaching may be used for the acquisition of clinical skills[273].

Clerkship directors are key coordinators of EM training in the US[477]. Residents (i.e. specialist trainees) were as effective as faculty in debriefing simulations[209], and were rated higher than consultants for their teaching[478], with an emphasis on a Residents-as-Teachers training programme[479]. In a German study, students scored house officers better than faculty in many categories[480]. Residents also served as 'senior-partners' of students in 'deliberate apprenticeship'[186]. Residents' own performance in 'systems-based-practice' and 'accountability' was correlated with evaluation as good teachers by students[481]. Peer review of videotaped lectures improved faculty performance[192], but staff development might sometimes fail to improve performance[208].

In Australia, EM doctors' willingness to teach was heightened by personal factors such as altruism, while systemic and university factors often had the opposite effect[428]. A US consensus paper addressed 'teaching across the generation gap[482]. A tiered mentorship programme is recommended to improve education outcomes[182]. Respect, shared goals and understanding, communication and complementary pairings have been identified as key themes in interdisciplinary 'co-teaching'[483].

Senior medical students and interns can be involved as (near) peers in teaching CPR[10,212] and case-based simulation[152,214], tutorials on managing fractures[210] and clinical skills training[72,211], in ultrasound and physical examination[213,484], echocardiography courses[63] and as examiners in OSCEs[215].

3.8 When?

Care for emergency patients typically takes place in the later years of medical training, once students have acquired a deeper clinical understanding. However, for some generic skills, a longitudinal integration of training is increasingly demanded, e.g. longitudinally integrated communication and CPR skills training is necessary to ensure retention of skills and transfer of learning into internship and clinical practice[6,9,85,316]. A comprehensive, longitudinally

integrated exposure to emergency medical care principles is advocated[220]. As introductions to the field, early 'pre-clerkship' observership increased students' interest in EM[181], and out-of-hospital exposure provides valuable professional formation[191,231]. Many of the courses are (initially) being offered as electives, e.g. in ultrasound[41,48,230,485], disaster medicine[170,253,254], global health[249,252], in-flight[234,251] and wilderness medicine[154].

In a 2011 US survey, 65% of US medical programmes had EM rotations in the third (penultimate) year, with 33% of them involving mandatory clerkships[278]; a model syllabus for this third year has been published[279,280] and a clinical procedures curriculum introduced[72]. A new Canadian third-year clerkship was positively received[225], and Ethiopia has a seven-week EM module[276].

The final year, as a transition to medical practice, is the most contested in terms of structure and content[198]. In 2010, just over half of US medical schools required mandatory EM clerkships, usually four weeks during the final year[267]. For certain US medical schools, empirical data shows better clinical ratings for graduates who had been exposed to intensive coursework during the final year[486]; an 'EM track' as (s)elective has been introduced in the final year to improve preparation of students for postgraduate training in EM[223] and the final year curriculum has been redesigned with a focus on transition to postgraduate training[216]. In 2011, only one private Pakistani medical school had included EM in the undergraduate curriculum[232]. The focused trauma evaluation and management course in Kenya was introduced in the final year[487]. In the Netherlands, Utrecht medical school dedicates the final year to preparing students for the transition into the clinical workplace[244].

4 Discussion

Emergency medical care constitutes a fundamental competency for the prospective medical graduate, and there is a vast and ever-growing body of scholarly knowledge available on the way it is taught to medical students. As EM as a clinical and academic entity has matured, the discipline has increased its leadership role in defining outcomes and ensuring their achievement. However, as clinical emergencies include scenarios and skills from many a clinical speciality, the educational enterprise is inevitably a multidisciplinary one. Local practices and other factors might, to a larger extent, define which disciplines are involved in a specific country. In addition to the variety of clinical disciplines, the field of health professions education and its own growing body of science have an important role to play, and the future of teaching will hopefully see strong cooperation between the clinical and educational sciences, especially to meet the need for more structured approaches to education-related research in emergency care[189,488,489].

Even though a wide variety of disciplines and a range of clinical conditions are involved, a set of core skills seems to exist. These skills include the ability to provide life support in peri-arrest situations through CPR and algorithm-based resuscitation, and using ultrasound as a diagnostic tool. On the education side, the combination of simulation-based skills training and experiential learning in the clinical context appears to be the gold standard.

On a higher level of reflection, on a 'meta-educational-research' level, considering the categories introduced by Cook et al. into the field of health professions education[490] may hold value. Much like they found in their review, most of the studies with education interventions in this review were either 'descriptive', in that they merely outline the new activities, or they were 'justifications', in that they assessed whether the intervention worked. Very few papers were on Cook's 'clarification' level of investigating more complex theory building and testing deduced predictions.

5 Conclusion

EM, where it exists as a discipline, has an important and growing role to play in undergraduate medical education. Teaching of emergency care needs to be an integral and integrated part of the curriculum, with appropriate educational architecture supporting it, such as scaffolding development in a 'spiralling', longitudinally integrated fashion, with clear outcomes defined as competencies or EPAs. A combination of simulation-based-training and experiential learning in a supervised clinical context is state-of-the-art, with ultrasound-skills being a standard diagnostic tool in the quiver of future doctors. Despite of the wealth of published material, higher level evidence such as educational meta-analyses on specific topics is rare.

6 Limitations of the study

Due to resource limitations, the review of abstracts and papers was performed only by the main author as a single reviewer. Given the number of papers, it was also not possible to review the reference lists of the included literature for further sources, as recommended by some authors[2], however, these limitations for postgraduate studies have been acknowledged in the literature[490].

Given the search strategy with its use of the term 'emergency', there was arguably an inherent bias towards the discipline of EM, as publications from the discipline would be more likely to be identified than those from other clinical disciplines.

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CHAPTER 4 - MANUSCRIPT 3

'INTEGRATION, INTEGRATION, INTEGRATION IN THE SENSE THAT WE SEE: PATIENTS DON'T READ THE TEXTBOOKS' - VIEWS ON UNDERGRADUATE MEDICAL EMERGENCY CARE EDUCATION FROM SOUTH AFRICAN MEDICAL SCHOOLS

This manuscript was prepared for the journal as detailed below:

Submission guidelines used	Medical Teacher
Attached as	Appendix D3
Title for submission	'Integration, integration, integration in the sense that we see: Patients don't read the textbooks' - Views on undergraduate medical emergency care education from South African medical schools
Short title	Views on emergency care education from South Africa
Submission date	not yet submitted

‘Integration, integration, integration in the sense that we see: Patients don’t read the textbooks’ – Views on undergraduate medical emergency care education from South African medical schools

Running title: Views on emergency care education from South Africa

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‘Integration, integration, integration in the sense that we see: Patients don’t read the textbooks’

Views on undergraduate medical emergency care education from South African Medical Schools

Abstract:

Background:

Early-career medical practitioners in South Africa are exposed to a wide range of emergency situations during their mandatory community service. We set out to collect perspectives of educators in the eight established medical programmes in the country on the training of undergraduate medical students for managing emergencies.

Methodology:

We performed in-depth interviews with key informants at the eight established medical programmes. Qualitative data were coded and analysed for categories and themes.

Results:

A diverse group of interviewees provided a wide range of insights. Three major themes emerged, namely ‘Curriculum and educational science’, ‘Content and methods’ and ‘Reality of teaching’. ‘Curriculum and educational science’ covers the theoretical and conceptual aspects and includes the categories of ‘Educational goals’, ‘Curricular structure’ and ‘Curriculum review’. In ‘Content and methods’, the actual teaching practice is discussed, and major categories are ‘Diseases in the community’, ‘Skills as outcomes’, ‘Educational methods’, ‘Coordination and updating content’ and ‘Assessment’. ‘Teaching reality’ describes the experienced enablers and obstacles of teaching and is influenced by the categories ‘Institutional culture’, ‘Time and resources’, ‘Staff categories involved’, ‘Institutional memory’ and ‘Challenges with students’.

Conclusions:

Emergency care training is an integral part of undergraduate medical training in South Africa, though the specific settings at institutions are different. Emergency medicine plays a growing role, once departments have been established. Common challenges are the mismatch between resources available, increasing student numbers, and managing, updating and coordinating the programmes.

Practice points:

Emergency care training needs to be integrated horizontally and vertically into medical curricula, and the related skills need to be developed in a spiral manner throughout programmes.

Where they exist, emergency medicine departments play an important and growing role in the training undergraduate medical students in South Africa in emergency care skills.

Emergency skills are taught through a mix of classroom, online, simulation unit and service delivery platform activities, and assessed similarly, with a range of formats.

Common challenges facing training are platforms overcrowded with students and a resulting mismatch with available educator numbers, inconsistent teaching across distributed platforms, and difficulties integrating teaching across disciplines and academic years.

Introduction

South Africa trains medical doctors for its population of almost 60 million at eight medical schools, with three additional institutions starting up medical programmes. Over the last few years, and assisted by a collaborative training agreement with Cuba, the annual number of medical graduates increased from a long-standing average of 1 200 (Academy of Science of South Africa (ASSAf) 2018) to almost 2 400 per year (Pillay 2019). Graduates enter a two-year medical internship programme and then work for one additional year in an accredited community service post (Republic of South Africa, Minister of Health 1998), often in rural or under-resourced areas. Given the realities in South Africa, medical graduates start their careers as fairly-independent practitioners with limited support from senior healthcare professionals. In contrast to young colleagues in better resourced countries, who might transition straight into specialising in a particular field of medicine, South African early-career doctors treat the full range of clinical problems that present at a district or day hospital, including acute exacerbations and emergencies (De Villiers 2006). Training needs to prepare undergraduate students sufficiently to master these broad challenges. A literature review on emergency care training for medical students did not identify any relevant publication regarding training in South Africa in the past ten years. This paper investigates current teaching practices at the country's eight medical schools for the management of emergency conditions, in a qualitative approach that involved in-depth interviews with key informants.

Methods

Design

We used a constructivist approach with the aim of identifying education strategies to enhance emergency care training, by combining different perspectives of individual 'narrative truths' (Charmaz and Bryant 2010) and focusing on 'meaningful units', as suggested by Chenail (2012), rather than single terms or phrases.

Objectives

Specific objectives of this study were to identify essential *outcomes/competencies* and *educational approaches* and *assessment criteria* that integrated emergency care programmes should achieve during undergraduate medical education and training.

Participant selection

Key informants at each of the eight medical schools were identified, either through peers in the health professions education network, or by inquiry at academic institutions. Interviewees had to be involved in the undergraduate medical programme, and had to have an understanding of the overall setting of emergency care training at their institution. Availability and willingness to participate were confirmed after obtaining institutional approval.

Data collection

Interviews were conducted face-to-face by the first author (DH) at venues convenient for the interviewees (Holstein and Gubrium 1995). Interviews were audio-recorded and additional fieldnotes were taken by the interviewer. A semi-structured interview guide was used (Attachment A).

Data analysis

All interviews were transcribed verbatim. Transcripts were edited for accuracy against the audio recordings by the first author (DH), who then sent it to the interviewees for verification, and performed thematic analysis using ATLAS.ti version 8.4 (Scientific Software Development, Berlin, Germany) for coding. Following the approach outlined by Ritchie and Spencer (1994) and Pope et al. (2000), the coder familiarised himself with the entire interview in transcript and audio recording. Initial coding identified relevant facts and ideas, and the codes were further refined and revised in the subsequent coding process, with more abstract and general concepts. Findings are presented in themes, categories and subcategories (Saldaña 2013: p. 12). Code lists, occurrence lists for the codes and the draft manuscript were circulated amongst the interviewees for further critical verification.

Ethics

The Health Sciences Research Ethics Committee granted ethics approval for the research (UFS-HSD2017/1547/2801) after institutional permission had been obtained by the respective authorities at each of the eight medical schools according to local protocol. Interviewees received the protocol and a summary, and gave written consent, including permission for audio recording.

Results and discussion

Interviewees

Eight in-depth interviews, one at each of the eight medical schools, were conducted between October 2018 and December 2019. As five of the eight medical schools have departments of emergency medicine, three of the interviews were with emergency physicians. Other interviewees included a registered nurse, a family physician, a trauma surgeon, a general surgeon and a medical practitioner serving as academic programme director. Given the diversity of South African medical schools, not only regarding their medical curricula, but

also in their specific administrative structures, these key informants were identified purposively at the individual institutions. Interviewees represented three ethnic groups, and four of the eight were female.

Categories and Themes

During the process of coding and data analysis, three major themes evolved, namely 'Curriculum and educational science', 'Content and Methods', and 'Teaching reality', each covering a range of categories and subcategories. 'Curriculum and educational sciences' represents more abstract concepts relating to the way the programmes were conceptualised, bringing into play key terms and approaches that are used to manage the academic programmes. 'Content and methods' as category entails the information shared by the interviewees on what is actually taught and how it is taught and assessed, in education terms, somewhat reflecting the 'syllabus' part around the emergency care training. Lastly, the 'Teaching reality' presents the lived realities, obstacles and enablers experienced at the medical schools.

Theme 1: Curriculum and educational science

Medical studies in South Africa are organised as an undergraduate academic programme at institutions of higher education, guided by a curriculum. This section will cover the categories *Educational goals*, *Curriculum structure* and *Curricular review*.

Category: Educational goals – the 'end product'

Planning of education activities requires a needs assessment (Thomas et al. 2016: 12) for the intended 'product' of the process. For the medical programme, this product would be a graduate who is competent to function as *"entry level health care practitioner"* under supervision during internship. In the further career trajectory, competent "*generalists"* need to manage *"undifferentiated patients"* and handle emergency situations as community service doctors – as spelled out by a participant: "*This guy is running a district hospital when he qualifies*". D8. These subcategories are presented in Table 4.1.

Table 4.1: Educational goals – subcategories

Entry-level practitioner	**Generalist**	**Undifferentiated patients**	**Dealing with emergencies**	**Compliance with accreditation requirements**
In the end we want to deliver a practitioner who is going to be competent in all the knowledge, skills and attitudes required of an entry-level healthcare practitioner D1	W*hen they graduate they need to be a doctor, a family, a normal GP. That's what they need to be. And they need to be able to recognise what they can manage, and ask for help for those that they*	*they have to be able to deal with the so-called undifferentiated patients* D1 *So there is a very strong emphasis on, in an undifferentiated patient, to even*	*one of the things that we are looking at for the new curriculum, is how we are going to scaffold that, […] have a focus on undifferentiated emergencies in various disciplines*	*We are led by the requirements of our accrediting body in terms of what should an entry-level healthcare practitioner look like. That includes the competencies of the CanMEDS*

the final product is evaluated […] on all the basic requirements for an intern entry-level healthcare practitioner D1	*can't basically* D5 *As much as they go there, they are exposed to cardiologists, they are exposed to nephrologists. No, no we are not interested in making them nephrologists, cardiologists. We want them to be generalists, first.* D8	*already start diagnosing and that's not necessarily what is required right there. They need to learn how to focus on the presenting signs and symptoms, manage them and refer* D5 *We are focusing a little bit more on presentations as opposed to only diseases and illnesses* D5	D5 *if they were to come to the scene of an accident as they exit […], I am wondering how many of them would be brave enough to say let's offer some help here* D3 *Doctors were graduating […] without having touched the defib for example. They had absolutely nothing and that was quite frightening* D5	*or Afrimeds competency framework and within those, emergency care* D1

Category: Curriculum structure

With the 'goalposts' for the training given above, the curriculum design needs to follow 'good educational practice':

> *You know the challenge is always with progress, that one doesn't want to just add things without looking at are you doing the right thing, should we be taking out things that are redundant. My buzzwords at the moment 'are we relevant and responsive?' D1*

One way to achieve this goal is through the integration of teaching efforts (Thomas et al. 2016: 218) in two dimensions, vertical and horizontal. Vertical (or longitudinal) integration occurs over time, implying that teaching at different times during the programme links to each other, with the earlier courses preparing for content to come later, and later teaching building onto and refering back to the earlier. Horizontal integration, on the other hand, refers to the coordination of concurrent teaching, with courses complementing each other and avoiding unnecessary replication, while reiterating important points (Prideaux et al. 2013: 65):

> *There is a move to integrated learning vertically as well as horizontally. And to trim the curriculum in terms of knowledge overload, trim it down to what is relevant and leave the canaries. D3*

> *Then we also have what we call the horizontal integration, in other words, things that are taught in one discipline, and as they move on to the other discipline, let's say internal medicine, they move on to the pediatrics, the knowledge that they have acquired in internal medicine is expected of them in pediatrics, because there is some commonality. D8*

Approaches that ensure learners' development are scaffolding and spiralling. Scaffolding, in the Vigotskyan sense, is a concept that enables learners to develop a cognitive framework to organise acquired educational content. Spiralling, on the other hand, refers to the recurrence of educational content at a higher level of complexity during later stages of the training (Prideaux et al. 2013: 65). The height of the spiral represents time passing, the circularity of the spiral denotes the repetition, while its widening expresses the wider and more complex insights:

> *So to an extent the ideal would be that you integrate the emergency care training as part of the rest of the training and that it's spiralled also vertically throughout the curriculum so that the students actually get a good scaffolding and it builds a foundation that eventually they will move on to be competent health care practitioners. D1*

> *But having to start really early on, we can really set a strong foundation from third year onward and build with basic skills, so that we have got the space in sixth year to advance and to try and sort of reinforce the longitudinal curriculums that are shared with the different specialties. D4*

Longitudinal integration and spiralling help to retain skills and knowledge:

> *They say you must go back and do it, because they know that whatever they taught you, if not refreshed will evaporate. I think we do not make follow ups to ensure that our clinicians get a revival of some kind in what they were taught. D3*

Clearly formulated educational outcomes guide the training:

> *So, each module would necessarily have to have learning outcomes. It would have to have objectives and learning outcomes and obviously the*

> *teaching and learning strategies would have to align with those and then the assessment aligned with that as well. D1*

A modular structure requires an understanding of the overarching outcomes, as well as the relation to other modules:

> *The modular structure came about 2016, so relatively new, and if you have to ask one of us as conveners we don't quite understand where or how this is properly structured in terms of how we are going to match or ensure the longitudinal outcomes are met. D4*

Curriculum mapping is a valuable tool for ensuring that outcomes are adequately covered, and for facilitating the coordination of different modules and lecturers:

> *Each university has to do it and submit it to the HPCSA by the end of the year. They have to do curriculum mapping to see where there are overlaps, so again they are the people who coordinate and then they feedback to us to say now this is covered, but this isn't covered, can you built it in and so on. […] all the stuff from this module I loaded onto the LOOOP [a computer program for curriculum mapping]. D2*

In South Africa, the undergraduate medical curriculum is not standardised, and even the duration varies from five to six years. Based on interactions with other medical schools, a nationwide standardisation of the curriculum is desirable:

> *I would like to see that happening across the South African undergraduate teaching curriculum. Even if we start small, as in just emergency medicine or acute care, because a lot of it was already developed […]. The tools are there, it's there online. The clinical skills in terms of the lectures and how they're run it's all there. It seems unnecessary to reinvent the wheel. D4*

In the absence of such standardisation, however, the accreditation body and clinical societies provide guidance on curriculum content:

> *[The] HPCSA [Health Professions Council of South Africa] should in the requirements for curriculums specify a certain amount of time exposure and a basic skills set that any graduate that becomes an MBChB in this country and proceeds to the clinical component of the internship and the comm-service should have covered and which of it should be theory and which of it should be skills. And I think those curriculums are fairly well*

described and so like I say we have based ours off the EMSSA [Emergency Medicine Society of South Africa] curriculum for undergraduates, […] we have covered probably 95 percent of what's in their curriculum. D2

Category: Curricular review

As Thomas states, 'A successful curriculum is constantly developing' (2016: 168). In most of the eight institutions, their curricula were reviewed in the recent past. Especially where emergency training was strengthened, changes were experienced positively, as shown in Table 4.2.

Table 4.2: Subcategories for curriculum review

New curricula	**Space for emergency medicine**	**Ongoing curricular revisions**	**Responsiveness to students' performance**
the good thing of this medical school is they have had a re-curriculation in about 2010. Up until then the sum total of the Emergency Training was the basic ambulance attendance course D2 *They have re-done the curriculum which is now from 2020 going to change* D7 *We are starting with a new curriculum in 2021. So things will be a little different then* D5	*The undergraduate students have got blocks and they get taught in all the different medical specialties and it would imply that there would have to be a change in that existing curriculum to incorporate emergency medicine as an undergraduate training block* D5 *But it [EM rotation] just needs to go past the curriculum committee and the medical school to make it happen. And that will be my vision that that should happen* D6	*So if you look at the curriculum […] there are so many changes that were brought up to the current day. When the HPCSA looks at it, they are happy with this one, it's perfect. Although in your own heart you know, there are areas that we need to continue to improve* D8 *Yearly […] we have got a faculty workshop to look at the curricula of the various disciplines and say what do we need to improve, what haven't we done better, how can we improve on that one. What does it entail? Usually what we do is every two year, we have an external assessor who comes*	*So obviously you want to take a look at the outcomes of your assessments which obviously also gives you some idea of what's happening in your different modules and phases and based on that as well as feedback from accreditation bodies on possible areas of improvement in the curriculum that is done via the programme committee […] and then also by annual curriculum reviews* D1 *But at least on an annual basis everybody sits down and considers or re-evaluates their curriculum. There is not so much a focus on trying to look at the longitudinal*

	from another medical school D8	*outcomes from what I have seen* D4

To summarise, the education goals for the MBChB are to train a competent entry-level healthcare worker, who, after completing an internship, will be able to manage undifferentiated patients in a district hospital. In the absence of a standardised national curriculum, medical schools design their curricula in a modular structure and are guided by exit-level competencies prescribed by the HPCSA. Sound education architecture entails vertical and horizontal integration, scaffolding and spiralling, with mapping of the projected outcomes through the programme. Curricular review to update the programme needs to control against overloading the programme, to keep it 'relevant and responsive'.

Theme 2: Content and methods

On a more practical level, the theoretical concepts of education philosophy are complemented by teaching content and the teaching methods applied, often referred to as a syllabus. 'Content and methods' will address the 'nitty-gritty' of teaching as it emerged from the interviews. Categories covered in this section include *Disease profile in the community*, *Skills as outcomes* (with a number of subcategories), *Educational methods*, *Coordination and updating content* and *Assessment.*

Category: Disease profile in the community

Training the future clinician in a relevant and responsive manner to deal with undifferentiated cases is guided by the local epidemiology:

> *So, we start with the high yield, high frequency presentations. […] We focus on the clinical conditions or diseases that would immediately kill you. D4*

Using the clinical platform with a random mix of cases for problem-based learning provides a case selection with the 'curriculum walking through the door', however, this approach might challenge the facilitators' clinical and educational skills, and they may to recognise teaching opportunities:

> *Tricky in the sense that we may say that […] curriculum is what comes through the door […], but is the tutor vigilant enough to recognise it so as to tease the students to also recognise it equally? D3*

Competency to handle undifferentiated cases is important in dealing with emergency cases, which are the very acute presentations of undifferentiated patients:

> *So, there is a curriculum for each block and for each subject you know in terms of what they are supposed to cover and the curriculum is more like*

> *an 'approach to', you know an approach to chest pain, an approach to whatever. D7*

Category: Skills as outcomes

Subcategory: Specific skills training

A range of specific skills is required for intervention in life-threatening situations:

> *But having to start really early on, we can really set a strong foundation from third year onward and build with basic skills. D4*

These skills include resuscitation skills, as well as skills for handling specific emergencies:

> *So they will have BLS [Basic Life Support] and then they will have advanced CPR [Cardiopulmonary resuscitation], cardiac arrest, anaphylaxis, bradycardia. What else do they have? They have a paeds session, so it's a septic shock paeds, approach to the paediatric patient and then the trauma. D5*

Not only the management of specific emergencies, but also the ability to identify clinical worsening and to prevent such deterioration, are emphasised:

> *All the medical emergency cases, acute severe asthma, endocrine emergencies, acute coronary syndrome, acute stroke and […] to round it all off basics of critical care. So the so-called fast-prep concept, […] to prevent deterioration. […] plus how to look for and the definitions of sepsis and septic shock. D2*

Category: Specialist disciplines and their stewardship of certain skills

Clinical skills are typically taught by specific clinical disciplines, for instance, anaesthetics teaches airway management, and EM shares some of the tasks:

> *I don't think it's necessary to, for example ask anaesthesiology to come and teach the students airway management, or to ask cardiology to come and teach them this. There is already an existing team of emergency physicians. D6*

Internal medicine covers a range of conditions:

> *If they are doing internal medicine, for example, they learn how to manage an acute asthmatic, how to manage a status, how to, one approach to chest pain D6*

Obstetric skills form part of emergency skills:

> *So basically, we should have finished all of the ESMOE [Essential Steps in the Management of Obstetric Emergencies] modules in their clinical rotation in their fifth year. D5*

And trauma management is essential:

> *Violence is a huge, huge factor. We need to have physicians that are able to manage an emergency as quickly as possible on the scene and in an emergency unit. D5*

Subcategory: Generic skills/non-technical skills

Non-technical skills are certainly also required in emergency medicine, yet the emergency medicine specialists see the focus in emergency medicine rotations rather on acute management of emergencies, with other skills covered elsewhere:

> *But I think that the pre-clinical years have a good curriculum in terms of developing the practitioners. So things like ethics and values are covered there, communication is covered there. D4*

Subcategory: Ultrasound

Ultrasound is mentioned as an important emerging diagnostic skill that needs to be taught:

> *The other thing that we are also going to bring in is ultrasound. So, we are going to be bringing in ultrasound in the new curriculum. D5*

Recommendations are mostly based on experiences with postgraduate emergency medicine training:

> *postgraduate students [in emergency medicine] get extensive ultrasound training. […] they get examined to the four modalities, which is FAST [Focused Assessment with Ultrasound for Trauma], abdominal aorta, DVT [deep vein thrombosis] and cardiac. D6*

Subcategory: Comprehensive emergency medicine outcomes

This emergency physician summarised a comprehensive set of outcomes:

> *So I would summarise them by saying firstly […] the primary survey resuscitation skills, in other words airway skills, breathing and ventilation skills, including bag-valve mask ventilation and then it would be in C or*

circulation skills which would be intravenous lines and then also in diagnostic, diagnostic aspects like diagnosing management of shock.

Secondly, it would be ultrasound, emergency ultrasound skills in the four modalities I already mentioned.

Thirdly, it would be in assessment and management of general emergencies and an approach to the undifferentiated emergency patient.

And then lastly it would be diagnostic dilemmas in emergency medicine and conditions that cause diagnostic problems in emergency medicine. D6

Category: Educational methods

Although 'classical' lectures still prevail, other approaches are increasingly being utilised. In keeping with international developments and supported by some universities' policies, online teaching has become increasingly common. Online material is often delivered in preparation for contact sessions as the 'flipped-classroom' approach. Due to the amount of practical skill needed in emergency care, simulation plays an essential role in stepwise acquisition skills. Eventually, and hopefully well prepared, students are exposed to experiential learning in the real-life clinical context. Quotes on educational methods are presented in Table 4.3.

Table 4.3: Educational methods

Flipped classroom	**Blended learning**	**Simulation**	**Real patients**
been shown video and stuff during our lecture very interactive lectures, […] small group tutorials. So we try and do as much flipped-classroom as possible, but limited theoretical background makes it difficult D2 *I use the flipped classroom technique; a lot of the information is on Vula ahead of the time, […] We want them to focus on hands on and*	*they have to go through reading material in the form of podcasts or presentations and there as well they actually have quiz or sort of self-directed learning with a quiz at the end of each section, where they will be able to identify the outcomes which occurred delineated online. The same outcomes are then matched in the skills lab* D4	*The majority of the clinical skills should be well established and there will be certain skills that would have been scaffolded, so specifically resuscitation skills would have been scaffolded nicely, so that by the time they get to the clinical rotations, they will be doing simulations. So, then it will be simulations, simulations, simulations, lots of*	*they have manikins. So that is how you intubate, that's the practical. When they come to their clinical years, we use real patients. So you want to put a drip on the patient, not on the manikin, you want to catheterise, you catheterise a true patient. But you don't do it alone, they see one, they assist one, and then they catheterise with a qualified healthcare worker, not independent*

clinical experience D4 *Try to shift 50 percent of the teaching onto the online platform* D4	*It's very much a blended learning approach, very big strong emphasis on blended learning* D5	*simulations, different forms and types* D5	D8

Some essential topics might lend themselves to specific educational methods:

> *There is a lot more that we can do on the online platform and that includes things like emergency radiology. Or as an example emergency ECGs [electrocardiography]. D4*

Subcategory: Distributed training platform

Clinical exposure happens on a 'distributed platform' – a number of small hospitals or community emergency centres where the students are placed for rotations. This practice faces its own challenges regarding supervision and logistics:

> *All of them are in the […] district hospitals scattered around […] out of the 26 […] we have chosen about 8. So that in each district hospital, which is 150 to 200 bedded, there are 5 students, which is many. D8*

Category: Coordination and updating content

Within academic programmes, there is a difference between the overarching curriculum addressed above and the coordination of actual modules and courses, often referred to as syllabus.

> *I think there needs to be input from each of those disciplines and there needs to be frequent meetings or some sort of communication. If, to say, look as an example, we have been asked to teach cricoid pressure, you know, and as emergency physicians, there isn't really good evidence for us to actually advocate the use of cricoid pressure whereas anaesthetics, you feel really strongly about this and you feel that this must happen in theatre, so perhaps if you would teach cricoid pressure and the skill thereof, we would take on something that you know you are trying to educate on, for example, cricothyroidotomy, just as an example. D4*

New evidence and new guidelines need to be integrated into the teaching:

> *We update a great deal as new evidence and stuff comes out, for example, the trauma stuff is all being changed slightly because of the 10th Edition*

ATLS that's just come out where there is some radical evidence-based improvements. D2

And the new AHA [American Heart Association] guidelines, or things like that, and we are the ones that are working with those things, so how do we implement, for example, the new AHA guidelines and stroke and STEMI [ST-elevation myocardial infarction]. How do we get there into neurology and cardiology to say change your practice this is what we are doing. It's a little bit difficult, you know, but ja. D7

Category: Assessment

In most of the programmes, combinations of different assessment methods are used, including multiple-choice questions (MCQ), OSCE (objectively-structured clinical examinations) and longitudinal assessments through portfolios and logbooks. Table 4.4 gives an overview of the methods used.

Table 4.4: Assessment techniques

OSCE & MCQ	**Portfolio**	**Programmatic & integrated assessment**
And it gets assessed at the end of the module plus it gets assessed from the more practical point of view in two components of the final year. So there will always be at least one OSCE station on something trauma/ critical care related or emergency medicine related in the family medicine final OSCE and there is usually one or two questions with X-rays or whatever in both the orthopaedic and the general surgical final OSCE or clinical exam D2	*But in terms of what we want for their portfolio, it certainly matches in terms of you must be able to triage a certain number of patients, clinically examine and be involved in the management of the critically ill patient under supervision. So both that sort of matches and those outcomes are met at the end of the sixth year* D4	*our assessments are all clinical scenario based, an X-ray, a couple of multiple choice questions related to the X-ray or the clinical scenario or the patient outcome or the potential complications, so it's a good way of looking at things as comprehensively as possible* D2
resuscitation itself, in terms of the advanced life support, that is examined at the exit OSCE. So, we have two independent, one infant station, where those outcomes are actually,	*at the end of each block, the student needs to come out with a certain number of or evidence of patients that they have seen, with evidence of clinical skills involvement as well as self-directed learning tasks. And each specialty is different, but ours, we wanted, as an example, our fourth year students to have evidence of*	*some formal OSCEs at various points, but we are going to be looking at more of a sort of a longitudinal, programmatic assessment type thing* D5
		Now they are bringing back that annual end-of-year assessment where you still have to learn everything. […] an integrated exam

where we are making sure that those outcomes are there. […] cardiology, respiratory, neurology and that sort of emergencies, that we really see more in the written format, so at the end of the block […] students have a combined MCQ exam, and they have an OSCE as well. In the MCQ exam we contribute forty MCQs, and the student needs to be able to pass that in order to progress D4	*having triaged ten patients, or clinically examined and been involved in the management of ten critically ill patients* D4 *they could write those and do a portfolio, but it was only me marking them, 300 students, and that was not working very well* D5	D7

Subcategory: Formative and summative assessments

Students need to receive regular feedback about their progress through formative assessments:

> *In third year, it's self-directed learning and fourth year it's the self-directed learning as well as the MCQs, so there is a bit of formative assessments there both into that, to that year. Fourth year is the MCQ and the OSCE at the end of the block. […] Sixth year I think it's another two weeks and we have got the self-directive learning, we have got formative assessments built in on online and in the workplace and we have got an exit OSCE at the very end as well. D4*

In summary, the content taught should be guided by emergency conditions the graduates are likely to encounter and needs to equip them with the essential basic skills (resuscitation, airway management, ultrasound, vascular access) and general approaches to handle them. Teaching is blended between lectures, online content delivery, simulation sessions and experiential learning on the distributive clinical platform involving emergency medicine, family medicine and specialist disciplines. Assessment is becoming more 'programmatic' and longitudinal, with a mix of MCQ, OSCE and portfolio-based components, allowing for formative and summative assessment.

Theme 3: Reality of teaching – challenges on the coalface

Although teaching should be guided by the curricular considerations mentioned above, and would strive to follow sound education principles to convey relevant and up-to-date content, the practical reality is more often than not unfolding in the lowlands of resource constraints and human interactions.

Category: Institutional culture

Given that South Africa does not have a prescribed standard curriculum for training medical students, and that the academic institutions offering these degrees differ vastly regarding their social and historical backgrounds, institutional culture is a relevant factor. This can hinder or support certain developments around emergency medicine:

> *I just think it's because it didn't exist in the past and because the previous management was not very much in favour of it [emergency medicine] and the new management is. D6*

Institutional culture can also constitute an obstacle to achieving generalist training when the focus is very much on specialities:

> *[X university] is very challenging because of this focus on sub-specialty and specialty medicine. D7*

In the broadest of senses, the following resource challenges also reflect institutional cultures, exhibited in preferences and allocation decisions.

Category: Time and resources

At academic institutions, teaching is often only awarded second rank after publishable research. This situation is worse in the field of academic health sciences, where staff faces a triple burden of clinical services, research and teaching. At the same time, the numbers of students that are being placed on the clinical platform has continuously increased. General staff shortages, lack of teaching skills, discipline-focused approaches, and challenges caused by different clinical sites might all lead to a mismatch between the intended outcomes and the available resources (Table 4.5).

Table 4.5: Challenges

Teaching time	**Discipline-specific approach**	**Staff shortages**	**Facilitator competence**	**Older colleagues**	**Student numbers and group size**	**Differences in pathology and content teaching**	**Other obstacles**
We just need the time. We just need the time D6 *So we went from four days to two weeks [for emergency care]. In another few years we can say now we want another week. That's the only way to do it* D6	*They will get taught bits and pieces of it by, you know, the surgical department, who teach that topic to them from the surgical perspective but will also mention the medical conditions that can cause it. The medical department will teach it from a medical point of view but there is not really an emergency medicine block in which they get taught sort*	*Emergency medicine has always been here as a discipline, but they have never had enough staff, and they still don't* D5 *The only other stumbling block is really the fact that the consultants [… have got a lot on their plate already* D6	*A lot of those things practically then is exposed when they are in the smaller hospitals in the emergency units with family medicine, they will see a patient with an acute red eye and they have to fall back on that theory and hopefully the person who is supervising them is up to-speed and will be doing the right thing* D2 *The challenge is content*	*[A] lot of old bad habits that die hard get taught and sometimes they can be frankly dangerous* D2 *It's very interesting seeing who is getting involved: very definitely the younger generation is more involved than the older generation. A lot of the older guys are sending, and I use the term guys because they are normally males in the older*	*When we originally started off they were in groups of between 20 and 30 and that was manageable. You could split 10 students with each consultant […] what you have got now is between 40 and 50 you can't do that. There is just not enough lecturers to go around* D2 *[X university] has in the last two intakes from the Cuban students got in*	*The weaknesses would be here because of the type of pathologies that we have. That's the weakness. You will find clearly when they go to one site there is a preponder-ance to one type of pathology* D8 *It would be great if you could split them up into small groups of 10 and send them out to five different hospitals or*	*And a further logistical problem in terms of training is accommo-dation* D8 *The third one is distance. Now [location X] is about 500 kilometres from here, [location Y] is about 200. What we do is a circuit riding* D8 *So internal medicine, they get the students for X amount of time, they get X amount of money out of*

	of like a balanced approach from emergency physicians that could point out the surgical and the medical emergency skills or causes D5 *Each different discipline does teach them a bit of the emergency skills that they need, but it's not been put together in one* D6	*teaching, because there are a few very enthusiastic emergency interested people within family medicine* D2	*group, they are tending to send some of the younger consultants through to come and have the discussions* D5 *But the guy is 60 years old and he is still following protocols that he has learnt, you know, all his life* D7	*about 450. So those 450 students then come back and integrate into our 230 or whatever we have. So the numbers in fourth and fifth year become huge* D7	*four different hospitals. The problem is the consistency of content, even though we have put our lectures […] online* D2	*the budget. Now suddenly they are not going to be spending so much time going through internal formally* D5

Category: Categories of staff involved

Clinical and skills teaching is done mostly by health professionals who provide emergency care, namely, medical practitioners, registered nurses and paramedics (Table 4.6).

Table 4.6: Staff categories involved in emergency care training

Consultants	**Registrars**	**Medical officers**	**Registered nurses**	**Paramedics**
A lot of the facilitators or educators come from our pool of specialty emergency physicians, which is already so small D4 *We depend on a lot of these specialists in the province to supervise our students. […] None of them have any training as educators* D4 *So the ones that are teaching them are all of our staff. So it's firstly it's the consultants* D6	*By signing a contract with [X university] to be part of the MMed programme, they are considered honorary lecturers and therefore have to assign a certain amount of time to teaching. […] this teaching happens on an EC [Emergency centre] floor.* D4 *Registrars in emergency medicine, whoever is in the unit, will do a fair amount. […] So, for example the lumbar puncture, they will be doing and then the students will be there* D7	*And then of course we have got some units where the medical officers are very experienced* D7 *So it will be consultants, registrars but also medical officers* D6	*So, I mean, what other university has the nurse as the person who is doing all of this?* D5 *They are […] deciding what do, how to treat this patient under supervision by a medical officer, including the experienced nurse you know the PHC nurses, the primary healthcare nurses* D3	*Our paramedics actually do a lot better, because they don't come in with a lot of […] baggage […] the way things should be structured, so they are far more openminded* D4 *Thankfully, emergency medicine has oversight in terms of clinical governance as far as the ambulance college is concerned. So there is still some sort of foot in the door* D4 *Again, taught quite a lot by some of the paramedics* D5

Subcategory: Joint staff and staff development

Many academic clinicians are appointed jointly by provincial departments of health and universities, which is not without its problems:

> *[X university] pays nothing at the moment, unlike [Y university] and I think Cape Town, the [Z university], the university does pay a component of your salary, which is supposed to be sixty-forty. […] so you are being paid completely by the Department of Health, which […] is not interested in […] training. D7*

A huge need exists for staff development of teaching skills:

> *It's just either you know it, or you don't know it, and you go and learn it, as opposed to: it's actually your responsibility [as lecturer] to find a way to teach in a different way. […] there is a lot to say for faculty development in terms of training. D4*

This includes empowering academic staff to use modern technologies:

> *So it would be nice to have resources in terms of faculty development for registrars, for the consultants in the province, for consultants at the teaching [X university] front as well, because we need ongoing development as well especially with advances in technology and because we are dependent on it, help us to […] shift 50 percent of the teaching onto the online platform. D4*

Category: Institutional memory

Curricula are designed by people, and many details are not explicitly mentioned:

> *These same people have been around for long, so they have some institutional memory […] of what's been happening over a period of time. So, whilst I think we don't necessarily have very effective documentation, it happens to some degree implicitly. D1*

Staff attrition might, however, threaten the continuity:

> *The person who has designed those curriculums or has knowledge of the longitudinal outcomes across the curriculum and who is responsible for that is actually not involved in the undergraduate programme anymore. D4*

Such broken links make organising training more difficult:

> *In terms of stakeholders […] it is in quite a bit of flux […] ever since the 2015 protests. With so many people exiting the programme or involvement therein, it's been a challenge to be able to say: okay, we need to now sit down with so and so and decide on a fixed plan in terms of how we are going to strengthen emergency medicine teaching with the undergraduate on the platform, because nobody knows who to speak to as yet. D4*

Category: Challenges related to students

Dealing with education implies dealing with students' challenges:

> *When it comes to second year the bottleneck starts, the step is too high for us to jump and we start failing. I mean their first test in anatomy, physiology is terrible, they fare badly and throughout the year some of them. D3*

> *Like any other student, whatever site you are, you may have a discipline problem. D8*

Students need to remain at the centre of the activity:

> *Our contact sessions are structured such that each specialty attends in that discussion, and most of those are around students' performance and students' learning gaps and finding ways to actually scaffold that learning or adjustments in the programme to accommodate them. D4*

Concluding on a positive note, great examples of longitudinal integration and interdisciplinarity are to be found:

> *But when you see a cardiothoracic surgeon coming when you are dissecting the chest and showing you the important things, I mean, ja, ja, including the pericardia and including the heart itself etc, I think it should generate excitement. D3*

In summary, challenges facing the teaching of emergency care skills are often related to either attitudes or resource constraints. A lack of commitment to teaching and upskilling oneself as a trainer is aggravated by increasing mismatches between staff and student numbers. Distances between sites, specialist disciplines and disease distribution on the clinical platform add further complexity to the consistent and standardised delivery of learning opportunities.

Conclusion

When it comes to keeping the teaching current and relevant, and demonstrating an active engagement with modern curricular concepts (Thomas et al. 2016), perspectives from the eight South African medical schools overlap to a large extent. As outlined above, the focus of a training programme needs to be on its relevance (Kent and De Villiers 2007; Academy of Science of South Africa (ASSAf) 2018) and on the skills and competency sets the graduates will need in their future practice (Frambach et al. 2015). Educational content is informed by evidence-based medicine guidelines, on the one hand, and by the actual case load and available interventions on the service delivery platform, on the other. Challenges in establishing the role of emergency medicine are a common theme at those medical schools where emergency medicine departments exist, much like the case in other African countries (Wen et al. 2011; Cox and Chandra 2013; Azazh et al. 2014).

Current best education practice determines the delivery of the curriculum (Carr et al. 2009; Tews and Hamilton 2011). Modern modes of content delivery are the backbone of successful education in a given resource environment (Chakravarthy et al. 2011; Heitz et al. 2011), and the focus of simulation training, with its potential and challenges, is in line with international developments. The same applies to the moves towards programmatic assessment (Van Der Vleuten and Schuwirth 2005; Norcini et al. 2018) to ensure that students are motivated to acquire the content set out in the curriculum.

Specific ‘institutional culture’ has a major impact on the realisation of education goals, as the lack of access to clinical, technical or human resource allocations might be major stumbling blocks (Cochran Ward et al. 2013), while a shared vision, mutual respect and ‘putting the money where the mouth is’ will facilitate great achievements.

Interestingly, only a very narrow focus is on ultrasound skills in the South African context, and this is usually done by emergency physicians, rather referring to the existing content for the postgraduate training of future emergency physicians. This is in stark contrast to the international literature (Soucy and Mills 2015; Phelps et al. 2016; Dietrich et al. 2017; Johri et al. 2018), where ultrasound training for undergraduate students, especially with a focus on emergency care, seems to be non-negotiable today. While the shortcoming in South Africa might be due, partially, to limited access to equipment, a lack of skills might be the other cause, and here emergency medicine is in a prime position to lead a fundamental curricular change.

Limitations of the study

We performed only one interview at each of the medical schools, which might have introduced selection bias. However, this is not a systematic review of the teaching at the various South African medical schools, but rather a ‘medley’ of views and experiences and, as such, benefited from the diversity of backgrounds of the interviewees.

Due to resource and time limitations, the coding and identification of themes was performed by the first author alone.

Notes on contributors

DH is a German trained family physician, jointly appointed by the University of the Free State and the Free State Department of Health. He is deeply involved in clinical service delivery and academic teaching at the university and the local district hospital.

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ML reports no declarations of interest.

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CHAPTER 5 - MANUSCRIPT 4

'ASSIGN SPECIFIC ROLES TO STUDENTS TO AVOID THEM BEING NOT SERIOUS!' A NOMINAL-GROUP-TECHNIQUE REVIEW OF UNDERGRADUATE MEDICAL STUDENTS' TRAINING IN EMERGENCY CARE, BASED ON EXPERIENCES OF RECENT GRADUATES

This manuscript was prepared for the journal as detailed below:

Submission guidelines used	African Journal of Health Professions Education
Attached as	Appendix D4
Title for submission	'Assign specific roles to students to avoid them being not serious!' A Nominal-Group-Technique review of undergraduate medical students' training in emergency care, based on experiences of recent graduates
Short title	Recent graduates' NGT review undergraduate emergency training
Submission date	not yet submitted

‘Assign specific roles to students to avoid them being not serious!’ A Nominal-Group-Technique review of undergraduate medical students’ training in emergency care, based on experiences of recent graduates

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Conflict of interest
The authors declare there is no conflict of interest on publishing this paper.

Author contributions

DH wrote the protocol under supervision by ML, DH organised the NGT sessions with the assistance of ML and created the first draft of the manuscript, both authors edited the manuscript and approved the final version.

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Abstract

Background

Competency in managing clinical emergencies is essential for medical practitioners in South Africa. This study expands on previous research that consulted undergraduate medical students, as recent graduates who participatd in this study provided a wider scope of experience.

Objectives

To obtain experience-based and relevant suggestions for improving the current teaching and to invite comment on the suggestions from the relevant managers.

Methods

A three-stage nominal group technique programme review was performed. In a first stage, recent graduates of the existing programme identified strengths and weaknesses. In the second stage, academic clinicians and technical experts provided suggestions for ways to address these challenges. In the third stage, the data obtained were discussed with academic managers responsible for the undergraduate medical programme.

Results

Findings were grouped into thematic categories, namely skills and short courses, module structure and content, experiential learning opportunities, health professions educational practice, and interprofessional education. Opportunities to gain experience as a team leader in emergencies in different clinical fields and in a multiprofessional team, both in simulation and in real-life practice, were among the highlights of the findings.

Conclusion

Many of the improvements that were suggested are achievable with the given resources, and recent changes due to the pandemic and lockdown have created an environment for change that benefits online-content-delivery. Recognising good teaching and learning activity is critical.

Background

Handling clinical emergencies is a fundamental skill expected of medical practitioners. At medical schools in South Africa, a broad range of approaches exist due the absence of a national curriculum. Ensuring competence in emergency care is an essential component of preparing graduates successfully for serving as entry-level practitioners who are working towards independent practice in their third (community service) year after graduation.[1,2] The paucity of literature on emergency care training for South African medical students prompted a previous nominal group study with undergraduate students.[3]

Aim

This study is a follow-up study to the one conducted two years prior. Whereas the earlier study focussed only on the students' experience with the emergency care content of their third-year module, the current study widened the view on emergency skills acquisition to the entire undergraduate programme. Performing the study among graduates from the programme rather than with students in the programmes allows the participants to critically value their training experiences against the knowledge and skills required from them in clinical practice after graduation.

Objectives

To obtain experience-based and relevant suggestions for the improvement of the current teaching and to invite comment on the suggestions from the relevant managers.

Methods

This qualitative, or as sometimes called, 'semi-quantitative', cross-sectional study consisted three steps, based on the 'Nominal-Group Technique' (NGT) for programme development which had been introduced in the 1970s by Delbecq et al.[4]

In the first step, a nominal-group was formed of medical interns who had graduated from our medical school and who had since completed either one or both years of the mandatory internship. Convenience sampling was done of graduates employed as medical interns at the local internship training complex, and all interns available and willing to participate at the time of the study were included.

In the second step we invited academic clinicians and education experts involved in the undergraduate medical programme at our medical school to reflect on the strengths and weaknesses identified by the graduates and to formulate suggestions for the way forward, both within the current resource envelope and with a view to additional resources required. For the conduct of both rounds we followed the steps as described above, with the group generating and discussing the ideas (qualitative data) and then voting them into a priority rank-order ('semi-quantitative' processing).

As a third step, the findings from these first two steps, together with the proposed categories and themes for improvement as well as a draft submission to the relevant committee overseeing the training activities, were presented to three academic managers in the undergraduate programme (programme director and the chairs of the educational committees for the two phases covering clinical content) for comment.

As the protocol constituted part of a postgraduate study in Health Professions Education, it had received academic evaluation, approval from the institution's Health Sciences Research Ethics Committee (UFS-HSD2017/1547/2801) and institutional permission from the university. Informed consent was obtained from all participants.

In addition to capturing and sorting the the hand-written NGT statements on a whiteboard, the discussions were audio-recorded and transcribed in order to analyse concepts and themes that might not be reflected in the written, summarised results of the NGTs.

Results

The two rounds of NGT discussions were held in November and December 2019. A discussion was held to verify the results with the 'resource controllers', i.e. the director of the undergraduate medical programme and the chairs of the pre-clinical and clinical phases of the medical training programme, who were invited to a discussion on the findings and a proposed way forward.

In the first round of NGTs, 11 (five women and six men) of the 25 current medical interns at the Bloemfontein complex who had graduated from the programme at the University of

the Free State (UFS) availed themselves. Six of them were completing the first year of their internship, and five were about to finish the second year. (*One female first-year intern left before the second question.)* Ranked results from this session are shown in Table 5.1 (Write down what you valued the most in the emergency care training during your undergraduate medical training at the UFS) and Table 5.2 (Write down suggestions on how to improve the emergency care training during undergraduate medical training at the UFS).

Seven participants constituted the panel for the second round; they represented the Departments of Obstetrics and Gynaecology (male specialist, training coordinator), Paediatrics (female medical officer, training coordinator), Family Medicine (male specialist, training coordinator and one male and one female specialist from the joint staff) and the Simulation Unit/ School of Basic Medical Sciences (female medical officer and male educational technologist). *(One female participant left before the second question.)* Ranked results of this session are shown in Table 5.3 and Table 5.4.

In the third-round discussion with the three academic managers of the undergraduate programme, the topics and themes suggested for improvement were considered in relation to their possible implementation and availability of resources to do so. A separate emergency medicine module appears unrealistic in the short to medium term, but the need to create longitudinal ‘themes’, which would also include palliative care, communication skills, ultrasound and community-based and interprofessional education was confirmed. Outcomes for such themes would have to be mapped and linked properly throughout the programme. Stewardship of these themes plays a crucial role through individuals taking ownership of the matters. Teaching and learning coordinators appointed in the clinical departments play a key role in ensuring the outcomes, but they will have to be supported in collecting and consolidating current and continuously updated protocols from their disciplines. Managers emphasised the availability of staff development opportunities and support resources and alluded to the individual lecturers’ responsibilities to take up such offers. Of sheer necessity, online content delivery enjoyed a major boost in the 2020 academic year, due to the COVID-19 pandemic, and achievements made in this regard need to be perpetuated and expanded. Step-by-step guides are available. Specific suggestions such as interprofessional education with the involvement of paramedic staff from the provincial emergency services, a focus on debriefing in the clinical context, and the use of a portfolio of learning were received positively and existing structures and projects in this regard were mentioned.

Table 5.1. Ranked responses by medical interns to 'Write down what you valued the most in the emergency care training during your undergraduate medical training at the UFS'

Rank	Response [score]	Thematic category
GS1	Allowing students to *assist with emergencies* and not to ask them to wait outside & practical experience in managing emergencies (simulation and hospital) [35]	EXP
GS2	*Repetition of basic skills* from third year onwards & start early from third year already [34]	SK/HPE
GS3	Getting a chance to work with *equipment you had never worked with* before, e.g. defib [20]	SK
GS4	Relaxed, *low pressure simulation* setting for practising [19]	HPE
GS5	Did *BLS certificate in 3rd year* already. Learn correct principles [17]	SK
GS6	Step approach (*protocols/outlines*) [10]	C
GS7	Being taught *basic skills before scenarios* (e.g. intubation) [8]	SK
GS8	Learning with others & *small group practice* sessions [6]	HPE/SK
GS9	*Experienced mentorship* helped a lot [5]	HPE
GS10a	Greatly emphasised that you have to *pass with a certain percentage*, and with every block at least one emergency [4]	C
GS10b	*Information before the actual practical session* to prepare for the practicals [4]	HPE

C = emergency module(s) structure and content; EXP = experiential clinical learning; GS = graduates – strengths; HPE/(I)HPE = health professions educational practice and interprofessional education; SK = resuscitation skills & short courses

Table 5.2. Ranked responses by medical interns to 'Write down suggestions on how to improve the emergency care training during undergraduate medical training at the UFS'

Rank	Response [score]	Thematic category
GW1	*Mock ACLS/ ATLS/ PALS course* [29]	SK
GW2	*Emergency module* on its own & well written, all-in-one study resource [19]	C
GW3	With simulations, *involve nursing students and EMS* as well [15]	IPE
GW4	More exposure to *be the team leader in a simulation* environment [14]	SK/HPE
GW5a	*Dedicated week* per block *to the emergencies* related to that rotation [12]	C
GW5b	Summarised *concise booklet* on how to treat common medical emergencies & more exposure to medical emergencies like hyperkalaemia [12]	C/EXP
GW7	BLS and *Basic Resus before you start calling* [11]	SK
GW8	*More simulated emergencies* frequently, e.g. every 3 months have one where we lead the team, and more tests [10]	C/HPE
GW9	*Logbook is not always the answer*. Students feel they will be penalised for not completing it and then write they have done it when they actually only witnessed it [7]	HPE
GW10	Make sure there is *enough time for each person to practice* enough. Even do 1-on-1 session if you see you do not have time & Supplemental classes for the students that struggle (1-on-1) [6]	HPE

C = emergency module(s) structure and content; EXP = experiential clinical learning; GW = graduates – wishes; HPE/(I)HPE = health professions educational practice and interprofessional education; SK = resuscitation skills & short courses

Table 5.3. Ranked responses by the technical experts to 'Write down suggestions, given current resources and based on the comments of the students, what you think can be done to improve the emergency care content and delivery in the undergraduate medical programme at UFS'

Rank	Response [score]	Thematic category
EC1	ACLS or other structured short courses with simulation to practise being a team leader & accredited course with self-study and certification in 3rd year & continue current BLS course [21]	SK
EC2	Get a basic (2 week) first aid course in first year [17]	SK
EC3	Unified approach between departments how things are taught, resulting in a reference guide [13]	C
EC4	Training in much smaller groups (4 – 6 students) [10]	SK/HPE
EC5	Have case discussions in smaller groups in addition to lectures [9]	HPE/EXP
EC6	In phase 3, have discipline-specific emergency cases in the curriculum of each clinical department [7]	C
EC7a	Structure in formal debriefing sessions (psychological and clinical) & teach students how to conduct it [4]	HPE
EC7b	Portfolio to capture experiential learning and reflection [4]	HPE
EC7c	Integrate/ provide solutions for resource-constraint environments [4]	C
EC10a	Interprofessional education simulations based on emergency scenarios (pre-hospital emergency care) [3]	(I)HPE
EC10b	Formal emergency medicine block [3]	C
EC10c	Have emergency medicine OSCE with pass/ fail stations [3]	C/HPE

C = emergency module(s) structure and content; EC = educators – current; EXP = experiential clinical learning; HPE/(I)HPE = health professions educational practice and interprofessional education; SK = resuscitation skills & short courses

Table 5.4. Ranked responses by the technical experts to 'Write down suggestions what additional resources and structures might be needed and how these would influence the delivery of the content'

Rank	Response [score]	Thematic category
EA1	Appointment of student preceptors (affiliated lecturers) to ensure the learning outcomes are achieved [15]	HPE
EA2	Appointment of new clinical staff to do the teaching in smaller groups [12]	HPE
EA3	Having approved, current clinical emergency protocols from each department [11]	C
EA4a	Money (grants/ donations, not from students) to finance study material/ staff etc) [9]	HPE
EA4b	Get the best, accredited courses for the students [9]	SK
EA4c	Have a properly functioning emergency (medicine) department at Pelonomi Tertiary Hospital [9]	C/EXP
EA7	Identify and equip (e.g. telemedicine) clinical training sites for emergency care, including private sites [8]	HPE
EA8	Make more use of videos, use university resources to produce them, as a team & more use of Blackboard/ train people to use it [6]	HPE
EA9	Have a formal agreement with EMS about mutual involvement in training [4]	(I)HPE
EA10a	Additional part-task trainers/ manikins to do skills training in smaller groups [3]	HPE
EA10b	Regular evaluation of the implemented developments [3]	HPE/C

C = emergency module(s) structure and content; EA = educators – current; EXP = experiential clinical learning; HPE/(I)HPE = health professions educational practice and interprofessional education; SK = resuscitation skills & short courses

Discussion

A range of themes emerged during the NGT discussions and can be summarised under the four categories of *resuscitation skills and short courses* (SK), *emergency module(s) structure and content* (C), *experiential clinical learning* (EXP), *health professions educational practice and interprofessional education* (HPE/(I)HPE). Next, we will discuss each of the themes. Themes are referenced with their placement in Tables 1 to 4, and with related literature reported in the literature review.[5]

Resuscitation skills and short courses

Formal advanced *resuscitation short courses* were top-of-the-list for both the graduates 'wish list' (GW1) and the educators' suggestions (EC1).[6] Such teaching events allow students to act as team leaders (GW4) and to train in small groups (GS8; EC4 & 5).[7] This finding echoes the graduates' appreciation of the spiralling of resuscitation skills (GS2, 3 & 7) and the provision of certified BLS training (GS5),[8] albeit more and earlier training would be desirable (GW4 & 7).[9] The introduction of additional formal courses, including early first aid skills training (EC1 & 2)[10] and training in smaller groups (EC4) is highly dependent on the commitment of resources.

Emergency module(s) structure and content

Structure and content of the module(s) was placed second on the 'wish list' (GW2), and involved a request for an 'emergency module'[11,12] with a 'well-written, all-in-one study resource' (GW2 & 5b), and reflected in the educators' demand for integration in a 'unified approach between departments' (EC3 & 10b)[13] and for 'approved, current emergency protocols' for each discipline (EA3), to expand on existing protocol-based approaches (GS6). Similarly valued (GS10a) and, at the same time, requested to be expanded (GW5b & 8) was the presentation of emergencies in the clinical rotations, with the graduates asking for a 'dedicated emergency week per rotation' (GW5a). The educator group responded to this by suggesting to 'have discipline-specific emergency cases in the curriculum of each department' (EC6),[14] plus the recommendation to 'provide solutions for resource-constrained environments' (EC7c),[15] and to 'teach preparation for the emergency' (EC13c).

Experiential clinical learning

Hands-on practice under supervision is the age-old concept of apprenticeship, and despite the invention of simulation-based skills training, clinical practice skills as an art-and-science are still mostly acquired in real-life encounters with patients.[16] The graduates, therefore, appreciated having been 'allowed to assist with emergencies' as students (GS1), but they wished they could have had more exposure (GW5b).[17] Lecturers would enjoy having case discussions in smaller groups (EC5), and suggested that students get 'exposed to pre-hospital emergency care' (EC13b)[18,19] and that they are 'assign[ed] specific roles and responsibilities during on-calls, to avoid them being 'not-serious' (EC16a) – although these suggestions didn't make it into the 'top-ten'.

Health professions educational practice and interprofessional education

Educational skills are essential for facilitating learning. Graduates lauded the 'relaxed, low pressure simulation setting' (GS4), 'experienced mentorship' (GS9) and 'information before the actual practical session to prepare' (GS10b). As suggestions for improvement, they mentioned more testing/assessment (GW8), enough time to practise (GW10), 'teaching by peers' (GW11b), and also tools, such as 'mnemonics and rhymes' (GW11a). Logbooks were criticised as being 'not always the answer', with students 'feel[ing] they will be penalised' (GW9) and 'teaching by humiliation or embarrassment is not teaching' (GW13).[20] Educators' suggestions for improving the assessments included the introduction of a 'portfolio to capture experiential learning and reflection' (EC7b) and the inclusion of 'pass/fail-stations' in a dedicated emergency medicine Objectively Structured Clinical Examination (OSCE) (EC10c). 'In-situ simulations in the clinical environment' could be a way to combine simulation-based learning with the real-life context (EC18b).[21]

Debriefing was mentioned, with lesser emphasis, by the graduates as 'helped a lot after real-life resus' (GS12) and in relation to a wish for 'more regular debriefing in the hospital setting' (GW14), indicating a staff development need on the clinical platform. This was echoed by the educators in the suggestion to 'structure in formal debriefing sessions (psychological and clinical) and teach students how to conduct it' (EC7a).[22]

Interprofessional education was another red thread running through the discussion. The graduates proposed to 'involve nursing students and EMS [emergency medical services] as well with simulations' (GW3),[23] resulting in the lecturers suggesting 'IPE simulations based on emergency scenarios' (EC10a),[24] and the exposure of students to pre-hospital emergency care (EC13b), possibly facilitated by a 'formal agreement with EMS about mutual involvement in training' (EA9) and 'better faculty coordination' (EA13).[25]

Resources

In keeping with the question posed, the second part of the educators' NGT provided a prioritised list of additional resources required. Obviously the most important were human resources, with a demand for appointment of preceptors (affiliated lecturers) on the extended training platform, as well as clinical staff (EA1 &2).[26,27] Providing 'current protocols' by departments and 'formal agreements with EMS' were mentioned above. Additional money, acquisition of 'accredited courses' and a 'proper functioning emergency department at […] Tertiary Hospital' were also seen as essential building blocks (EA4a–c).[28] Identification of and equipping (telemedicine)[29] with additional training sites (EA7),[30] the production of blended learning material (EA8),[31] and 'additional part-task trainers' (EA10a) complete the list. 'Evaluation of implemented developments' (EA10b)[32,33] and a 'focus on health education research' (EA12) would ensure quality.[34]

Comparison with previous study[3]

Students and graduates share an appreciation of practical, hands-on skills training, and the demand for a consolidated, well-integrated emergency module that provides clear protocols in a concise module guide was reiterated. Strengthening the training through increasing the numbers of sites, facilitators, formative assessments, simulation and task trainers and blended learning-use of videos resonates with the findings of our previous study.

Major differences are the increased valuation of both structured advanced resuscitation courses and the request for more exposure to and more independent (team leader) handling of real-life clinical emergencies, including the demand for structured debriefing, which can certainly be explained by the increased clinical experience of the participants and the broader focus of this study.

Interestingly, ultrasound skills were not mentioned in any of the discussions. This striking absence, in contrast to the vast presence of the topic as a basic skill in the recent literature on emergency skill training, suggests a 'blind spot', or an 'unknown unknown' shared by graduates and educators.

Recommendations for the way forward

Based on the above, the following is suggested:

- Creation of a dedicated emergency care/medicine module with clearly defined and mapped outcomes. This module should be driven by dedicated staff, preferably with emergency medicine qualifications, and should be well integrated with the teaching and practice of emergency scenarios in the clinical disciplines. Simulation, blended learning and ongoing formative assessment would be essential building blocks.

- This development needs to be complemented by a thorough needs assessment regarding online material development, simulation equipment and skills and the availability of a clinical training platform and skills (e.g. debriefing) of preceptors on this platform.

- Depending on the available 'resource envelope', small-group case-based teaching should be strengthened throughout the programme, and would ideally include skills short courses that range from basic first aid in the first year via cardiopulmonary resuscitation courses, up to advanced courses, such as advanced cardiac life support (ACLS) and advanced trauma life support (ATLS).

- In cooperation with other stakeholders in the academic institutions and on the service delivery platform, a comprehensive interprofessional education programme should use synergies and complementary skills of trainers, and should foster good interprofessional practice (e.g. handover, joint resuscitations).

Conclusion

Existing strengths of the programme were again highlighted, and many of the suggested improvements can be achieved with the existing resources. External circumstances, such as the lockdown and the resulting forced migration to distance-education tools, created a dynamic that can enhance the developments further. Significant additional resources are unlikely to be available in the foreseeable future, and recognition of good teaching and learning within the academic and clinical environment will be essential.

A submission to the joint advisory committee between the university and the Provincial Department of Health was drafted for submission.

Limitations

Due to time constraints and the impact of Covid-19, it was not possible to organise additional NGT sessions in the first and second step.

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CHAPTER 6 - MANUSCRIPT 5

UNDERGRADUATE MEDICAL EDUCATION IN EMERGENCY CARE AT SOUTH AFRICAN UNIVERSITIES, A FRAMEWORK

This manuscript was prepared for the journal as detailed below:

Submission guidelines used	Higher Education
Attached as	Appendix D5
Title for submission	Undergraduate medical education in emergency care at South African universities, a framework
Short title	Framework emergency care training
Submission date	not yet submitted

NB: The following manuscript derives a framework inductively from the findings presented in the manuscripts in Chapters 2 to 5. As these manuscripts have not yet been published and therefore cannot be cited as journal articles, references to Chapters 2 to 5 in the following manuscript also give the Chapter number and page number where the reference can be found.

Undergraduate medical education in emergency care at South African universities, a framework

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Abstract Care in acute emergencies is a key skill for future medical practitioners and should be acquired during training at medical school. Academic institutions are complex organisations, and academic medical schools all the more so, as they involve stakeholders from both higher education and health care delivery. We propose a framework to illustrate the multiple factors that influence the training of undergraduate medical students, which comprises the three main components of high-standard clinical practice, up-to-date educational practice and institutional culture. Each of the components is discussed in detail to introduce three contributing factors for each of them. Evidence-based medicine, contextuality and comprehensive competencies are contributing factors for high-standard clinical practice, while educational architecture, learning opportunities and assessment and evaluation contribute to up-to-date educational practice, and platform, people and programmes contribute to institutional culture. As tools to manage the complex interactions, we recommend strengthening health professions education competencies, stewardship of the coordination of clinical and educational change, and including emergency care skills in the different levels of outcomes, possibly aided by a collaborative research effort. (173 words)

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Declarations

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Authors' contributions All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Hagemeister. Labuschagne and Bezuidenhout supervised the research. The first draft of the manuscript was written by Hagemeister and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Keywords

Undergraduate medical education, medical school, emergency care, health professions education

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Introduction

Attending to a person in acute distress is one of health care professionals' most urgent activities and, if successful, also one of the most rewarding. Competencies required to provide relief in an acute clinical emergency need to be acquired during professional training (Hobgood et al. 2009). Future medical professionals are educated at academic medical schools the world over, and South Africa is no exception in this regard.

Nine medical schools at universities (Academy of Science of South Africa (ASSAf) 2018) in six of the country's nine provinces currently graduate around 1 800 new medical practitioners annually. We are deeply involved in the clinical and skills education at one of these universities, and we set out to explore the field of emergency care training of undergraduate medical students in a doctoral research project in health professions education. This included benchmarking the regulatory environment for undergraduate medical education in South Africa to the setting in other countries (Hagemeister and Labuschagne tbca, Chapter 2), a scoping review of literature on the topic published in the last decade (Hagemeister et al. tbc, Chapter 3), in-depth interviews with key informants involved in emergency care training at eight South African medical schools (Hagemeister and Labuschagne tbcb, Chapter 4), and a nominal-group technique review of the training at our own medical school (Hagemeister and Labuschagne tbcc, Chapter 5).

References and examples originate from the clinical or educational emergency care context. However, as the training of these competencies takes place in undergraduate medical programmes, the proposed framework and its constituents reach wider and often address general matters of health professions education too. We will use an example from emergency care, namely airway management to illustrate concepts across the clinical and the educational spaces.

Ecosystem of health professions education

The aim of this paper is to propose a framework in which health professions education and, more specifically, emergency care training in undergraduate programmes unfolds, based on the above-mentioned studies. Figure 1 shows this 'ecosystem of health professions education'. In their review of educational sciences for the teaching of resuscitation, Cheng et al. present the 'modified formula for survival', which factors in the three components, medical science, educational efficiency and local implementation (2018, p. e2). Analogous to this, we identified 'high-standard clinical practice', 'up-to-date educational science and practice' and 'institutional culture' as the major modifiable factors playing out in the training of undergraduate medical students.

Dual set of rules

Contraposition of 'clinical practice' and 'educational practice' mirrors, to some extent, the regulatory environment (Hagemeister and Labuschagne tbca, Chapter 2, p. 61), as well as the realities of the service delivery platform. Undergraduate medical programmes, by virtue of their nature as academic programmes for future health professionals, are governed by a dual sets of rules, namely rules for academic programmes (in South Africa under the stewardship of the Department of Higher Education and Training and the Council on Higher Education) and rules for health professionals (under the stewardship of the Department of Health and the Health Professions Council of South Africa). The platform for academic services is typically owned and run by a particular university, while the clinical service delivery platform consists of health care facilities governed by provincial governments (and, to a lesser extent, private and other stakeholders). This involuntary but essential partnership creates a complex environment, which, in turn, results in remarkably variable 'institutional cultures'. However, this overlap does not imply that the three factors could be separated and allocated to any specific stakeholder. Instead, they constitute a 'tripod' – a three-legged vessel much like the South Africa 'potjie' that is used for cooking, where each leg needs to be of sufficient and equal strength.

Interconnectedness of the constituents and environmental factors

Health professions education that does not involve teaching 'high-standard clinical practice' would be, at best, useless, if not harmful, as the clinicians it would produce would be unable to provide an appropriate standard of care. If 'up-to-date educational sciences and practice' are ignored, on the other hand, such education might be ineffective. Without accounting for the 'institutional culture', resulting obstructions might render training impossible to conduct. These three factors are, thus, interdependent, as illustrated by the example of ultrasound skills in emergency care. A new development, such as the use of ultrasound in the emergency room, has become an international standard (clinical practice). To be incorporated into teaching, skills trainers and approaches need to be identified (educational practice), yet, in the absence of the respective skills or the willingness to acquire skills and equipment in the institution (culture), nothing will materialise.

In the following sections, each of the three main factors will be discussed in detail. External factors, as shown in Figure 6.1 in the outer sphere (patients, students, resources, regulations, system and disease burden) influence the education enterprise through the three main factors, and will be covered accordingly, e.g., 'students' under 'institutional culture' or 'system' under 'contextuality' of 'clinical science and practice'. Interdependence between the factors is summarised in Table 6.1.

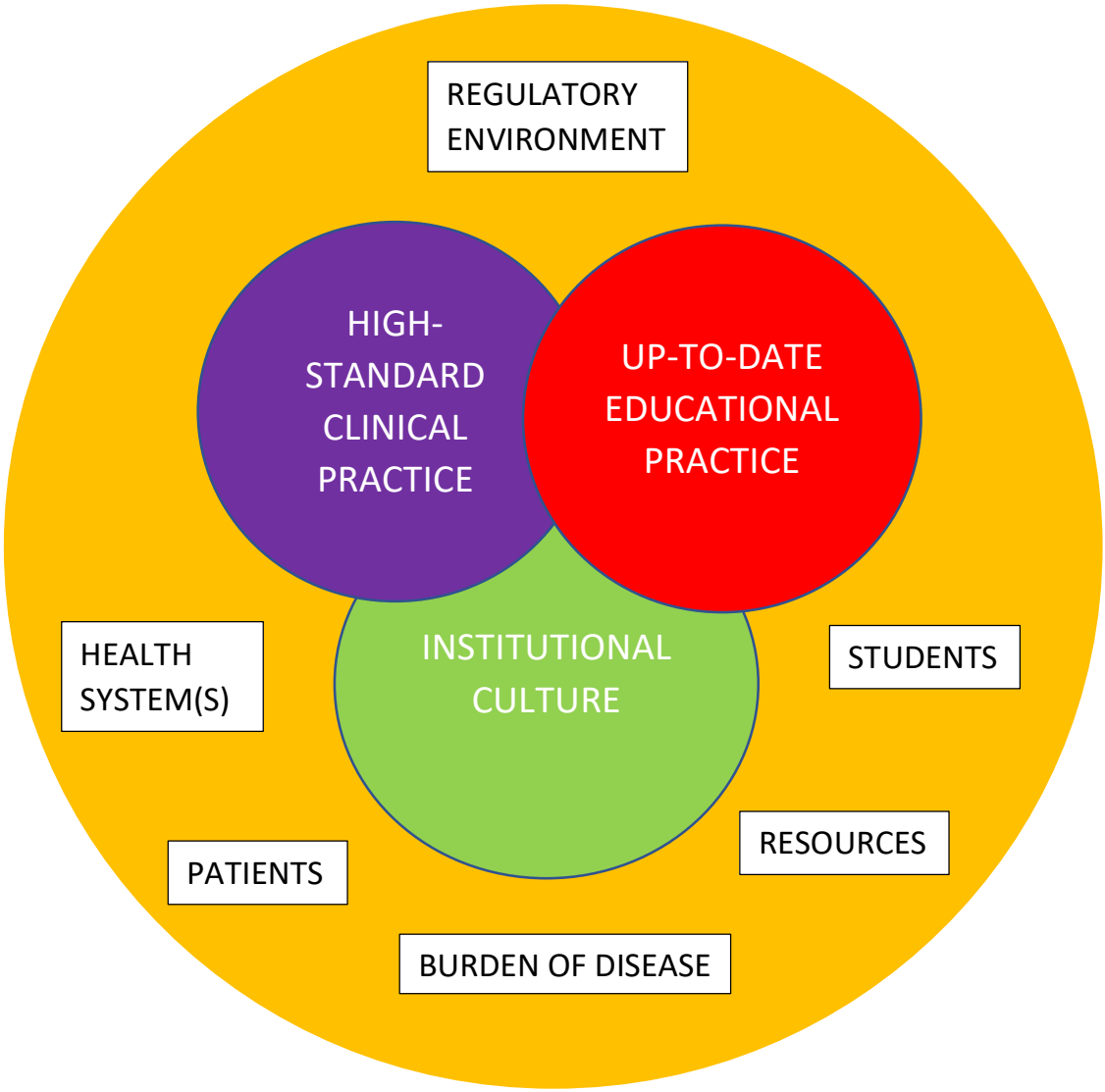

Figure 6.1: Ecosystem of health professions education

Table 6.1: Interdependence of factors

Framework factors	**Dependency on *high-standard clinical practice***	**Dependency on *best current educational practice***	**Dependency on *institutional culture***	**Facilitating tools and interventions**
Evidence-based medicine	Part of	Requires effective educational tools for spreading	+ Openness to new developments - Power/'eminence-based' structures	Clinical stewardship, continuous professional development, standardisation committees, resource allocation (clinical)
Contextuality of clinical practice	Part of	+ community-based education + local research and data + usage of local guidelines	- lack of community focus - absence of local role models	Emphasis on local context (guidelines, data), Research focus
Comprehensive skills set	Part of	+ inclusion in outcomes and assessment + focus on process competency - focus on content acquisition	+ lived values (e.g. communication, respect)	Reflective practice (feedback), Communication skills training, Information management skills (e.g. guideline retrieval)
Educational architecture	+ education goals aligned with community/society needs + education outcomes reflecting up-to-date skills set	Part of	+ strong 'education' competence/department in faculty - historical structures ('powerhouses') in the faculty	Development of technical expertise (HPE), Curriculum review, Outcome mapping
Learning opportunities	+ exposure to EBM best practice - unavailability of skills/equipment on service platform	Part of	+ available sites and facilities (clinical and simulation) - staff shortages - access problems (site ownership, distance)	Resource allocation (educational), Review and alignment of outcomes and learning opportunities, Review of failures to achieve, Programme feedback by students
Assessment and evaluation	+ assessment of relevant competencies + comprehensive and representative assessment - perpetuation of outdated tools and content	Part of	+ staff competence in education (assessment tools) + comprehensive assessment strategy + alignment of outcomes and assessment practice	Assessment training (HPE), Review of outcomes, Technical assistance/external peer review
Platform	+ selection of relevant (for outcomes) and up-to-date clinical sites	+ skills labs (simulation, computer, anatomy, etc.) in line with EBM needs	Part of	Formal agreements between stakeholders (higher education institutions, Department of Health, emergency medical services)
People	+ acquisition and retention of relevant skills	+ recognition of best educational practice + skills development (HPE)	Part of	Clear performance framework for education and service delivery, Career opportunities for 'education specialists'
Programmes	+ enabling clinical environment (guideline access, IT support) + 'systems view'	+ adequate tools for online teaching, outcome mapping, feedback - ignorance/lack of support	Part of	Peer feedback and support on recent developments Clear institutional policies

EBM: evidence-based medicine; HPE: health professions education; +/-: factor discussed in the row will be positively affected by the dependency in the column

High-standard clinical practice: EBM, contextuality and comprehensive competence

Future clinical practice is the main purpose of health professions education. Clinical practice at medical schools needs to be sound and current. In this section, three aspects of 'high-standard clinical practice' will be discussed: the scientific base of 'evidence-based medicine' (EBM), the contextuality of clinical practice with regards to geography/health systems/disease burden, etc., and the need for clinicians to possess comprehensive sets of competencies beyond the narrow disease-treatment relation.

Evidence-based medicine

Science is the backbone of modern clinical practice, as represented by the concept of evidence-based medicine (Sackett et al. 1996). With an exponentially growing amount of study-based evidence, however (Colquhoun et al. 2014), 21st century's clinicians are challenged by a massive overload of information, rather than by the struggle to access data, as in previous centuries. Systematic (e.g. Cochrane) reviews of available evidence have been introduced to consolidate the available evidence into clinical recommendations, and today, evidence-based guidelines that are published and updated by national or international organisations are a mainstay of clinical practice. The International Liaison Committee on Resuscitation provides an ongoing review of available evidence and provides recommendations for resuscitation. These recommendations, published at five-year intervals and containing major revisions, demonstrate one prominent character of clinical guidelines: They change! (Hazinski et al. 2015; Merchant et al. 2020; Soar et al. 2019) and, so, should the clinical practice guided by changing guidelines. For airway-management, a gross change occurred in 2010, when the previous sequence for cardiopulmonary resuscitation of airway-breathing-circulation (ABC) was changed to circulation-airway-breathing (CAB) (Nolan et al. 2010). Newer airway adjuncts, such as supraglottic airways, demonstrate another aspect of modern medicine: human anatomy might not change, but the tools we use on it do. Guidelines and algorithms are published to assist current and future clinicians to manage emergency situations (Frerk et al. 2015).

Scientific advances, however, do not automatically imply good clinical practice. Most academic clinicians have experienced the tension between clinical research and practical implementation. Converting research findings into best clinical practice is a complex matter, and research-focussed medical schools tend to neglect education goals (S. W. Bloom 1989, p. 236). It is, therefore, important to understand and be sensitive to the context of clinical practice.

Contextuality of clinical practice

If called up to an inflight passenger emergency on an airplane, a highly specialised intensivist who routinely pulls through severely ill patients with the use of high-tech equipment, might be disadvantaged, compared to a rural medical practitioner who is used to practicing medicine with very limited resources. This is just one example of how geography of practice, the availability of resources and the specific setting of the case contextualise clinical skills and knowledge. David Sackett's classic definition of EBM emphasises the role of individual expertise: "The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research" (1996). While bringing in individual expertise opens the Pandora's Box of clinicians' stubbornness (to be discussed below), it also points out a key weakness of systematic evidence: the best available evidence, in itself, is contextual and might not be transferable to the current problem. Local epidemiology and comorbidities are examples of such contextuality, and lower-income countries often lack applicable evidence.

Clinical contextuality in teaching

Being 'relevant and responsive' by conveying content and skills that can be applied in the local context is key for medical education (Hagemeister and Labuschagne tbcb, Chapter 4, p. 136f). Unavailability of certain devices (e.g. laryngeal tubes) in a South African hospital setting renders teaching their use futile; furthermore, the COVID-19 pandemic resulted in temporary revision of protocols, such as avoiding 'listen & feel' for breathing over a patient's mouth, or early intubation during CPR to 'seal' the airway (Resuscitation Council of Southern Africa 2020).

A further example of the context-sensitivity of clinical skills teaching is the expectations of the graduate held by the health system and the regulatory environment. Newly graduated European doctors might never manage a delivery unless they specialise in obstetrics, while their South African colleagues will have to do this many a time in the district hospital during their mandatory community service (Hagemeister and Labuschagne tbcb, Chapter 4, p. 136). Students, rightfully, ask for inclusion of 'approaches for resource limited settings' (Hagemeister and Labuschagne tbcc, Chapter 5, p. 171). On the other hand, one might ask whether we are being left behind as clinicians in South Africa when new tools, such as ultrasound, become international gold standards (Hagemeister et al. tbc, Chapter 3, p. 85), but are, in South Africa, largely confined to postgraduate specialist training (Hagemeister and Labuschagne tbcb, Chapter 4, p. 143) and do not even cross the mind of graduates and educators in a programme review (Hagemeister and Labuschagne tbcc, Chapter 5, p. 173).

Comprehensive set of competencies

Contextuality and up-to-date clinical content are essential for the sound preparation of future clinicians, but more is required. So-called 'soft skills', or better, 'non-technical skills', are increasingly recognised. As general academic graduates will face ever-changing environments over their careers in the 21st century, the South African Qualifications Authority, two decades ago, spelled out a set of 'Critical cross-field education and training outcomes', which require students to "identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made", in addition to teamwork, communication, self-efficacy and reflection and the critical use of science and technology (2000). For the health professions, the Commission on Education of Health Professionals for the 21st Century calls for a third major reform of health professions education (after the previous adoptions of science-based and problem-based education respectively) towards "transformative" and "systems-based" learning (Frenk et al. 2010). In South Africa, the 2018 consensus report on "Reconceptualising Health Professions Education" addresses these matters, including a focus on interprofessional education (Academy of Science of South Africa (ASSAf) 2018, p. 103) – a deficit also identified by our graduates (Hagemeister and Labuschagne tbcc, Chapter 5, p. 167) – and emphasise the core competencies (Academy of Science of South Africa (ASSAf) 2018, p. 131). The Canadian CanMEDS is a well-known set of roles for the medical graduate, which guides the acquisition of competencies, e.g. as a communicator or a health advocate, and has been adopted in South Africa (Frank et al. 2015; Health Professions Council of South Africa, Medical and Dental Professions Board 2014).

Information society and staying current

The 4th Industrial Revolution (4IR) – creating an 'information society' – comes with its own implications for clinical practice and, by extension, for the training of health care professionals. In health professions education the focus shifts from knowledge acquisition, to information processing and life-long-learning. For emergency skills, while the educator should share the current best-practice skills (Hagemeister and Labuschagne tbcc, Chapter 4, p. 145f), students need to understand the temporary nature of current recommendations (Glasziou et al. 2011). Besides the 'current-best-clinical practice', the provider must also acquire a willingness to review and even retrain such practice, based on future changes in clinical sciences. Identifying and accessing appropriate sources of innovations and revised recommendations is a precondition for staying up to date. At the same time, the future professional needs to be capacitated to advocate for the availability of innovations (e.g. of certain airway adjuncts: health advocate), communicate its use (and its non-use due to, e.g., futility in terminal disease: communicator) and execute its use effectively with the team at work (leader and collaborator).

In summary, future health professionals need to practice according to current best evidence recommendations within their specific context of availabilities and needs, while displaying the comprehensive set of graduate attributes that enables them to communicate, collaborate, advocate and lead effectively, and self-manage towards being a well informed, up-to-date professional.

Up-to-date education science and practice

Education sciences in health experience an exponential growth, not unlike that in clinical sciences, and systematic reviews of education science on resuscitation now appear next to those on clinical science (Cheng et al. 2018, 2020). Educational practice in undergraduate medical programmes requires ongoing review and revision of not only the clinical content taught, but also of the educational approach to the way it is being taught. Up-to-date educational science and practice was, therefore, identified as the second major contributing factor in our framework.

Guilbert's educational spiral (1992) has been 'flattened' into a three-segment cycle of 'learning objectives', 'instructional methodology' and 'assessment and evaluation' (Amin and Khoo 2002, p. 70). The following section will discuss the application of best educational practice under slightly changed headings, by widening the concept of 'learning objectives' to 'educational architecture' and interpreting instructional methodology as 'learning opportunity' (Figure 6.2).

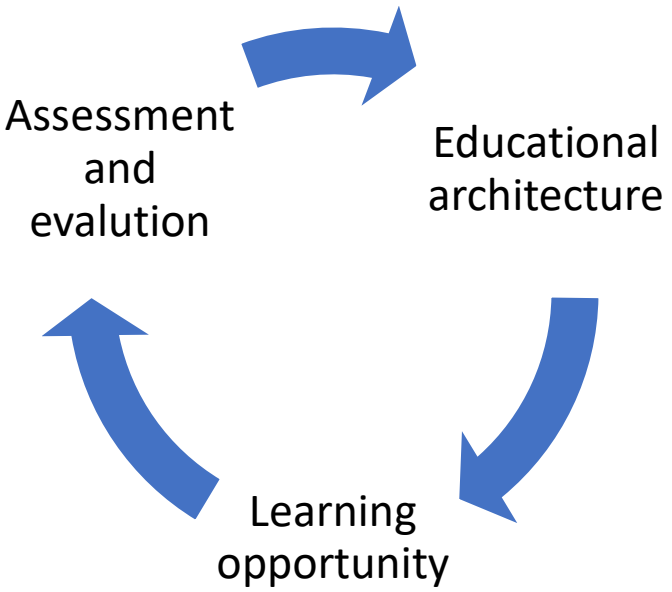

Figure 6.10: Educational cycle (modified from Amin 2002)

Manifold tools are available for education projects, from guidance on curricula (Hobgood et al. 2009; Thomas et al. 2016) and outcome descriptors, such as entrustable professional activities (EPAs) and

graduate attributes for the blueprint (Association of American Medical Colleges 2014; Frank et al. 2015), via building blocks for the educational process, such as the flipped classroom/blended learning and simulation, all the way to the assessment of the graduates through, for example, programmatic assessment (Van Der Vleuten and Schuwirth 2005).

Educational architecture

Whose work is most important in constructing a building might depend on whom one asks this question, but little doubt will exist that, without proper and competent planning, the project is unlikely to succeed. “Education is a process, the chief goal of which is to bring about change in human behaviour” and “the result of education is an expected change of the behaviour of the student in the course of a given period” (Guilbert 1992). Our review of the regulatory environment (Hagemeister and Labuschagne tbca, Chapter 2, p. 64f) and the literature published on emergency care training (Hagemeister et al. tbc, Chapter 3, p. 84) indicates a shift towards outcomes-based education with increased use of entrustable professional activities (EPAs). A surgeon’s apprentice of old would not have had an explicit ‘learning plan’, but would acquire knowledge, skills and attitudes by ‘imitating’ his master. Flexnerian institutionalisation of medical education (Flexner et al. 1910) required the curriculisation of the process, and lead to content and method being described. However, where the curriculum, on the one hand, gives structure, it also cements the status quo, on the other. Reforms towards problem-based learning and community-based learning were initiated (Frenk et al. 2010), and often hit ‘institutional concrete walls’ and ended up as ‘reform without change’ (S. W. Bloom 1989; Mennin and Kaufman 1989).

Danger of overload

Given the ever-growing amount of medical scholarship, a constant threat to medical education is the ‘wild growth’ of content without measures to contain it. Much like a primary health care provider would consolidate the multitude of patients’ specialist scripts into a single, effective prescription without mutual contraindications and adverse drug interactions, the designer of a modern, learner-centred curriculum has to provide a concise path to the acquisition of essential competences, without drowning the student in historical ballast (Hagemeister and Labuschagne tbcc, Chapter 4, p. 137). In the educational enterprise, ‘less is more’, with a focus on ‘memorisability’ and ‘teachability’, contrary to the excitement of academic clinicians adding new insights to the syllabi every day, but in keeping with educational recommendations (Cheng et al. 2018, p. e9f; Thomas and Abras 2016, p. 67).

Outcomes-based education

When it comes to designing the learning experience, outcomes-based education (OBE) 'starts from the end', by describing what the 'change of behaviour' looks like as 'the graduate is able to …'. Competence-based education adds concepts of deliberate learning and mastery to this outcome (Cheng et al. 2020, p. s557), owing to the need for professional training programmes to allow benchmarking for certification purposes. EPAs represent a further refinement of this approach. Rather than describing individual skills competencies, the graduate is meant to be competent to perform a (often more complex) professional activity with a degree of reliability (ten Cate 2013). A major advantage of the EPA approach is that documents on a more strategic level, such as exit-level outcomes and curricula for academic programmes, can abstain from defining individual skills while still ensuring graduates' ability to handle certain situations. Using the airway example, a 'competence' outcome would be, "is able to demonstrate endotracheal intubation on an airway simulator and an uncomplicated patient", while the EPA would rather require, "is able to secure a threatened airway in an uncomplicated anatomy". The latter, thus, allows more flexibility for both process and future developments; even if the tools and clinical guidelines change, the strategic EPA statement remains relevant. However, in light of constant change, the detailed operationalisation of learning opportunities to achieve the required competencies in syllabi has become even more demanding in terms of review and coordination. EPAs in themselves are more of a framework – scaffolding – for the actual algorithmic and skills competences to be 'filled-in'.

When operationalising such learning outcomes into educational activities, congruency and educational efficacy are important, but have to be balanced with safety needs. Remembering Bloom's three categories of outcomes, cognitive, psychomotor and affective (B. S. Bloom et al. 1956), learning opportunity and assessment method need to be congruent: if the outcome is that the graduate needs to be able to do something (e.g. intubate), learning and assessment need to have the student do it – reading will not provide a congruent learning experience, and answering a multiple-choice test would be incongruent assessment.

Designing learning opportunities: the education vehicle

Where the curriculum, as the overall strategic plan, defines exit-level outcomes and some overall determinants of the programme such as prescribed modules, the more intricate 'inner-structure' plays out in documents such as syllabi for individual disciplines or guides for modules. As the actual, explicit recipe for the execution of the educational enterprise, it needs to clarify 'what' is to be learned, 'who' is going to teach it, 'how' it is going to be taught, 'when' and 'where' (Hagemeister et al. tbc, Chapter 3). A major challenge in creating and maintaining this system lies in the coordination of teaching and learning activities within and between modules (Hagemeister and

Labuschagne tbcb, Chapter 4, pp. 138f & 145). To create a clinician who is competent to manage an airway, as overall exit-evel outcome, is one thing, but merely deciding which anatomical and physiological knowledge, which induction drug pharmacologies, which tools and equipment skills are relevant, is already something different entirely. And that is without even having decided whether a paramedic turned skills facilitator in the simulation unit, an anaesthetic registrar in the elective theatre, or the medical officer in the emergency department, will convey the skills of handling a human throat with a laryngoscope to insert an endotracheal tube past the vocal cords (Hagemeister and Labuschagne tbcb, Chapter 4, p. 142). Many clinical tasks are a complex mix of knowledge, skills and attitudes. Securing the airway of a patient with severe burns on the face requires knowing that certain induction drugs are contraindicated, requires the dexterity to find the right pathway in distorted anatomy, and the ability to overcome possibly strong feelings of fear or disgust. Breaking these tasks down into individual development steps and accommodating them in an enabling environment is what is referred to 'scaffolding' in a 'spiralling' approach: the learner gets opportunities to acquire skills on more and more advanced levels within a supportive system. Teaching is 'facilitating learning', and teachers need to learn to facilitate learning. Duration and tools required might differ, and flexibility to accommodate different needs should be included (deliberate learning). Kolb's cycle (Figure 6.3) visualises the concept of experiential learning (1984).

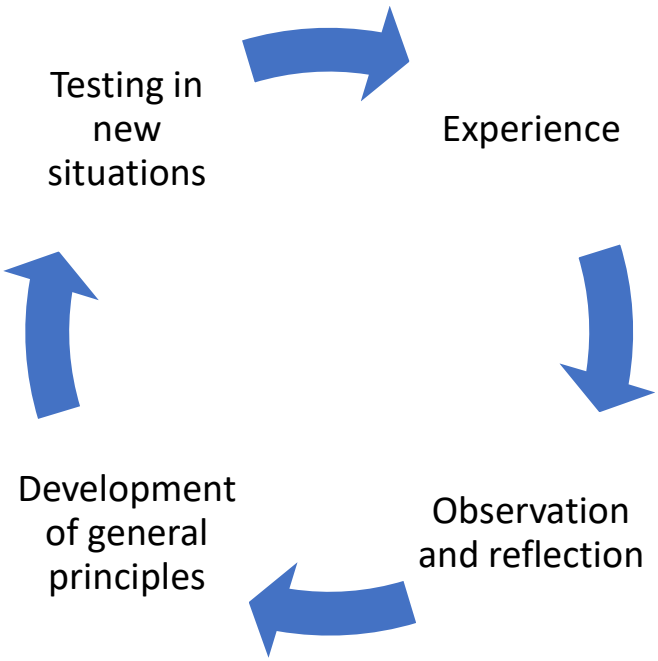

Figure 6.11: Kolb's cycle of experiential learning

At the same time, learning opportunities and outcomes need to be integrated, both vertically (over time, e.g. between the anatomy lecture and the skills practice) and horizontally (between concurrent events, such as the clinical emergency medicine and anaesthetic rotations). A stepwise approach

introduces the relevant basic anatomy first, traditionally through lectures, textbooks and practical dissections of corpses and, these dayss aided by blended learning with videos and digital content. Simulations, then, provide the necessary ‘muscle memory’ before the student proceeds to the application of skills to real patients. Concepts such as ‘spaced learning’ with repeated return to skills training on a simulator or gaming (the utilisation of the innate joy of playing) are additional ways to improve the retention of learned content (Cheng et al. 2018; Hagemeister et al. tbc, p. 138). Further integration would include the cooperation with other training programmes for the purpose of interprofessional training.

Assessment and evaluation

A well designed assessment structure can assist the learning process through timely feedback (formative assessment), and should allow a ‘final’ judgement about whether the learner is competent to proceed to the next level of training, or even, ultimately, can be considered a competent practitioner for registration purposes. However, like the other parts in this framework, poor assessments might even be distracting and harmful to the intended learning. As for learning opportunities, many different assessment tools are available, often specific for one domain of outcomes. Multiple choice questions (MCQ) and essay question papers, whether paper-based or digital, largely cover the cognitive domain, OSCEs and observational tools, such as mini clinical evaluation exercises (mini-CEX) and direct observation of procedural skills (DOPS), which are more geared towards psychomotor and communicative skills. Many observational assessment tools have been created for resuscitation and related skills, such as teamwork (Cheng et al. 2018, p. e18). As the learning cycle indicates, assessment is an integral part of the process and itself gives guidance again for the further process.

Programmatic assessment

To get a more comprehensive picture of competences and to do justice to the complexities of clinical practice, a programmatic approach to assessment has been suggested (Norcini et al. 2018; Van Der Vleuten and Schuwirth 2005). Quality indicators of the assessment are contextual. the reliability of an assessment depends greatly on the number of (adequate) samples, and validity depends on using an appropriate and congruent tool on the right competence level. For the emergency airway context, a number of OSCE stations to assess psychomotor skills, possibly together with high quality MCQs that integrate basic physiological and pharmacological knowledge into clinical judgement, might give a reasonable idea. Again, correlation to the expected level of competence is essential, as the use of common airway adjuncts should be routine practice at the end of undergraduate medical training, while an emergency ‘surgical airway’ (cricothyrotomy) would only be taught to the ‘can describe the procedure’ level. Logbooks aim to ensure sufficient exposure and feedback during experiential

learning, while higher levels of the amended skills pyramid, such as professional identity (Cruess et al. 2016), can only be assessed through more longitudinal observation, such as workplace-based assessment (Norcini and Burch 2007) using portfolios. Professional graduate attributes, such as communicator or advocate, include attitude outcomes, which is the most difficult-to-assess domain of the three. Here, real-life observation of behaviour (by means of a reflective portfolio) would be the ultimate, albeit resource-intense, tool. While an OSCE could cover the technical aspects of 'managing a threatened airway', real-life behaviour might differ, for example, in that the student is too scared to cut into the throat.

In summary: successful acquisition of the necessary emergency competencies by the medical graduate depends on proper design and execution of the educational programme. Identification of clear and appropriate outcomes (competencies, attributes, EPAs) for the entire programme and each of its modules, and the successful coordination of these between the stakeholders needs to lead to the provision of adequate and sufficient learning opportunities and end with the confirmation of the successful acquisition of competencies in well designed and programme-embedded assessment. Evaluation of the assessment results, as well as structured feedback from students and educators, need to close the loop for maintenance and improvement of programme quality.

However, health professions education happens in a real-world environment, and therefore, the actual setting has a major impact on learning, as will be discussed in the next section.

Institutional culture and systems context: Platform, people, programmes

Sporn describes the culture of a university as a major factor in its management (1996). Medical schools as social institutions (S. W. Bloom 1989) have been described as inherently resistant to change (Mennin and Kaufman 1989; Rotem and Bandaranayake 1981). Leadership attitude in the faculty and significant staff exodus due to institutional tension have been named as disabling challenges (Hagemeister and Labuschagne tbcb, Chapter 4, p. 152f). In the following section, institutional culture will be discussed regarding the role it plays for and through people, how it affects the platform and places available for teaching and the importance of programmes.

People

Despite 'institutional' resistance, change can be achieved in organisations (Gale and Grant 1997; Mennin and Kaufman 1989). However, change happens with, by and through people. People are the most important assets at educational institutions. As humans, we are living by the experiences that shaped us, and we assess new experiences against ones we had previously. New topics need stewards,

who remind the system of the need for change and to push – they need enthusiasm displayed by ‘champions’ to infect others.

Medical schools have specialists in clinical fields, and often, subspecialists for even smaller clinical fields. Such specialist focus might, at times, be counterproductive for the teaching of generalist content, such as ‘a general approach to’ (Hagemeister and Labuschagne tbcb, Chapter 4, p. 144). There is also a clear need for specialists in the fields of education, including curricular development and assessment, or the development of online material. And education needs hands, and dedicated staff time, even on the clinical platform, as expressed by the educators in our NGT (tbcc, Chapter 5, p. 169). Academic clinicians are typically torn between the three tasks of research, clinical work and teaching, with the latter often receiving the least dedication.

On a national level, the need to strengthen the educational competences of academic staff through skills development and rewards has been identified (Republic of South Africa, Department of Higher Education and Training 2018). Health professions education, with its unique setting of jointly appointed staff (between the provincial department of health and the university) is even more complex than other academic fields (Hagemeister and Labuschagne tbcb, Chapter 4, p. 152). Performance management and development for academic clinicians is typically done through provincial processes with little or no interest in teaching (or research). This complicates recognition and structured development of clinical teaching.

Another obstacle for effective clinical teaching is the above-mentioned ‘individual-’, or ‘eminence-based’ medicine. Academic clinicians are characterised by two traits, namely the wish to teach things ‘their way’ and to start a case discussion from the special and exceptional aspects, rather than from general protocols. Both tendencies hamper student progress: instead of learning one general and consistently applied protocol, students are exposed to the anaesthetic department’s protocol for rapid sequence induction versus the emergency medicine department’s protocol (Hagemeister and Labuschagne tbcb, Chapter 4, p. 145 & 149), or to Dr X’s sequence of listening to confirm the proper endotracheal tube position as opposed to Prof Y’s way. Concepts of spiralling the learning process, from basic principles to the more exceptional circumstances, scaffolded by a memorisable structure, recommend otherwise.

The key people on the other side of education service delivery are students. Academic institutions in South Africa historically served selected parts of the population, with regard to both ethnicity and language. Democratic changes in the 1990s removed most formal barriers. This has resulted in a significant change of student demographics and begs the question whether curricula have been adjusted to accomodate this (Academy of Science of South Africa (ASSAf) 2018; Council on Higher

Education 2013). Does the learner have to be ready for the institution, or the institution ready for the learner?

Platform (and places)

Medical education as experiential learning happens in a clinical context. Patient care provides the learning opportunities to develop consultative, diagnostic and therapeutic skills (Nordquist et al. 2019). However, these academic clinical sites are not owned by the universities, but are usually controlled by provincial health departments (Republic of South Africa 2005 section 51), which receive additional funding from the national government, which has shown the intention to move them under the control of the national government (2017). Many of the academic clinicians on this platform are joint appointees, as mentioned above, reporting to two 'bosses'. This comes with the previously mentioned tensions between staff tasks and development goals, but might also disconnect the medical school as 'resource-user' from the provincial resource control regarding filling and prioritisation of posts (Myburgh n.d.). Increasing student numbers (Hagemeister and Labuschagne tbcb), and the competition for clinical training sites between universities complicate access to the clinical service platform. Additional challenges are uneven or unrepresentative case distributions that limit the comprehensive learning experience of students, vast distances to reach some of the training sites, and the related need for student accommodation (Hagemeister and Labuschagne tbcb, Chapter 4, p. 149).

Cooperative clinical governance between provincial and academic stakeholders synergistically improve clinical services and the students' learning experience, e.g. if clinical lead departments at the university, such as anaesthesia for airway management, take up the challenge to ensure that referring hospitals in their drainage area have the necessary clinical skills available.

As mentioned above, the existence of well positioned specialist departments has a strong influence on the content and delivery of the curriculum (Hagemeister and Labuschagne tbcb, Chapter 4, p. 148f), in the sense that 'specialists want to train specialists'. An anaesthetist subspecialised in paediatric surgery might struggle to understand that basic anaesthetic skills are just one competence among many others needed by a medical officer in a district hospital (De Villiers 2006). Here the 'who' (is teaching) drives the 'what' (is taught).

The teaching platform also includes all the settings needed for the students' learning experiences throughout the programme, such as dissection halls, simulation and skills units and computer labs.

Programmes

In this case, the term program has a dual meaning, as both the academic and staff development programmes and the information technology (IT) environment are covered in this section. Firstly,

there will be little doubt that any academic institution, its employees and its graduates will have to be computer-literate in the 21st century. Students entering the academic space in South Africa are often not fully computer literate, even though they might still outperform their lecturers. It is paramount to develop the academic workforce through training and recruitment, so that members are eager to deliver online learning content. This can only occur in a supportive environment that provides both the skills and the infrastructure (hard- and software) to cause such skills to blossom. Examples of such support include, but are not limited to the use of IT to present lecture content online, to design and perform assessments online, to obtain student and staff feedback, to create and maintain an online portfolio or to map educational outcomes and curricular structure.

Secondly, dedicated staff development and support 'programmes' will need tangible outcomes – what performance is expected, how is it going to be measured … and rewarded, and what tools/ teams/courses are available to support this development (Republic of South Africa, Department of Higher Education and Training 2018). This is where the departments/divisions of health professions education play a role (Burch and Norcini 2019; Keshmiri et al. 2019). As the stewards of 'good educational practice', health professions education must open the space for staff development to 'teach-the-teacher-to-teach and allow-the-learner-to-learn'. However, above and beyond strengthening educational skills, health professions education needs to be the driver of change in academic programmes, from regular revisions of content and outcomes to interprofessional interaction with other professional programmes. Health professions education needs to be the steward of good educational practice in the clinical field and foster matters such as standardised protocols, debriefing skills and formative assessments (Hagemeister and Labuschagne tbcc, Chapter 5, p. 167f).

In summary: Medical schools represent a complex environment, dominated by a variety of stakeholders and interests. Proper coordination is essential for the functioning and further development of a medical school. Much of this development is achieved by people and through people. Leadership needs to be demonstrated, staff needs to be developed, and students need to feel welcome and be given the learning opportunities they deserve. Physical and financial resources are important, but a lot can be achieved by commitment and the right priorities.

Conclusions and recommendations: 'Toolbox' to address the complexities of relationships of the above constituents

As stated above, none of the three key constituents (clinical, educational, institutional) of the framework represents a factor independent of the other two, instead, there is a rather complex and bi- (or multi-) directional relation between the three dimensions. Key to the mapping of some of these complex interactions is the human actor within the system, although the influence individuals could have on the system might be mitigated (or aggravated) through institutionalised processes.

Challenges differ significantly between different countries, and even within the same country, medical schools will experience gross differences with regard to, e.g. epidemiology, clinical service platforms, educational resources and curricula. Therefore there are no 'one-size-fits-all' solutions. In the following sections, we suggest a number of 'should-haves' as well as a more general 'way-forward' to facilitate undergraduate medical education in emergency care.

Health professions education

A structured approach to staff development in the field of teaching and learning is paramount (Republic of South Africa, Department of Higher Education and Training 2018). The responsibility will lie with the academic institution, even though the target population should ideally include clinicians at provincial facilities that are involved in undergraduate teaching. This development might involve a levelled approach – high-level educational training required for key 'educationalists', such as programme directors or heads of schools, less stringent requirements for module leaders, and some basic training on bedside teaching for clinical preceptors. Such development needs to reflect in strategic faculty documents and filter down into operational plans and job descriptions. The role of staff dedicated to the development of teaching and learning skills, from health professions education divisions to expert offices for curriculum development or assessment planning, can hardly be overemphasised. On a national scale, peer-review mechanisms will assist in developing educational skills, even on the clinical platform, through sharing of strengths and identification of weaknesses (Mash et al. 2019).

Emergency skills in exit-level outcomes, curriculum and syllabi

Emergency care competence needs to be included in national regulatory documents (Hagemeister and Labuschagne tbca, Chapter 2, p. 68). Programme exit-level outcomes as EPAs need to be supported by enabling competencies (Association of American Medical Colleges 2014). Specific competencies, e.g. endotracheal intubation, can then be assigned to modules and be mapped throughout the programme, to ensure adequate integration and spiralling. However, EPAs, in a holistic sense, are more than the sum of their enabling competencies, or put differently, the student who acquires a box full of competencies still needs to gain the overall plan where and when to apply them – in effect, 'a general approach to' clinical presentations (Checkett et al. 2019).

On a strategic level, the changes proposed above would require understanding curriculum as a highly dynamic system, which needs regular maintenance, major revisions at regular intervals and a lot of work and commitment to make the educational spirit encapsulated in the curriculum document a living and thriving reality (Kern and Thomas 2016, p. 168).

Stewardship for and coordination of emergency care content

Emergency care happens in many settings and is provided by many specialities. Basic skills, such as airway management, CPR and advanced life support algorithms, are required whether a cardiac arrest occurs in internal medicine, orthopaedic surgery, obstetrics or under the care of an anaesthetist in theatre. The emergency protocols that are used tend to be as diverse as the clinicians involved. Instead of a 'general approach to', students are confused between a 'surgical approach to' and an 'internal medicine approach to'. Emergency medicine has established itself as the clinical and academic lead for general, integrated approaches. However, many medical schools in South Africa do not have departments of emergency medicine, and at others, such departments struggle to obtain a 'standing on eye-level' with more established departments. Stewardship and advocacy are essential in achieving change, and emergency skills would benefit from strong stewardship.

Yet, stewardship alone will not achieve the change – a responsive and enabling environment is needed. Given the complexities described above, characterised by multiple clinical disciplines and staff members reporting to different employers, structures such as resuscitation committees for the review of equipment, practice and skills, are essential. This needs to be balanced against the common 'committeetitis' at academic institutions, where an entire working life might be spent rushing from one committee to the next. 'Clinical quality and standardisation committees' on an institutional or even provincial level could provide the entire service delivery platform with guidelines, e.g. for rapid-sequence-induction, basic resuscitation or emergency equipment.

Way forward

A national set of outcomes would go a long way in guiding undergraduate medical education in South Africa. These outcomes could be written as EPAs, according to the example the Association of American Medical Colleges has provided (2014). Using EPA 10 from the American document as example ('Recognize a patient requiring urgent or emergent care and initiate evaluation and management'), a research project could develop a consensus list of emergency scenarios and related skills, and competency lists for emergency care training, thus mirroring similar developments in the postgraduate field (Hagemeister and Labuschagne tbcb, Chapter 4, p. 139 & 143).

Similar cooperation would be desirable for the more cognitive parts of the field, which can be assessed by means of MCQs. Based on a catalogue of EPAs, and topics suggested above, these MCQs could be used for formative assessment during undergraduate programmes, as well as, eventually, in a national exit exam similar to the one introduced in North America (Heitz et al. 2016).

Limitations

This framework is derived inductively from findings in the empirical research studies but has not, itself, been studied empirically.

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CHAPTER 7 - CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

7.1 INTRODUCTION

This study was motivated by the identification of a gap regarding integrated emergency care training by undergraduate medical programmes in South Africa. The preceding chapters presented the research plan with background and methodological discussions, in Chapter 1, and the findings of the four phases of the study, written up as manuscripts and presented in Chapters 2 to 6. In this final and concluding chapter, a summary overview of the findings will be provided, followed by a discussion of the research objectives as spelled out in Section 1.7, and an explanation of how they were addressed through the methods and the findings. This will be followed by a discussion of how addressing these objectives answers the overall research question and the detailed research questions as listed in Section 1.6. After these discussions, general limitations of the study will be considered, recommendations resulting from the study will be summarised and concluding remarks on the research will be made.

7.2 OVERVIEW OF THE STUDY

Emergency care training for undergraduate students is an essential albeit problematic issue for existing medical programmes in South Africa, as outlined in Chapter 1. Basic concepts of emergency medicine and health professions education were illustrated in the introduction in Chapter 1. However, the wealth of clinical emergency medical insights and a similar treasure of educational concepts and wisdoms do not always translate into solid outcomes in terms of graduates' emergency care skills. This gap was identified, and correlated research questions and objectives were formulated to guide the planning and execution of this study. The findings as presented in the manuscripts in Chapters 2 to 6 will be discussed here in response to the individual research objectives. After stating the objectives, the methods of the research speaking to each specific outcome will be listed, followed by a more detailed outline of the answers these parts of the study provided to the respective objective.

7.2.1 Objective 1

The objective was stated as,

I. *(a) To gain a comprehensive understanding of current national and international trends in the teaching of emergency care to undergraduate students of medicine, and*
(b) To identify existing examples of outcomes and competencies to be achieved in integrated emergency care curricula, based on the information obtained from key role players at South African medical schools.

This objective required an overview of developments in the teaching of emergency care in South Africa and international. To achieve this, firstly, a targeted internet search of regulatory documents from accreditation bodies for undergraduate medical training was performed, complemented by an analysis of available recommendations from professional associations in the field of emergency medicine. The results were presented in manuscript format in Chapter 2. Secondly, a wider structured search of databases of published journals covering the years 2009 to 2019 was conducted. The findings were presented as a manuscript for a scoping review in Chapter 3. Lastly, the in-depth interviews with key stakeholders at South African medical schools as outlined in Section 1.9.2 and reported as a manuscript in Chapter 4, yielded a wealth of insight into the trends and approaches of the local undergraduate medical training community.

With regard to the first part of the objective concerning trends in the teaching of emergency medicine, the following was found:

- Most of the international accreditation bodies (e.g. in the United Kingdom, the European union, Australia, Germany, United States, Nigeria) have included emergency care competencies in the formal requirements for exit-level outcomes of the medical programmes. South Africa and Canada are notable exceptions (Chapter 2).
- Entrustable professional activities (EPAs) are the latest development in formalising exit-level outcomes (Chapters 2 and 3).
- Emergency medicine, where it exists as a clinical discipline, plays an increasingly important role in undergraduate medical education. This includes the creation and

expansion of clinical rotations or clerkships in emergency medicine (Chapters 3 and 4).

- Skills teaching, generally, takes place in a simulation environment, and skills range from simple psycho-motor skills to complex processes and social skills (leadership, communication) (Chapters 3 and 4).
- Resuscitation skills training is typically based on standardised short courses and international guidelines (Chapter 3 and 4).
- Ultrasound in the emergency room (point-of-care-ultrasound or POCUS) is an established, standard diagnostic tool in the United States and Europe and, as such, it is taught during undergraduate medical training (Chapters 3 and 4).
- Clinical experiential learning typically takes place in the emergency department, and to a lesser extent in select programmes only in the pre-hospital care (Chapters 3 and 4).

With regard to the second part of the objective, concerning outcomes and competencies for integrated emergency care training, the following findings can be reported:

- In South Africa, the absence of emergency-related outcomes in the HPCSA document guiding undergraduate medical training resulted in only one of eight exit-level outcome documents of the SAQA database containing a reference to the management of emergencies (Chapter 2).
- Training of future medical practitioners in South Africa is aiming at producing competent entry-level practitioners. However, the legally required career trajectory through a two-year internship and subsequent one-year community service requires these early career practitioners to be able to manage undifferentiated patients and emergencies independently in a district hospital context (Chapter 4).
- Among international models, the American Association of Medical Colleges' (AAMC) document on EPAs in undergraduate medical education provides good guidance how to approach the challenge of creating EPAs for undergraduate training (Association of American Medical Colleges, 2014; Englander, Flynn & Call, 2014).
- Regarding skills and competency lists, detailed guidance can be found in the documents of the AAMC (Association of American Medical Colleges:Medical School Objectives Project, 1998), the German Council of Medical Faculties (Medizinischer Fakultätentag & Gesellschaft für Medizinische Ausbildung, 2015) and, probably most

appropriately for the South African setting, the International Federation for Emergency Medicine's (IFEM) model curriculum (Hobgood *et al.*, 2009).

- At this point, no universal emergency-care-related outcome objectives (or undergraduate medical training outcome objectives in general) exist in South Africa.
- Medical schools in South Africa are expected to, and are therefore busy mapping outcomes through the year and the levels (exit level, year, semester level and module level) of programmes. Some schools (e.g. UKZN, SMU) use dedicated software for this purpose (Chapter 4).

7.2.2 Objective 2

The objective was stated as,

II. To collect evidence on the educational approaches currently in use, and content and structures that facilitate the acquisition of emergency medical care competence in undergraduate medical programmes at universities in South Africa.

Through this objective, a thorough understanding of the approaches to emergency care training, as currently applied at medical schools in South Africa, was sought. This objective was informed, firstly, by the findings of the document review on regulations (Chapter 2), and took place against the background of published international best practices (Chapter 3). The in-depth interviews conducted, as outlined in Section 1.9.3, at the eight medical schools in South Africa that have graduated MBChB students (Chapter 4) provided comprehensive information on the current approaches at these institutions. The following findings can be reported:

- Curricula for the undergraduate medical training (MBChB) at universities in South Africa are structured in modules.
- At some institutions – those with an academic department of emergency medicine – an emergency medicine module exists. Other institutions convey the clinical content related to emergencies in an acute care module, or as an integral part of other, discipline-specific clinical modules.
- Emergency medicine departments, where they exist, continuously attempt to take a lead role in providing structured approaches to common clinical presentations (cardinal symptoms), in keeping with the conceptual foundations of this discipline.

- Undergraduate medical programmes in South Africa are committed to reviewing curricular content and structure on a regular basis. However, this happens at vastly different intervals and to different extents at the eight medical schools.
- Establishing good education practices, such as scaffolding and spiralling of skills development, and longitudinal and horizontal integration of teaching, are on the agenda of key role players in the field, but often face challenges related to the structural and historical realities at the medical schools.
- Simulation-based skills units constitute the backbone of skills training at the medical schools, although the range and the number of skills trainers varies significantly.
- Resuscitation and other emergency skills are often taught by interdisciplinary teams from different clinical specialities (anaesthetics, emergency medicine, surgery, family medicine). and often by interprofessional teams involving registered nurses and paramedics.
- Where registrars and consultants in emergency medicine are available, they contribute significantly to undergraduate training, but the often-significant teaching burden collides with their academic and clinical responsibilities.
- The mismatch between increasing student numbers and limited resources is a common theme across the medical schools in South Africa.
- Horizontal and longitudinal coordination of training between the involved stakeholders is another common challenge, and the tools available to achieve this differ. Where multidisciplinary modules are offered, meetings between the lecturers involved serve the purpose of coordination. In other contexts, committees and workshops are meant to provide a platform for coordination, but face competition from manifold other commitments of the staff involved.
- Training on teaching and assessment skills for academic staff, including clinicians, is an essential need that is met to a varying extent at the different institutions.
- Clinical content, both knowledge and skills, is often defined by the speciality departments involved in its teaching. Syllabi and outcome mapping are often incomplete, and the actual practice tends to differ from the planned curriculum.
- Assessment is provided both in a formative manner during the modules, and in a summative manner. A mix of methods covering both knowledge (e.g. MCQ tests) and psychomotor skills (e.g. OSCE) are applied. The trend towards more integrated and programmatic assessment has been realised to different extents at the various institutions and involves logbooks and other tools for workplace-based assessment.

- Assessment criteria are skills and knowledge outcomes as spelled out in the module guides. Higher level, integrated assessment criteria, such as scenario-based assessments that enable entrustment decisions related to EPAs, remain to be developed.

7.2.3 Objective 3

The objective was stated as,

III. To identify strengths and weaknesses of the existing programme and to formulate appropriate outcomes, educational approaches and assessment criteria for improvement, based on information obtained from local key role players at the UFS.

Through this objective, a critical review of current education practice at the UFS was intended. To achieve this, the three-staged NGT review of the current teaching of emergency care was performed, as outlined in Section 1.9.4 and reported as a manuscript in Chapter 5. The following findings were made:

Themes that emerged during the NGT discussions were summarised under the four categories of *resuscitation skills & short courses*, *emergency module(s) structure and content*, *experiential clinical learning*, *health professions educational practice and interprofessional education*.

Resuscitation skills and short courses

Formal advanced *resuscitation short courses* were at the top of both the graduates' 'wish lists' and the educators' suggestions. Such teaching events enable students to act as team leaders and to train in small groups. Graduates appreciated the spiralling of resuscitation skills and the provision of certified basic life support training, although more and earlier training was requested. Educators suggested introducing additional formal courses, including early first aid skills training and training in smaller groups, but this would depend greatly on the commitment of resources.

Emergency module(s) structure and content

Structure and content of the module(s) was placed second on the graduates 'wish list'. They requested an "emergency module" with a "well-written, all-in-one study resource", while

the educators demanded integration in a "unified approach between departments" and the provision of "approved, current emergency protocols" for each discipline to expand on existing protocol-based approaches. Similarly valued and, at the same time, requested to be expanded was the presentation of emergencies in the clinical rotations, with the graduates asking for a "dedicated emergency week per rotation". The educator group responded by suggesting to "have discipline-specific emergency cases in the curriculum of each department", and added the recommendation to "provide solutions for resource-constrained environments" and to "teach preparation for the emergency", in addition to the actual management of emergencies.

Experiential clinical learning

Hands-on practice under supervision is the age-old concept of apprenticeship, and despite the invention of simulation-based skills training, clinical practice skills as an art-and-science are still mostly acquired in the real-life encounter with patients. The graduates, therefore, appreciated having been "allowed to assist with emergencies" as students, but desire more exposure. Lecturers would enjoy having case discussions in smaller groups, and suggested that students are "exposed to pre-hospital emergency care" and that they get "assign[ed] specific roles and responsibilities during on-calls to avoid them being 'not-serious'".

Health professions education practice and interprofessional education

Educational skills are essential for facilitating learning. Graduates lauded the relaxed, low-pressure simulation setting; and experienced mentorship and information before the actual practical session to prepare. As suggestions for improvement, they mentioned more testing/assessment, enough time to practise, teaching by peers, and also tools such as mnemonics and rhymes. Logbooks were criticised as not always being the answer, with students expressing the fear that they will be penalised – teaching by humiliation or embarrassment is not teaching. From the educators' side, came suggestions for improvements to the assessments, including the introduction of a portfolio to capture experiential learning and reflection and the inclusion of pass/fail-stations in a dedicated emergency medicine OSCE. In-situ simulations in the clinical environment are a way to combine simulation-based learning with real-life context.

Debriefing was mentioned, with lesser emphasis, by the graduates as "helped a lot after real-life resus" and with a wish for "more regular debriefing in the hospital setting",

indicating a staff development need on the clinical platform, which was echoed by the educators in a suggestion to "structure in formal debriefing sessions (psychological and clinical) and teach students how to conduct it".

7.2.4 Objective 4

The objective was stated as:

IV. To develop a framework for the integrated emergency care curriculum, using the results from Objectives I–III.

This objective intended to achieve a summarising synthesis of the findings of the empirical parts of the studies. The researcher, thus, utilised the findings from the review of regulations and published literature on emergency care training (Chapters 2 and 3), the insights gained from the in-depth interviews at the South African medical schools (Chapter 4) and the comments and suggestions obtained regarding current practice at the UFS (Chapter 5). The framework was written up as a manuscript for a publishable paper, and was presented in Chapter 6. The following model was suggested.

The overall framework is constituted of three main, modifiable factors, namely, evidence-based clinical practice, best current education practice, and institutional culture. These main factors are closely related and mutually interconnected and constitute the main targets for managerial interventions to improve the training of undergraduate medical students. Within the 'ecosystem of health professions education', they exist within a surrounding world of less modifiable factors, such as the health system, regulatory environment, resources, disease burden, students and patients.

Each of the three major factors is characterised further by a set of three contributing factors under the respective major factor.

For *evidence-based clinical practice*, the actual up-to-date *evidence-based medicine,* as published on an international and national level, the *contextuality* of clinical practice due to its geographical and situational setting, and the *comprehensive skills set* required by a good practitioner of evidence-based clinical practice, including but not limited to interpersonal

and communications skills and the ability to manage the vast amounts of information relevant in the field, and retrieving the relevant information successfully.
For *best current education practice*, these contributing factors are *educational architecture*, *learning opportunities* and *assessment and evaluation*. *Educational architecture* refers to the need for sound curricular structure and planning, applying concepts such as scaffolding, spiralling, longitudinal and horizontal integration and the definition and mapping of outcomes. *Learning opportunities* cover the idea of teaching methods, and emphasises, at the same time, the focus on the students' achievement, rather than on the educators. Assessment and evaluation bring home the insight that successful education projects need to be designed with the end in mind, where formative and summative assessment of the learning achievement are a well-integrated part of the plan.

Institutional culture, as a last pillar of the model, is characterised by the three contributing factors, *platform*, *people* and *programmes*. *Platform* refers to the physical (and increasingly digital) spaces where teaching and learning take place. *People* refers to the important role individual human beings play in the enterprise of education – people are the 'recipients' and the 'providers' of education, and the management of this resource is a key factor for success. Lastly, *programmes* refers has a dual meaning and refers to both the electronic environment that supports the education project, and to professional development programmes for educators.

Characterised by these factors, the environment (or ecosystem) for emergency care training in the undergraduate programmes is a complex one. Several tools to manage and improve the complex interrelations are suggested.

- Creating, sustaining and growth of expertise in education through institutionalised and well-supported programmes in health professions education.
- Adequate coordination and alignment of teaching efforts between the various people and disciplines involved.
- Explicit inclusion of emergency care competence in the exit-level outcomes, and the appropriate translation of these into EPAs and supporting competences, which are well reflected and mapped throughout the curricula and syllabi.
- Provision of strong stewardship for the field of emergency medicine, and its integration with other clinical and pre-clinical disciplines to ensure the continuous provision of skills

training that is aligned with latest developments and consistent across the clinical and academic platform.

- Establishing of a clear and sustainable regulatory environment for the staff involved in training, whether on the university, the provincial service delivery or the joint staff establishment platform. This includes adequate career paths for educationalists and agreement on the roles and workloads of the different stakeholders. Progressive and cooperative management on the side of all institutions involved is essential.

7.2.5 Research questions of the study

The overall research question for this study was phrased as:

> *What educational strategies should be used to enhance the emergency care curriculum by means of an integrated undergraduate clinical emergency care programme?*

The following research questions were addressed by the specific objectives of this study:

Research question 1:

> *What are the essential outcomes/ competencies in the field of emergency care to be achieved during undergraduate medical education?*

Based on the findings from the literature reviews and the in-depth interviews, as discussed above this research question was answered by objective I:

I. *(a) To gain a comprehensive understanding of current national and international trends in the teaching of emergency care to undergraduate students of medicine, and*
(b) To identify existing examples of outcomes and competencies to be achieved in integrated emergency care curricula, based on the information obtained from key role players at South African medical schools.

Research question 2:

> *What are the educational approaches and methods to achieve these outcomes?*

Based on the findings from the in-depth interviews and informed by the background of the literature reviews, as discussed Section 7.2.2, this research question was answered by objective II:

II. *To collect evidence on the educational approaches currently in use, and content and structures that facilitate the acquisition of emergency medical care competence in undergraduate medical programmes at universities in South Africa.*

Research question 3:

> *What are the assessment criteria for the integrated emergency care programme?*

Based on the findings from the in-depth interviews and the NGT and informed by the background of the literature reviews, as discussed above in Sections 7.2.2 and 7.2.3, this research question was answered by objectives II and III:

II. *To collect evidence on the educational approaches currently in use, and content and structures that facilitate the acquisition of emergency medical care competence in undergraduate medical programmes at universities in South Africa.*

III. *To identify strengths and weaknesses of the existing programme and to formulate appropriate outcomes, educational approaches and assessment criteria for improvement, based on information obtained from local key role players at the UFS.*

Research question 4:

> *What organisational framework is required to facilitate the achievement of these outcomes?*

Based on the findings from the in-depth interviews and the NGT and informed by the background of the literature reviews, as discussed in Section 7.2.4, this research question was answered by objective IV:

IV. To develop a framework for the integrated emergency care curriculum, using the results from Objectives I–III.

7.3 CONCLUSIONS

In summary, the findings discussed in the previous section allow the following conclusions:

- Emergency care competencies are stated as a separate educational outcome objective by many regulatory authorities.
- Skills and competencies required for the management of emergencies constitute a longitudinal theme in the undergraduate programmes.
- Identification and mapping of specific educational outcome objectives within curricula, academic years and modules remains a challenging enterprise, but should be facilitated in the future by the increasing use of electronic tools for the mapping of educational objectives.
- Emergency medicine departments play a growing role as stewards of academic teaching and clinical delivery of emergency care.
- Graduates from the programme at the UFS and their educators suggested the strengthening of short-course-based skills training, structural improvements and better integration of the emergency care training in the programme, increased opportunities for experiential learning as a team and the further development of education skills.
- The framework derived inductively from the findings of the empirical research emphasises the complex interaction between clinical practice, educational practice and institutional culture.

7.4 REFLECTIONS ON THE RESEARCH

Although this doctoral research was an exciting, often demanding and eventually rewarding exercise, there are limitations and challenges to be addressed.

Some external circumstances were not favourable to the conceptualisation and conduct of this study. The initial drafting and finalisation of the protocol was delayed by challenges in the researcher's workplace. Similarly, the COVID-19 pandemic during the final year of this journey delayed some of the interactions and discussions that were planned, however, most of these obstacles were overcome by the 'new normal' of electronic communication.

As is often the case, initial plans for data collection and review proved to be rather ambitious, and at times, excessive. The extensive literature review based on online databases resulted in a massive workload. A wider review of existing undergraduate medical programmes with a view to identifying outcomes and assessment criteria turned out to be unachievable, because of the difficulty of sourcing these documents from the various medical schools, and because of the sheer workload a comprehensive mapping of outcomes across eight or nine undergraduate programmes would imply. Such an endeavour might justify a postgraduate research project on its own.

In some cases, gaining access to key informants for the in-depth interviews at the eight medical schools turned out to be difficult, as tackling the two hurdles of obtaining institutional permission and identifying available interviewees with the required insight into the local programme was a lengthy and cumbersome process at some institutions. Though it might have been desirable to obtain more than one perspective from each of the medical schools, e.g. one from the side of academic programme coordination and one from the clinical in-service teaching side, the researcher is still confident that the diverse set of interviewees allowed for a sufficient saturation of information about relevant aspects.

Resource limitations with regard to funding and time also reflect in the fact that coding of qualitative data in the literature review and the in-depth interviews was only performed by one researcher. However, the interviewees were repeatedly involved in the quality assurance of the process, as transcripts and coding tables, as well as the draft manuscript, were shared with the interviewees for verification.

7.5 LIMITATIONS

As this study was conducted at South African medical schools and had a focus on the South African regulatory framework, the applicability of the findings in other contexts might be limited.

Even though implementation is an important and relevant matter, due to resource limitations, this study does not cover the eventual implementation of the curriculum framework and its implied changes to the undergraduate programme at the UFS.

A formal validation of the framework by means of a Delphi technique, similarly exceeds the resource envelope for this study, which would be worth considering at a later stage.

This study also does not cover issues regarding postgraduate training in emergency medical care, or the training of emergency care skills in undergraduate programmes other than the MBChB (undergraduate medical) programme.

7.6 RECOMMENDATIONS

Based on the findings of this study, and following from the insights outlined above, the following recommendations are made.

To further research the identified gap regarding integrated emergency care training, a multi-institutional review of emergency care related objectives in the curricula of the medical programmes should be pursued. This study could only obtain gross information on the structure and sequence of modules addressing the topic of emergency care. Future research could utilise the increasingly available electronic mapping of educational objectives across modules and academic years, which would provide for a more detailed picture of the integration or lack thereof.

To utilise national synergies, and in the absence of a prescribed single medical curriculum in the country, work and resources should be committed to developing a South African national set of undergraduate medical EPAs. Much like in the example of the United States, one of the EPAs should cover emergency conditions, and a national endeavour to identify

relevant conditions under this EPA could be executed through, for example, a Delphi process.

On a national level, the competency to "manage relevant emergency conditions" should be included into the HPCSA's curriculum guideline (Republic of South Africa, Minister of Health, 2009). Such guidance would, hopefully, result in medical schools including an emergency competence outcome in their exit-level outcomes.

Undergraduate medical programmes in South Africa should recognise emergency care as one of the longitudinal themes that need continuous dedication and attention throughout the programme, comparable to themes such as communication skills or palliation and end-of-life care. Common to these *themes* is that they are basic skills in many disciplines and contexts of modern health care, and are often not 'ringfenced' in a specific academic discipline.

Where they exist, emergency physicians and their departments play an important role in organising and advocating for integrated emergency care training. However, since emergency physicians are a scarce resource, and some of the medical schools function without them, a steward for emergency care training needs to fill the void. Such stewardship of emergency care could expand beyond undergraduate medical education and could provide for a champion of emergency care in its many different aspects, including, but not limited to, the most up-to-date resuscitation guidelines and clinical management protocols for undifferentiated presentations with cardinal symptoms.

Medical schools are a challenging, and sometimes difficult, environment. To create educational competency amongst clinicians in these schools, a combined effort of providing adequate professional development opportunities through health professions education programmes, and motivating them to attend these events through recognition and career progression in the faculties might be necessary.

7.7 VALUE, SIGNIFICANCE AND CONTRIBUTION OF THE STUDY

7.7.1 Value

This study addressed the optimisation of the teaching and learning of undergraduate medical emergency skills in the School of Clinical Medicine, UFS, with many of the insights also being relevant for other undergraduate programmes. The study intended to achieve an indirect improvement of health outcomes in emergency situations managed by graduates of this programme.

7.7.2 Significance

The study focussed on an issue that had not been researched in the local context in the Free State province, or in South Africa as a whole, before. It provides insights that can assist the management team in the Free State as well as other academic institutions in a similar position.

7.7.3 Contribution

The framework provides guidance on the resources, structures and tools needed to enhance the training of emergency care skills through delivery of an integrated curriculum.

7.8 CONCLUDING REMARKS

From a philosophical point of view, if I may refer to the section on epistemology, the work remained largely within the confines of the dominant paradigm. For the conceptualisation and execution of this study, the current practice of medical care for emergencies served as guidance. Investigations and the collection of empirical data took place against the unspoken background assumption that this practice is serving our communities well, and that the optimisation of competence creation in this practice would improve the health of the people we care for.

Much of the study, therefore, and rightfully so, concerned itself with technical aspects of undergraduate medical training. From curriculum structure to clinical content issues and from education techniques to assessment models – most of the discussions in this thesis addressed the question of *how to*.

When we consider responsible academic leadership, however, the technical expertise of *how to* needs to be complemented by a strong foundation on the *why*. Such justification might be regarded as stemming from the sphere of spirituality and, as such, unsuitable for an academic discourse. Yet, this would be aiming too short, as it negates and neglects our innate need as humans to attribute sense to what is happening in our lives. Pioneering thinkers in medical education have ventured to interrogate the very foundations of our medical model with a view to identify "Identity, Power and Location in medical Education". (Bleakley *et al.*, 2011: 61) With their critical reflection on the founding assumptions of medical education, they followed other critical thinkers in other fields, such as patient-clinician interactions (Balint, 1957), the role of medicine in society (Illich, 2013), the role of medical institutions (Foucault, 2012), cultural background in medicine (Rothman, 2003), and the role of education in general (Freire, 1996). Considering Kuhn's ideas about paradigm shift (Kuhn, 1996), this could well indicate a paradigm in crisis.

It is, therefore, the sincere hope of the researcher that he will not only find an opportunity to apply the six-step approach to curriculum development for medical education (Thomas *et al.*, 2016), but also to do this based on a critical needs assessment that takes such challenges to the very foundations of the paradigms into account.

We should not only to ask whether the doctors we train have the skills to deal with relevant clinical emergencies; we should also ask whether our training provides our society with the professionals our people want to have helping them. We should not only ask whether our graduates can manage the emergencies we identify, but ask whether the emergencies we identify are the ones that concern the community, and are the emergencies that the people in our communities would like to be relieved of, and, thus, not only to ask whether the resources we commit to the task of emergency care training of undergraduate medical students are used effectively, but whether we are using such resources efficiently on behalf of our society.

To conclude, the example given by one of the leaders in emergency medicine in southern Africa might illustrate this view: When asked to advise on the creation of a community resuscitation programme in a neighbouring country, he apparently replied by asking what would happen to the patients after successful resuscitation. Until the local system can provide reliable ambulance or hospital services, much of the training efforts will be futile, while deviating essential resources from other tasks, such as prevention through vaccination or nutrition. Not only do we need up-to-date clinical and educational skills, we need to make a paradigm shift towards a systems and societal perspective (Frenk *et al.*, 2010).

In brief:

It is not enough to do the things right; we need to do the right things. …

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Appendix A1: Information leaflet and consent form for interviewees (In-depth interviews)

Dr Dirk Hagemeister
Department Family Medicine
School of Medicine
Faculty of Health Sciences
University of the Free State
HagemeisterDT@ufs.ac.za
+27 (0) 72 9426218

Dear …,

you have been invited to participate in research titled: ***A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES ,*** and in the following you will find more details about this research.

My name is Dr Dirk Hagemeister, I am a family physician jointly appointed by the University of the Free State and the Free State Department of Health, and as lecturer I am responsible for the emergency care content during the 3rd year and some of the clinical training in the fourth and final years.

This research is about finding out what works well and what should be improved in the undergraduate programme. This constitutes part of my PhD project in Health Professions Education at the University of the Free State. The in-depth interview I want to conduct with you serves to find out in detail about how the emergency care training is being done at your institution in your undergraduate programme.

I have attached a copy of the research proposal for your information.

You have been informed about the study by Dr Dirk HAGEMEISTER.

You have been informed that there is no financial compensation for your participation.

You may contact Dr Dirk HAGEMEISTER at 072-9426218 any time if you have questions about the research.

You may contact the Secretariat of the Health Sciences Research Ethics Committee, UFS at telephone number (051) 4017794/5 if you have questions about your rights as a research subject.
Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to terminate participation.

If you agree to participate, you will be given a signed copy of this document as well as the participant information sheet, which is a written summary of the research.

Your support is highly appreciated.

Declaration:
The research study, including the above information has been verbally and by means of an information leaflet described to me. I understand what my involvement in the study means and I voluntarily agree to participate.
I agree □ / I do NOT agree □ to the audiotaping of our discussion.

_____ _____
Signature of Participant Date

Appendix A2: Information leaflet for participants in the nominal groups (recent graduates of MB ChB programme)

Dr Dirk Hagemeister
Department Family Medicine
School of Medicine
Faculty of Health Sciences
University of the Free State
HagemeisterDT@ufs.ac.za
+27 (0) 72 9426218

Dear UFS medical graduate,

you have been invited to participate in research titled: ***A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES ,*** and in the following you will find more details about this research.

My name is Dr Dirk Hagemeister, I am a family physician jointly appointed by the University of the Free State and the Free State Department of Health, and as lecturer I am responsible for the emergency care content of the clinical skills module which you would have done during the 3rd year of your programme and some of the training in the final year.

This research is about finding out what works well and what should be improved in the undergraduate programme. You will have an opportunity to give input based on your experiences and impressions, and I would like to ask you to relate the experiences and insights you gained in the time since you graduated, but to focus your comments on the content your undergraduate programme.

The participation in this research is entirely voluntary, and you will not be disadvantaged in any way if you decide not to participate or to exercise your right to terminate your participation at any stage. You will not receive any remuneration or other forms of reward for your participation either, but you might be able to improve the learning experience for future students.

The study itself uses a technique that is called 'Nominal Group Technique'. You will be part of a group of approximately 15 – 20 and you will be asked to quietly write down your ideas regarding the research topic. A moderator will help your group with the details. The ideas will then be collected, displayed and discussed in the group, before all the group members will be asked to rank the ideas. After the results have been counted, as second round of discussion and ranking will follow. The entire process usually would take up to 90 minutes of your time.

Some of you might be asked to represent the group in a further discussion with medical teachers, so that your concerns can be appropriately expressed.

If you are willing to participate, please sign the attached consent form. You may keep this information leaflet. Your support is highly appreciated.

Appendix A3: Information leaflet for participants in the nominal groups (technical experts - academic clinicians & health educationalists)

Dr Dirk Hagemeister
Department Family Medicine
School of Medicine
Faculty of Health Sciences
University of the Free State
HagemeisterDT@ufs.ac.za
+27 (0) 72 9426218

Dear colleague,

you have been invited to participate in research titled: ***A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES,*** and in the following you will find more details about this research.

My name is Dr Dirk Hagemeister, I am a family physician jointly appointed by the University of the Free State and the Free State Department of Health, and as lecturer I am responsible for the emergency care content of the clinical skills module which you might be involved in teaching during the 3rd year of the undergraduate programme and some of the training in the final year.

This research is about finding out what works well and what should be improved in the undergraduate programme. You will be informed about findings from a first round of discussions that has been had with recent graduates of the programme (current 2nd year medical interns and community-service medical officers) to explore potential strengths and weaknesses.

You will have an opportunity to give input based on your experiences and knowledge of the system, and I would like to ask you to be frank and open about approaches you deem to be addressing the matters expressed by the students. We will also invite some students to explain their views.

The participation in this research is entirely voluntary, and you will not be disadvantaged in any way if you decide not to participate or to exercise your right to terminate your participation at any stage. You will not receive any remuneration or other forms of reward for your participation either, but you might be able to improve the learning experience for future students.

The study itself uses a technique that is called 'Nominal Group Technique'. You will be part of a group of approximately 10 – 15 and you will be asked to quietly write down your ideas regarding the research topic. A moderator will help your group with the details. The ideas will then be collected, displayed and discussed in the group, before all the group members will be asked to rank the ideas. After the results have been counted, as second round of discussion and ranking will follow. The entire process usually would take up to 90 minutes of your time. Parts of the discussion will be audiotaped if all members of the group consent to this.

If you are willing to participate, please sign the attached consent form. You may keep this information leaflet. Your support is highly appreciated.

Appendix A4: Consent form for participants in the Nominal Groups

You have been asked to participate in a research study called: ***A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES***

You have been informed about the study by Dr Dirk HAGEMEISTER.

You have been informed that there is no financial compensation for your participation.

You may contact Dr Dirk HAGEMEISTER at 072-9426218 any time if you have questions about the research.

You may contact the Secretariat of the Health Sciences Research Ethics Committee, UFS at telephone number (051) 4017794/5 if you have questions about your rights as a research subject.
Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to terminate participation.

If you agree to participate, you will be given a signed copy of this document as well as the participant information sheet, which is a written summary of the research.

Your support is highly appreciated.

Declaration:
The research study, including the above information has been verbally and by means of an information leaflet described to me. I understand what my involvement in the study means and I voluntarily agree to participate.

I agree □ / I do NOT agree □ to the audiotaping of our discussions in the group.

_____ _____

Signature of Participant Date

Appendix A5: Research Instrument 1 (Interview guide for in-depth interviews)

NB: Specific questions for clarification of matters arising from the review of documents related to the programme at the specific medical school of the interviewee might be added.

When we talk about Emergency Care training for undergraduate medical students, what are your thoughts about this at your medical school?

Where do you see the strengths of your programme with regards to Emergency Care training for undergraduate medical students?

Are there any weaknesses or areas that you would want to improve on?

Are there specific/ explicit outcomes related to Emergency Care training for undergraduate medical students in your MBChB programme?

Where do the students achieve the outcomes related to Emergency Care training for undergraduate medical students in your MBChB programme?

How do you coordinate the Emergency Care training for undergraduate medical students in your MBChB programme between the different stakeholders? Are any specific means of communication and coordination needed? (Meetings, regulations?)

Appendix A6: Research Instrument 2 (Guide for nominal group sessions)

Dear _____,

Thank you again for agreeing to assist me with this task of facilitating one of the discussion group desks on …. at …. in _____ as part of my study: ***A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES***.

Here is a brief description as to what I would like you to do:

Introduction:

1. We will split the whole group of participants (hopefully 15 – 20) into three desks of 5 -7 each, one of which will be facilitated by you (depending on the number of participants, we might omit the division into desks).
2. Please hand out the two documents titled *Information leaflet* and *Consent form* to the participants at your desk. I will orally explain the process to the participants, and will be available in the room for questions about the research. Ensure that each of the participants signs the *Consent form* and hands it back to you, and please countersign it as witness at the space provided. The *Information leaflet* is meant to remain with the participant.
3. Once the group is settled and the questions have been answered, you will hand out the colour coded voting cards to the participants, each should receive 5 of each for the voting process, as well as notepad paper for the idea generation and pens.

Idea generation:

4. A) Graduates: Kindly advise the participants now to write down their thoughts about:
   Write down what you valued the most in the emergency care training your undergraduate medical training at the University of the Free State
   The second question (see point 15) will be:
   Write down suggestions on how to improve the emergency care training your undergraduate medical training at the University of the Free State
   B) Technical experts: Kindly advise the participants now to write down their thoughts about:
   Write down suggestions, given current resources and based on the comments of the students, what you think can be done to improve the emergency care content and delivery in the undergraduate medical programme.
   The second question (see point 15) will be:
   Write down suggestions what additional resources and structures might be needed and how these would influence the delivery of the content
5. Provide sufficient time for everybody to write down their thoughts, approximately 5 – 10 minutes, and ask them to do this silently and not to discuss the matters yet.

Round-robin:

6. Once everybody is done writing, a *round-robin* will take place. This means that each of the participants at a time will be asked to name one of the items on one of their green cards.
7. Please write this item on the sheet provided and ask the other participants in your group to indicate whether they have the same item on their cards. Add tics behind the item for each additional candidate that indicates so.
8. Continue the round-robin until each of the participants has finished naming all the items on the green cards. This will see some of the participants not having items anymore, but each participant is free not to provide items in any of the rounds, or to provide more items after having paused previously (if they think of new matters).

Discussion of ideas:

9. After completion of the round-robin, the participants have an opportunity to ask questions to each other and discuss the matters that are written down on display.

Voting (small group):

10. Please mark each of the individual items on the flip chart sheet(s) uniquely, e.g. by giving it a capital letter in alphabetical order.
11. Ask the participants to choose and write the five most important items from the list on the voting cards, one item per card.
12. Ask the participants to do assign points from 5 to 1 to the items on the voting cards, giving each of the five chosen item one of the amounts of points.
13. During the following tea-break, we will add up the 'points' for each item. Add all the points up for each item, and determine which five of the items scored the highest on lists, respectively.

Tea-break & vote counting:

14. When the full group reconvenes after the tea break, the top-fives from each desk will be displayed on new sheets.

Repetition of process for second question:

15. Please repeat the same process (4 – 14) now for the second question.

Large group item clarification and voting (steps might be omitted if only 1 desk):

16. There will be a brief discussion to clarify the items for participants from the other desk(s).
17. This might result in a consensus that certain items are identical, but please confirm with the large group whether anybody feels that the matters should be kept as separate items.
18. A final round of voting will take place out of the combined sets of top-fives for the positive and negative experiences respectively.

Assigning of importance (time allowing):

19. Please ask the individual participants to assign 'importance' counts on the colourful papers provided, assigning each item an count between 100 (the most important) and 0 (irrelevant)

20. This concludes the session, the participants will be thanked for their participation and will be asked whether anybody wants to be representing the group at the following sessions with other groups. They are now free to leave or wait for the voting results.

Appendix B1.1: Letter to the Head of the School of Medicine, UFS

Dr Dirk Hagemeister
Department Family Medicine
School of Medicine
Faculty of Health Sciences
University of the Free State
HagemeisterDT@ufs.ac.za
+27 (0) 72 9426218

To the
Head of the School of Medicine
Prof …
Faculty of Health Sciences
University of the Free State

Re: Research Project:
A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES

Dear Prof …,

I would like to request your permission to conduct the above-mentioned research project.
The project contains two separate methodologies, namely In-depth Interviews and Nominal Group Technique discussions.
The In-depth Interview will be performed with one key-role-player at each medical school.
The Nominal Group Technique discussions will take place in two phases, first with recent medical graduates (approximately 30-40) to identify existing strengths and weaknesses, and secondly Nominal Group Technique discussions with academic clinicians and health educationalists involved in the academic programme to identify potential improvements and resources required.
I have attached a copy of the protocol for your perusal.
The protocol will be submitted for review to the Health Sciences Research Ethics Committee of the Faculty of Health Sciences, UFS, and permission will be requested from the relevant authorities as per form HSREC 17.
Please do not hesitate to contact me if you have any inquiries or concerns about the research project.

Yours sincerely

Dr Dirk Hagemeister
Researcher
Date

Appendix B1.2: Letter to the Dean, Faculty of Health Sciences, UFS

Dr Dirk Hagemeister
Department Family Medicine
School of Medicine
Faculty of Health Sciences
University of the Free State
HagemeisterDT@ufs.ac.za
+27 (0) 72 9426218

To the
Dean of the Faculty of Health Sciences
Prof Gert van Zyl
Faculty of Health Sciences
University of the Free State

Re: Research Project:
A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES

Dear Prof van Zyl,

I would like to request your permission to conduct the above-mentioned research project.

The project contains two separate methodologies, namely In-depth Interviews and Nominal Group Technique discussions.

The In-depth Interview will be performed with one key-role-player at each medical school.

The Nominal Group Technique discussions will take place in two phases, first with recent medical graduates (approximately 30-40) to identify existing strengths and weaknesses, and secondly Nominal Group Technique discussions with academic clinicians and health educationalists involved in the academic programme to identify potential improvements and resources required.
I have attached a copy of the protocol for your perusal.
The protocol will be submitted for review to the Health Sciences Research Ethics Committee of the Faculty of Health Sciences, UFS, and permission will be requested from the relevant authorities as per form HSREC 17.
Please do not hesitate to contact me if you have any inquiries or concerns about the research project.
Yours sincerely

Dr Dirk Hagemeister
Researcher
Date

Appendix B1.3: Letter to the Vice-Rector: Research, UFS

Dr Dirk Hagemeister
Department Family Medicine
School of Medicine
Faculty of Health Sciences
University of the Free State
HagemeisterDT@ufs.ac.za
+27 (0) 72 9426218

To the
Vice-Rector: Research
Prof C Witthuhn
University of the Free State
by hand delivery

Re: Research Project:
A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES

Dear Prof Witthuhn,

I would like to request your permission to conduct the above-mentioned research project.

The project contains two separate methodologies, namely In-depth Interviews and Nominal Group Technique discussions.

The In-depth Interview will be performed with one key-role-player at each medical school.
The Nominal Group Technique discussions will take place in two phases, first with recent medical graduates (approximately 30-40) to identify existing strengths and weaknesses, and secondly Nominal Group Technique discussions with academic clinicians and health educationalists involved in the academic programme to identify potential improvements and resources required.

I have attached a copy of the protocol for your perusal.

The protocol will be submitted for review to the Health Sciences Research Ethics Committee of the Faculty of Health Sciences, UFS, and permission will be requested from the relevant authorities as per form HSREC 17.

Please do not hesitate to contact me if you have any inquiries or concerns about the research project.

Yours sincerely

Dr Dirk Hagemeister
Researcher
Date

Appendix B1.4: Cover letter to the chairperson of the HSREC, UFS

Dr Dirk Hagemeister
Department Family Medicine
School of Medicine
Faculty of Health Sciences
University of the Free State
HagemeisterDT@ufs.ac.za
+27 (0) 72 9426218

To the
Chairperson of the
Health Sciences Research Ethics Committee
Faculty of Health Sciences
University of the Free State
Dr Esme Le Grange

Re: Research Project: ***A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES***

Dear Dr Le Grange,

I would like to request your permission to conduct the above-mentioned research project.

The project contains two separate methodologies, namely In-depth Interviews and Nominal Group Technique discussions.

The In-depth Interview will be performed with one key-role-player at each medical school.

The Nominal Group Technique discussions will take place in two phases, first with recent medical graduates (approximately 30-40) to identify existing strengths and weaknesses, and secondly Nominal Group Technique discussions with academic clinicians and health educationalists involved in the academic programme to identify potential improvements and resources required.

I have attached a copy of the protocol for your perusal.

The protocol will be submitted for review to the Health Sciences Research Ethics Committee of the Faculty of Health Sciences, UFS, and permission will be requested from the relevant authorities as per form HSREC 17.

Please do not hesitate to contact me if you have any inquiries or concerns about the research project.

Yours sincerely

Dr Dirk Hagemeister
Researcher
Date

Appendix B1.5: Cover letter to the (HS)REC/ institutional heads, other universities

Dr Dirk Hagemeister
Department Family Medicine
School of Medicine
Faculty of Health Sciences
University of the Free State
HagemeisterDT@ufs.ac.za
+27 (0) 72 9426218

To the
Chairperson of the (Health Sciences) Research Ethics Committee/
Head of the School of Medicine (or equivalent)
Faculty of Health Sciences/ Medicine
University of …
Prof/ Dr/ Mr/ Mrs/ Ms

Re: Research Project: ***A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES***

Dear …,

I would like to request your committee's/ institution's approval to conduct the above-mentioned research project.
The project contains two separate methodologies, namely In-depth Interviews and Nominal Group Technique discussions.

The In-depth Interview will be performed with one key-role-player at each medical school. This is the only part of the research that will be performed at your institution.

The Nominal Group Technique discussions will take place with graduates and staff of the University of the Free State in two phases, first with recent medical graduates (approximately 30-40) to identify existing strengths and weaknesses, and secondly Nominal Group Technique discussions with academic clinicians and health educationalists involved in the academic programme to identify potential improvements and resources required.

The protocol has been submitted for review to the Health Sciences Research Ethics Committee of the Faculty of Health Sciences, UFS, reference number …

I have attached a copy of the protocol and the approval letter from the HSREC, UFS, for your perusal.

Permission will be requested from the relevant authorities at your institution as required.

Please do not hesitate to contact me if you have any inquiries or concerns about the research project.

Yours sincerely

Dr Dirk Hagemeister
Researcher
Date

Appendix B2.1: Ethics committee partial approval UFS October 2018

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

IRB nr 00006240
REC Reference nr 230408-011
IORG0005187
FWA00012784

19 October 2018

DR DT HAGEMEISTER
DEPT OF FAMILY MEDICINE
FACULTY OF HEALTH SCIENCES
UFS

Dear Dr DT Hagemeister

UFS-HSD2017/1547
PROJECT TITLE: A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES

1. You are hereby kindly informed that the Health Sciences Research Ethics Committee (HSREC) reviewed this protocol and reached the following decisions:

   Research has been approved in the following academic institutions:
   University of the Free State
   University of Stellenbosch

   Research has been conditionally approved pending submission of institutional permissions; only once submitted can research commence:
   Sefako Makgatho University
   University of Cape Town
   University of KwaZulu Natal
   University of Pretoria
   University of Witswatersrand
   Walter Sisulu University

   NOTE: Final Study Approval from HSREC will be granted once all institutional permissions have been obtained and submitted to the HSREC via RIMS.

2. The Committee must be informed of any serious adverse event and/or termination of the study.

3. Any amendment, extension or other modifications to the protocol must be submitted to the HSREC for approval.

4. A progress report should be submitted within one year of final study approval and annually for long term studies.

5. A final report should be submitted at the completion of the study.

6. Kindly use the **RIMS NR (UFS-HSD)** as reference in correspondence to the HSREC Secretariat.

Health Sciences Research Ethics Committee
Office of the Dean: Health Sciences
T: +27 (0)51 401 7795/7794 | E: ethicsfhs@ufs.ac.za
Block D, Dean's Division, Room D104 | P.O. Box/Posbus 339 (Internal Post Box G40) | Bloemfontein 9300 | South Africa
www.ufs.ac.za

UNIVERSITY OF THE FREE STATE
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YUNIVESITHI YA FREISTATA

UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

7. The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; The International Conference on Harmonization and Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH Tripartite), Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

Yours faithfully

MRS MGE MARAIS
HEAD: HEALTH SCIENCES RESEARCH ETHICS COMMITTEE ADMINISTRATION

Health Sciences Research Ethics Committee
Office of the Dean: Health Sciences
T: +27 (0)51 401 7795/7794 | E: ethicsfhs@ufs.ac.za
Block D, Dean's Division, Room D104 | P.O. Box/Posbus 339 (Internal Post Box G40) | Bloemfontein 9300 | South Africa
www.ufs.ac.za

Appendix B2.2: Ethics committee final approval UFS November 2019

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

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HEALTH SCIENCES
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Health Sciences Research Ethics Committee

29-Nov-2019

Dear **Dr Dirk Hagemeister**

Ethics Clearance: **A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES**

Principal Investigator: **Dr Dirk Hagemeister**

Department: **Family Medicine Department (Bloemfontein Campus)**

APPLICATION APPROVED

Please ensure that you read the whole document

With reference to your application for ethical clearance with the Faculty of Health Sciences, I am pleased to inform you on behalf of the Health Sciences Research Ethics Committee that you have been granted ethical clearance for your project.

Your ethical clearance number, to be used in all correspondence is:**UFS-HSD2017/1547/2801**

The ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension.

We request that any changes that may take place during the course of your research project be submitted to the HSREC for approval to ensure we are kept up to date with your progress and any ethical implications that may arise. This includes any serious adverse events and/or termination of the study.

A progress report should be submitted within one year of approval, and annually for long term studies. A final report should be submitted at the completion of the study.

The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; The International Conference on Harmonization and Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH Tripartite), Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

For any questions or concerns, please feel free to contact HSREC Administration: 051-4017794/5 or email EthicsFHS@ufs.ac.za.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours Sincerely

Dr. SM Le Grange
Chair : Health Sciences Research Ethics Committee

Health Sciences Research Ethics Committee
Office of the Dean: Health Sciences
T: +27 (0)51 401 7795/7794 | E: ethicsfhs@ufs.ac.za
IRB 00006240; REC 230408-011; IORG0005187; FWA00012784
Block D, Dean's Division, Room D104 | P.O. Box/Posbus 339 (Internal Post Box G40) | Bloemfontein 9300 | South Africa

Appendix B2.3: Institutional permission UFS

HSREC 17

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

HEALTH SCIENCES RESEARCH ETHICS COMMITTEE

APPROVAL FROM UFS AUTHORITIES
FOR PARTICIPATION OF STUDENTS/STAFF IN RESEARCH PROJECTS

Title, Initials, Surname:	**Dr DT HAGEMEISTER**	**Staff/Student number**	**0871385/ 2013205188**
Department/Institution:	**Family Medicine/ Division Health Sciences Education**		
Phone:	**072-9426218**	**E-mail address:**	**HagemeisterDT@ufs.ac.za**
Supervisor(s):	**Dr M LABUSCHAGNE/ Dr J BEZUIDENHOUT**	**Phone:**	**051-4013848**

Protocol Title:	**A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES**

Who will be involved in the study? (tick ✓)	☑ UFS Personnel	☐ Students

INSTRUCTIONS:

I. Please attach the study protocol and all supporting documentation to this form when requesting approval from the signatories.
II. Kindly note that it is the responsibility of the researcher(s) to ensure that all relevant signatures are obtained before this signed form is returned to the HSREC. The application may, however, be submitted for HSREC approval while signatures are being obtained.
III. If any uncertainty exists regarding this process, please contact HSREC Administration for advice.
IV. Section C is **mandatory** for all research on campus.

HSREC 17

A. FOR RESEARCH ON UFS STUDENTS AND/OR UFS STAFF FROM A SPECIFIC FACULTY, BOTH THE FOLLOWING SIGNATURES MUST BE OBTAINED:		
I. HEAD OF SCHOOL (IF APPLICABLE):	☑ Approved	☐ Not Approved
Signature:	Date: 03-05-2018	
Comments: Ethics committee requirements to be adhered.		

PROF. W.H. KRUGER
HEAD OF DEPARTMENT
DEPARTMENT OF COMMUNITY HEALTH
UNIVERSITY OF THE FREE STATE

II. DEAN OF FACULTY:	☐ Approved	☐ Not Approved
Signature:	Date:	
Comments:		

Dean: Faculty of Health Sciences
University of the Free State
14-05-2018
Dekaan: Fakulteit
Gesondheidswetenskappe
Universiteit van die Vrystaat

B. FOR RESEARCH ON UFS STUDENTS, THE FOLLOWING SIGNATURE MUST BE OBTAINED:		
I. DEAN: STUDENT AFFAIRS	☐ Approved	☐ Not Approved
Signature: N/A	Date:	
Comments:		

C. ALL RESEARCH ON UFS STUDENTS AND/OR UFS STAFF TO BE APPROVED BY:		
I. VICE-RECTOR: RESEARCH	☑ Approved	☐ Not Approved
Signature: dWitthuhn	Date: 25/06/2018	
Comments:		

Die Universiteit van die Vrystaat
The University of the Free State
2018-06-25
Prof. R.C. Wittihuhn
VISEREKTOR: NAVORSING
VICE RECTOR: RESEARCH

Appendix B3: Institutional permission Stellenbosch University

UNIVERSITEIT • STELLENBOSCH • UNIVERSITY
jou kennisvennoot • your knowledge partner

INSTITUTIONAL PERMISSION:

AGREEMENT ON USE OF PERSONAL INFORMATION IN RESEARCH

Name of Researcher: **Dr. Dirk Thomas Hagemeister**

Name of Research Project: A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES

Service Desk ID: IRPSD - 1024

Date of Issue: 27 September 2018

You have received institutional permission to proceed with this project as stipulated in the institutional permission application and within the conditions set out in this agreement.

1 WHAT THIS AGREEMENT IS ABOUT	
What is POPI?	1.1 POPI is the Protection of Personal Information Act 4 of 2013. 1.2 POPI regulates the entire information life cycle from collection, through use and storage and even the destruction of personal information.
Why is this important to us?	1.3 Even though POPI is important, it is not the primary motivation for this agreement. The privacy of our students and employees are important to us. We want to ensure that no research project poses any risks to their privacy. 1.4 However, you are required to familiarise yourself with, and comply with POPI in its entirety.
What is considered to be personal information?	1.5 'Personal information' means information relating to an identifiable, living, individual or company, including, but not limited to: 1.5.1 information relating to the race, gender, sex, pregnancy, marital status, national, ethnic or social origin, colour, sexual orientation, age, physical or mental health, well-being, disability, religion, conscience, belief, culture, language and birth of the person; 1.5.2 information relating to the education or the medical, financial, criminal or employment history of the person;

	1.5.3 any identifying number, symbol, e-mail address, physical address, telephone number, location information, online identifier or other particular assignment to the person; 1.5.4 the biometric information of the person; 1.5.5 the personal opinions, views or preferences of the person; 1.5.6 correspondence sent by the person that is implicitly or explicitly of a private or confidential nature or further correspondence that would reveal the contents of the original correspondence; 1.5.7 the views or opinions of another individual about the person; and 1.5.8 the name of the person if it appears with other personal information relating to the person or if the disclosure of the name itself would reveal information about the person.
Some personal information is more sensitive.	1.6 Some personal information is considered to be sensitive either because: 1.6.1 POPI has classified it as sensitive; 1.6.2 if the information is disclosed it can be used to defraud someone; or 1.6.3 the disclosure of the information will be embarrassing for the research subject. 1.7 The following personal information is considered particularly sensitive: 1.7.1 Religious or philosophical beliefs; 1.7.2 race or ethnic origin; 1.7.3 trade union membership; 1.7.4 political persuasion; 1.7.5 health and health related documentation such as medical scheme documentation; 1.7.6 sex life; 1.7.7 biometric information; 1.7.8 criminal behaviour; 1.7.9 personal information of children under the age of 18; 1.7.10 financial information such as banking details, details relating to financial products such as insurance, pension funds or other investments.

	1.8 You maymake use of this type of information, but must take extra care to ensure that you comply with the rest of the rules in this document.
2 COMMITMENT TO ETHICAL AND LEGAL RESEARCH PRACTICES	
You must commit to the use of ethical and legal research practices.	2.1 You must obtain ethical clearance before commencing with this study. 2.2 You commit to only employing ethical and legal research practices.
You must protect the privacy of your research subjects.	2.3 You undertake to protect the privacy of the research subjects throughout the project.
3 RESEARCH SUBJECT PARTICIPATION	
Personal information of identifiable research subjects must not be used without their consent.	3.1 Unless you have obtained a specific exemption for your research project, consent must be obtained in writing from the research subject, before their personal information is gathered.
Research subjects must be able to withdraw from the research project.	3.2 Research subjects must always be able to withdraw from the research project (without any negative consequences) and to insist that you destroy their personal information.
Consent must be specific and informed.	3.3 Unless you have obtained a specific exemption for your research project, the consent must be specific and informed. Before giving consent, the research subject must be informed in writing of: 3.3.1 The purpose of the research, 3.3.2 what personal information about them will be collected (particularly sensitive personal information), 3.3.3 how the personal information will be collected (if not directly from them), 3.3.4 the specific purposes for which the personal information will be used, 3.3.5 what participation will entail (i.e. what the research subject will have to do), 3.3.6 whether the supply of the personal information is voluntary or mandatory for purposes of the research project, 3.3.7 who the personal information will be shared with,

	3.3.8 how the personal information will be published, 3.3.9 the risks to participation (if any), 3.3.10 their rights to access, correct or object to the use of their personal information, 3.3.11 their right to withdraw from the research project, and 3.3.12 how these rights can be exercised.
Consent must be voluntary.	3.4 Participation in the research project must always be voluntary. You must never pressure or coerce research subjects into participating and persons who choose not to participate must not be penalised.
Using the personal information of children?	3.5 A child is anybody under the age of 18. 3.6 Unless you have obtained a specific exemption in writing for your research project, you must obtain 3.6.1 the consent of the child's parent or guardian, and 3.6.2 if the child is over the age of 7, the assent of the child, before collecting the child's information.
Research subjects have a right to access.	3.7 Research subjects have the right to access their personal information, obtain confirmation of what information is in your possession and who had access to the information. It is strongly recommended that you keep detailed records of access to the information.
Research subjects have a right to object.	3.8 Research subjects have the right to object to the use of their personal information. 3.9 Once they have objected, you are not permitted to use the personal information until the dispute has been resolved.
4 COLLECTING PERSONAL INFORMATION	
Only collect what is necessary.	4.1 You must not collect unnecessary or irrelevant personal information from research subjects.
Only collect accurate personal information.	4.2 You have an obligation to ensure that the personal information you collect is accurate. Particularly when you are collecting it from a source other than the research subject. 4.3 If you have any reason to doubt the quality of the personal information you must

	verify or validate the personal information before you use it.
5 USING PERSONAL INFORMATION	
Only use the personal information for the purpose for which you collected it.	5.1 Only use the personal information for the purpose for which you collected it. 5.2 If your research project requires you to use the personal information for a materially different purpose than the one communicated to the research subject, you must inform the research subjects and Stellenbosch University of this and give participants the option to withdraw from the research project.
Be careful when you share personal information.	5.3 Never share personal information with third parties without making sure that they will also follow these rules. 5.4 Always conclude a non-disclosure agreement with the third parties. 5.5 Ensure that you transfer the personal information securely.
Personal information must be anonymous whenever possible.	5.6 If the research subject's identity is not relevant for the aims of the research project, the personal information must not be identifiable. In other words, the personal information must be anonymous (de-identified).
Pseudonyms must be used whenever possible.	5.7 If the research subject's identity is relevant for the aims of the research project or is required to co-ordinate, for example, interviews, names and other identifiers such as ID or student numbers must be collected and stored separately from the rest of the research data and research publications. In other words, only you must be able to identify the research subject.
Publication of research	5.8 The identity of your research subjects should not be revealed in any publication. 5.9 In the event that your research project requires that the identity of your research subjects must be revealed, you must apply for an exemption from this rule.
6 SECURING PERSONAL INFORMATION	
You are responsible for the confidentiality and security of the personal information	6.1 Information must always be handled in the strictest confidence. 6.2 You must ensure the integrity and security of the information in your possession or under your control by taking appropriate and reasonable technical and organisational measures to prevent: 6.2.1 Loss of, damage to or unauthorised destruction of information; and

	6.2.2 unlawful access to or processing of information. 6.3 This means that you must take reasonable measures to: 6.3.1 Identify all reasonably foreseeable internal and external risks to personal information in your possession or under your control; 6.3.2 establish and maintain appropriate safeguards against the risks identified; 6.3.3 regularly verify that the safeguards are effectively implemented; and 6.3.4 ensure that the safeguards are continually updated in response to new risks or deficiencies in previously implemented safeguards.
Sensitive personal information requires extra care.	6.4 You will be expected to implement additional controls in order to secure sensitive personal information.
Are you sending any personal information overseas?	6.5 If you are sending personal information overseas, you have to make sure that: 6.5.1 The information will be protected by the laws of that country; 6.5.2 the company or institution to who you are sending have agreed to keep the information confidential, secure and to not use it for any other purpose; or 6.5.3 get the specific and informed consent of the research subject to send the information to a country which does not have data protection laws.
Be careful when you use cloud storage.	6.6 Be careful when storing personal information in a cloud. Many clouds are hosted on servers outside of South Africa in countries that do not protect personal information to the same extent as South Africa. The primary example of this is the United States. 6.7 It is strongly recommended that you use hosting companies who house their servers in South Africa. 6.8 If this is not possible, you must ensure that the hosting company agrees to protect the personal information to the same extent as South Africa.
7 RETENTION AND DESTRUCTION OF PERSONAL INFORMATION	
You are not entitled to retain personal information when you no longer need it for the purposes of the research project.	7.1 Personal information must not be retained beyond the purpose of the research project, unless you have a legal or other justification for retaining the information.

If personal information is retained, you must make sure it remains confidential.	7.2 If you do need to retain the personal information, you must assess whether: 7.2.1 The records can be de-identified; and/or whether 7.2.2 you have to keep all the personal information. 7.3 You must ensure that the personal information which you retain remains confidential, secure and is only used for the purposes for which it was collected.
8 INFORMATION BREACH PROCEDURE	
In the event of an information breach you must notify us immediately.	8.1 If there are reasonable grounds to believe that the personal information in your possession or under your control has been accessed by any unauthorised person or has been disclosed, you must notify us immediately. 8.2 We will notify the research subjects in order to enable them to take measures to contain the impact of the breach.
This is the procedure you must follow.	8.3 You must follow the following procedure: 8.3.1 Contact the Division for Institutional Research and Planning at 021 808 9385 and permission@sun.ac.za; 8.3.2 you will then be required to complete the **information** breach report form which is attached as Annexure A. 8.4 You are required to inform us of a **information** breach within 24 hours. Ensure that you have access to the required information.
9 MONITORING	
You may be audited.	9.1 We reserve the right to audit your research practices to assess whether you are complying with this agreement. 9.2 You are required to give your full co-operation during the auditing process. 9.3 We may also request to review: 9.3.1 Forms (or other information gathering methods) and notifications to research subjects, as referred to in clause 3; 9.3.2 non-disclosure agreements with third parties with whom the personal information is being shared, as referred to in clause 5.4; 9.3.3 agreements with foreign companies or institutes with whom the personal

	information is being shared, as referred to in clause 6.5.
10 CHANGES TO RESEARCH	
You need to notify us if any aspect of your collection or use of personal information changes.	10.1 You must notify us in writing if any aspect of your collection or use of personal information changes (e.g. such as your research methodology, recruitment strategy or the purpose for which you use the research). 10.2 We may review and require amendments to the proposed changes to ensure compliance with this agreement. 10.3 The notification must be sent to permission@sun.ac.za.
11 CONSEQUENCES OF BREACH	
What are the consequences of breaching this agreement?	11.1 If you do not comply with this agreement, we may take disciplinary action or report such a breach to your home institute. 11.2 You may be found guilty of research misconduct and may be censured in accordance with Stellenbosch University or your home institute's disciplinary code.
You may have to compensate us in the event of any legal action.	11.3 Non-compliance with this agreement could also lead to claims against Stellenbosch University in terms of POPI and/or other laws. 11.4 Unless you are employed by or studying at Stellenbosch University, you indemnify Stellenbosch University against any claims (including all legal fees) from research subjects or any regulatory authority which are the result of your research project. You may also be held liable for the harm to our reputation should there be an information breach as a result of your non-compliance with this agreement.
12 CONTACT US	
Please contact us if you have any questions.	Should you have any questions relating to this agreement you should contact permission@sun.ac.za.

Appendix B4: Institutional permission University of KwaZulu-Natal

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

12 November 2018

Dr Dirk Hagemeister
University of the Free State
Email: HagemeisterDT@ufs.ac.za

Dear Dr Hagemeister

RE: PERMISSION TO CONDUCT RESEARCH

Gatekeeper's permission is hereby granted for you to conduct research at the University of KwaZulu-Natal (UKZN) towards your postgraduate studies, provided Ethical clearance has been obtained. We note the title of your research project is:

"A Framework for Integrated Emergency Care Education in South African Undergraduate Medical Programmes."

It is noted that you will be constituting your sample by conducting interviews with staff members in the College of Health Sciences on the Medical School campus.

Please ensure that the following appears on your notice/questionnaire:

- Ethical clearance number;
- Research title and details of the research, the researcher and the supervisor;
- Consent form is attached to the notice/questionnaire and to be signed by user before he/she fills in questionnaire;
- gatekeepers approval by the Registrar.

You are not authorized to contact staff and students using 'Microsoft Outlook' address book. Identity numbers and email addresses of individuals are not a matter of public record and are protected according to Section 14 of the South African Constitution, as well as the Protection of Public Information Act. For the release of such information over to yourself for research purposes, the University of KwaZulu-Natal will need express consent from the relevant data subjects. Data collected must be treated with due confidentiality and anonymity.

Yours sincerely

Mokoena

MR SS MOKOENA
REGISTRAR

Office of the Registrar
Postal Address: Private Bag X54001, Durban, South Africa
Telephone: +27 (0) 31 260 8005/2206 **Facsimile:** +27 (0) 31 260 7824/2204 **Email:** registrar@ukzn.ac.za
Website: www.ukzn.ac.za

Appendix B5.1: Ethics committee approval Sefako Makgatho University

SEFAKO MAKGATHO
HEALTH SCIENCES UNIVERSITY

Postgraduate Studies, Research Development, Integrity & Ethics
Sefako Makgatho University Research Ethics Committee (SMUREC)

Dr DT Hagemeister
Doctoral Candidate
University of the Free State

Dear Dr Hagemeister

RE: DR DT HAGEMEISTER – REQUEST TO CONDUCT RESEARCH AT SEFAKO MAKGATHO HEALTH SCIENCES UNIVERSITY

SMUREC **NOTED** an email dated 03 July 2019, requesting permission to collect data at Sefako Makgatho Health Sciences University.

SMUREC **NOTED** that the researcher has already received approval for her proposal from University of the Free State Human Research Ethics Committee (Medical).

Study Title:	A framework for emergency care integration in South African undergraduate medical programmes
Researcher:	Dr D Hagemeister
Supervisor:	Dr MJ Labuschagne
Co-Supervisor:	Dr J Bezuidenhout
University:	University of the Free State
Degree:	Doctor in Health Professions Education (PhD HPE)
Protocol Number.:	UFS-HSD2017/1547
Approval letter date:	29 November 2018

SMUREC **NOTED** and **GRANTED** the researcher permission to collect data at Sefako Makgatho Health Sciences University for the above mentioned study.

Yours Sincerely,

PROF C BAKER
ACTING CHAIRPERSON SMUREC

SEFAKO MAKGATHO
HEALTH SCIENCES UNIVERSITY
SMU Research Ethics Committee
Chairperson
Date: 05 September 2019

Cc: Dr MJ Labuschagne
05 September 2019

Molotlegi Street, Ga-Rankuwa
Pretoria, Gauteng
PO Box 163, Medunsa, 0204
www.smu.ac.za

Telephone: +27 12 521 5617 / 3698
Facsimile: +27 12 521 3749

Email: lorato.phiri@smu.ac.za

Appendix B5.2: Institutional permission Sefako Makgatho University

SEFAKO MAKGATHO
HEALTH SCIENCES UNIVERSITY

Office of the Deputy-Registrar

Dr DT Hagemeister
PhD Candidate
University of the Free State

05 September 2019

To whom it may concern,

A Framework for Integrated Emergency Care Education in South African Undergraduate Medical Programmes

This letter confirms that the abovementioned study has received approval to be conducted on the university premises, and staff and/ or students will be invited to participate.

Where research is conducted that involves specific cohorts, year groups or courses from Schools, the approvals from the Heads of Department or individual academics must be obtained so that appropriate arrangements for access may be made.

In conducting the research, the researcher agrees to adhere to all university regulations for the responsible conduct of research and will always consider participant rights to withdraw without any negative consequence.

This letter, together with the Ethics Clearance Certificate and/or site approval letter from the Sefako Makgatho University Research Ethics Committee (SMUREC) must be available for all research conducted with staff and students at the university. A copy of the dissertation or thesis must kindly be submitted to the Sefako Makgatho Health Sciences University on completion of the study.

Sincerely

Ms Kanyisa Magwentshu
Deputy-Registrar

SEFAKO MAKGATHO
HEALTH SCIENCES UNIVERSITY

2019 -09- 12

DEPUTY REGISTRAR
ACADEMIC ADMIN
PO BOX 197, MEDUNSA, 0204

Appendix B6.1: Ethics committee approval University of the Witwatersrand

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R14/49 Dr Dirk Thomas Hagemeister

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M190764

NAME: (Principal Investigator)	Dr Dirk Thomas Hagemeister
DEPARTMENT:	Department of Family Medicine University of the Free State
PROJECT TITLE:	A framework for integrated emergency care education in South African undergraduate medical programmes
DATE CONSIDERED:	Ad hoc
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Prof Mathys Labuschagne
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	26/08/2019

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the Third Floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in July and will therefore be due in the month of July each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature

Date 16/10/2019

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix B6.2: Institutional permission University of the Witwatersrand

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

OFFICE OF THE DEPUTY REGISTRAR

29 July 2019

Dirk Thomas Hagmeister
PhD (HPE) Candidate
University of the Free State

TO WHOM IT MAY CONCERN

"A framework for integrated emergency care education in South African undergraduate medical programmes"

This letter serves to confirm that the above project has received permission to be conducted on University premises, and/or involving staff and/or students of the University as research participants. In undertaking this research, you agree to abide by all University regulations for conducting research on campus and to respect participants' rights to withdraw from participation at any time.

If you are conducting research on certain student cohorts, year groups or courses within specific Schools and within the teaching term, permission must be sought from Heads of School or individual academics.

Ethical clearance has been obtained. (Protocol Number: UFS-HSD2017/1547)

Nicoleen Potgieter
University Deputy Registrar

Private Bag 3, Wits, 2050, South Africa | T +27 11 717 1204/8 | F +27 86 553 2271 | www.wits.ac.za

Appendix B7.1: Ethics committee approval University of Cape Town

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room E53-46 Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
Email: shakirah.coenraad@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/forms

17 September 2019

HREC REF: 634/2019

Dr Dirk Hagemeister
Family Medicine,
University of Free State
Room 51, CR De Wet Building,
Rectors Road, UFS,
Universitas,
Bloemfontein

Dr Dirk Hagemeister

PROJECT TITLE: A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES

Thank you for submitting your request to the Faculty of Health Sciences Human Research Ethics Committee for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study via a reciprocal review process with University of Free State REC reference number #UFS-HSD2017/1547:

Approval is granted for one year until the 30th September 2020.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval before the research may occur.

Please quote the HREC REF in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE
Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938

Appendix B7.2: Institutional permission University of Cape Town

HR194	ACCESS TO UCT STAFF FOR RESEARCH PURPOSES	UNIVERSITY OF CAPE TOWN

RECEIVED
25 SEP 2019
ED: HR OFFICE

NOTES
- Forms must be downloaded from the UCT website: http://forms.uct.ac.za/forms.htm
- This form must be completed by applicants who are requesting to access UCT staff for the purpose of research.
- A copy of the research proposal as well as the Ethics Committee approval must be attached.
- It is the **responsibility of the researcher/s to apply for ethical clearance** from the relevant Faculty's Research in Ethics Committee (REC).
- If you are requesting staff information, you are required to complete the HR Information Request Form (HR190) and submit it together with all the required documentation.
- The turnaround time for a reply is **approximately 10 working days unless specified as urgent.**
- Return the completed application form and all the above documentation to Joy Henry via email: joy.henry@uct.ac.za; or deliver to: For the Attention: Executive Director, Human Resources Department, Bremner Building, Room 214, Lower Campus, UCT.

SECTION A: APPLICANT DETAILS

Title	Dr	Name	Dirk HAGEMEISTER
Telephone number	051-4017045/072-9426218	Email address	HagemeisterDT@ufs.ac.za
Student number		Staff number	
Visiting researcher ID / passport number	7008295843185		
Faculty Officer contact details			
University or institution at which employed or a registered student	University of the Free State		
Faculty or department in which you are registered or work	Faculty of Health Sciences		
Address (if not UCT)	Room 51, CR de Wet Building, Rectors Road		
	University of the Free State		
	Universitas, Bloemfontein, 9301		

SECTION B: SUPERVISOR DETAILS

	Title and name	Telephone number	Email address
Supervisor	Prof M Labuschagne	051-4013848	LabuschagneMJ@ufs.ac.za
Co-Supervisor	Dr J Bezuidenhout	051-4053095	BezuidJ@ufs.ac.za

SECTION C: APPLICANT'S FIELD OF STUDY (if applicable) / TITLE OF RESEARCH PROJECT / STUDY

Degree	PhD HPE		
Research project or title	A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES		
Research proposal attached	☒ Yes	☐ No	
Target population (number of UCT staff)	One academic clinician familiar with the undergraduate medical programme the teaching of emergency care		
Amount of time required for an interview and/or questionnaire	+/- 1 hour		
Lead Researcher details	Dr Dirk HAGEMEISTER		
Proof of ethical clearance status attached	☒ Yes	☐ No	

SECTION D: FOR OFFICE USE (Approval status to be completed by the Executive Director, Human Resources or Nominee)

Support or approval			Role	Signature	Date
Supported?	☒ Yes	☐ No	Joy Henry (Office Co-Ordinator)		23/09/2019
Approved?	☒ Yes	☐ No	Miriam Hoosain (Executive Director: HR)		25/09/19

Appendix B8.1: Ethics committee approval University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.

- FWA 00002567, Approved dd 22 May 2002 and Expires 03/20/2022.
- IRB 0000 2235 IORG0001762 Approved dd 22/04/2014 and Expires 03/14/2020.

10 October 2019

Approval Certificate
New Application

Ethics Reference No.: 634/2019
Title: A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES

Dear Dr DT Hagemeister

The **New Application** as supported by documents received between 2019-09-30 and 2019-10-09 for your research, was approved by the Faculty of Health Sciences Research Ethics Committee on its quorate meeting of 2019-10-09.

Please note the following about your ethics approval:

- Ethics Approval is valid for 1 year and needs to be renewed annually by 2020-10-10.
- Please remember to use your protocol number (634/2019) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, monitor the conduct of your research, or suspend or withdraw ethics approval.

Ethics approval is subject to the following:

- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

Additional Conditions:

- Approval is conditional upon the Research Ethics Committee receiving approval letter from the Deputy Dean Teaching and Learning (Prof Steenkamp) must be obtained and uploaded before the research can commence and the research participants of University of Pretoria be presented with the ethics approval certificate when obtaining their informed consent.

We wish you the best with your research.

Yours sincerely

Dr R Sommers
MBChB MMed (Int) MPharmMed PhD
Deputy Chairperson of the Faculty of Health Sciences Research Ethics Committee, University of Pretoria

The Faculty of Health Sciences Research Ethics Committee complies with the SA National Act 61 of 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 and 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes, Second Edition 2015 (Department of Health).

Research Ethics Committee
Room 4-60, Level 4, Tswelopele Building
University of Pretoria, Private Bag X323
Arcadia 0007, South Africa
Tel +27 (0)12 356 3084
Email deepeka.behari@up.ac.za
www.up.ac.za

Fakulteit Gesondheidswetenskappe
Lefapha la Disaense tša Maphelo

Appendix B8.2: Institutional permission University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences

15/10/2019

Dr D Hagenmeister
Researcher
Health Sciences
UNIVERSITY OF FREE STATE

Dear Dr Hagenmeister

Institutional approval for participation in research project

As ethical approval have been granted, this serves to confirm that I am supportive of the above mentioned research project for :

Dr Dirk Hagemeister (Researcher)

Project entitled:

A Framework for integrated Emergency Care Education in South African Undergraduate Medical Programmes

I have no objection to the researcher requesting the recent medical graduates and academic clinicians to participate in the study by doing In-depth interviews and Nominal Group Technique discussions.

I hereby agree to Institutional Approval as requested. We wish the candidate well with this study.

Kind regards

Prof V Steenkamp
Deputy Dean: Teaching and Learning

Deputy Dean: Teaching and Learning
Room 5-20.1, Level 5, Health Sciences Building
University of Pretoria, Private Bag X323
Arcadia 0007, South Africa
Tel +27 (0)12 319 2174
Email vanessa.steenkamp@up.ac.za
www.up.ac.za

Fakulteit Gesondheidswetenskappe
Lefapha la Disaense tša Maphelo

Appendix B9: Institutional permission Walter Sisulu University

OFFICE OFTHE DEAN – FACULTY OF HEALTH SCIENCES
Tel: 047 502 2667/2233/2672 - Fax: 086 614 0246
Website: www.wsu.ac.za E-mail: fhs@wsu.ac.za
Enquiries: MRS. Z DLAMINI: 087 351 3483 Mobile: 082 781 9936
Email: zdlamini@rtc.wsu.ac.za / zdlamini@wsu.ac.za

Medical School Sisson Street Campus
Mthatha 5099
Private Bag X1, MTHATHA. 5099

Dr DT Hagemeister

28 November 2019

Faculty of Health Sciences

University of the Free State

Dear Dr Hagemeister

Re: Permission to Conduct Research in WSU Medical School, Faculty of Health Sciences

The Faculty of Health Sciences has reviewed the request for permission to collect data in WSU Medical School towards the study, "A FRAMEWORK FOR INTEGRATED EMERGENCY CARE EDUCATION IN SOUTH AFRICAN UNDERGRADUATE MEDICAL PROGRAMMES".

The study is towards a PhD qualification and it was granted ethical clearance by the Health Sciences Research Ethics Committee of the University of the Free State.

On behalf of the Rector of Mthatha Campus, Walter Sisulu University, the Dean of the Faculty of Health Sciences hereby extends permission for the study to be conducted in the Medical School.

During data collection, a copy of the letter granting you permission accompanied by the proposal and a copy of the ethics clearance letter should be presented.

Wishing you all the best.

Approved/ Not Approved

29/11/2019

Prof AJ Mbokazi: Dean Faculty of Health Sciences, Walter Sisulu University

Appendix C1: Journal submission guidelines *African Journal of Emergency Medicine*

Introduction

The African Journal of Emergency Medicine (AfJEM, ISSN: 2211-419X) is the official journal of the African Federation for Emergency Medicine. It is an international, peer-reviewed journal aimed in particular at supporting emergency care across Africa. AfJEM publishes original research, reviews, brief reports of scientific investigations, case reports as well as commentary and correspondence related to topics of scientific, ethical, social and economic importance to emergency care in Africa. Articles will be of direct importance to African emergency care, but may have originated from elsewhere in the world.

TYPES OF ARTICLES

Original Article: Original studies of basic or clinical investigations in areas relevant to emergency medicine. Reference to the relevance of the research in a resource poor setting is essential and should be alluded to in the discussion section. References and a structured abstract (see Preparation below) are required. Maximum length: 3,000 words, 5 tables and/or figures, plus the abstract (300 words) and references (max 50). The checklists found on the following websites should be used to structure your manuscript (a copy of the checklist indicating which elements of the reporting format you adhered to, a signed conflict of interest form - see below- should be submitted with your manuscript):

a. For randomised control trials: http://www.consort-statement.org

b. For cohort, case-control, and cross-sectional studies: http://www.strobe-statement.org/

c. All other studies: http://www.equator-network.org/

2. *Review Articles*: Extensive reviews of the literature on a narrow clinical topic. References must include, but need not be limited to, the past 3 years of the literature. A structured abstract is required (see Preparation below). Maximum length: 3,000 words, plus the abstract (max 300 words) and references (max 50). **Please contact the editor in chief before you submit a review.** The following reporting checklists should be used to structure your manuscript (a copy of the checklist indicating which elements of the reporting format you adhered to, a signed conflict of interest form - see below- should be submitted with your manuscript):

a. A Resourced-tiered review checklist is the standard reporting format for publication in AfJEM: http://www.afjem.com/resource-tiered-checklist.html

b. If your topic does not lean itself towards a resourced tiered review consider alternative reporting checklists for systematic reviews and meta-analyses such as Prisma checklist (http://www.prisma-statement.org) or similar. **Please check with the editor-in-chief**

before using a checklist other that the resources-tiered checklist.

3. *Abbreviated paper (previously Brief Research Reports)*: Reports of preliminary data and findings or studies with small numbers demonstrating the need for further investigation. References and a structured abstract (see Preparation below) are required. Maximum length: 1,500 words, plus the abstract (max 300 words) and references (max 10) and 3 tables and/or figures. Checklists described for original research above should be used to structure your manuscript (a copy of the checklist indicating which elements of the reporting format you adhered to, a signed conflict of interest form - see below- should be submitted with your manuscript)

4. *Commentary*: Descriptions of clinical and nonclinical problems and solutions; descriptions of novel approaches to planning, management, or provision of emergency services; and practical " how-to" articles describing aspects of emergency medicine management (includes African country acute care profiles) . A narrative abstract (see Preparation below) is required. Maximum length: 3,000 words, plus the abstract (max 300 words) and references (max 50). A signed conflict of interest form- see below- should be submitted with your manuscript.

5. *Editorials (commissioned and including op-ed*): Authoritative comments or opinions on major current problems of emergency physicians or on controversial matters with significant implications for emergency medicine; or, qualified, thorough analysis and criticism of articles appearing in AfJEM. Maximum length: 1,500 words plus references (max 5). An abstract is not required. A signed conflict of interest form- see below- should be submitted with your manuscript.

6. *Correspondence*: Discussion, observations, opinions, corrections, and comments on topics appearing in AfJEM; very brief reports or other items of interest. Maximum length: 500 words, plus references (max 5). An abstract is not required. Please enter: Not applicable, Correspondence when prompted to enter an abstract. Letters discussing an AfJEM article should be received within 6 weeks of the article's publication. The article must be included in the references. Authors of articles about which letters are received will be given the opportunity to reply, which will not be shared with the letter writer prior to publication. Letters of political or other topics unrelated to the science of medicine, as well as those containing personal criticisms, will not be published. A signed conflict of interest form- see below- should be submitted with your manuscript

7. *Erratum*: Corrections on topics appearing in AfJEM. Maximum length: 300 words, plus references (max 5). An abstract is not required. Please enter: Not applicable, Erratum when prompted to enter an abstract. Letters discussing an AfJEM article should be received within 6 weeks of the article's publication. The article must be included in the references. Authors of articles about which letters are received will be given the opportunity to reply, which will not be shared with the letter writer prior to publication. Letters of political or other topics unrelated to the science of medicine, as well as those containing personal criticisms, will not be published elsewhere including electronically in the same form, in English or in any other language, without the written consent of the copyright-holder. A signed conflict of interest form- see

below- should be submitted with your manuscript.

Submission

Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

Please submit your article via https://www.evise.com/profile/api/navigate/AFJEM

Submission Checklist

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

Ensure that the following items are present:

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• E-mail address
• Full postal address

All necessary files have been uploaded:

•Title page
•Cover letter
•Manuscript article structure template:
• African relevance
• Dissemination of results
• Conflict of Interest Form
• Relevant reporting checklist (see mandatory inclusions)
• Supplemental files (appendices, data supplements, etc.)
• Other files (where applicable)

Further considerations

• Manuscript has been 'spell checked' and 'grammar checked'
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• Journal policies detailed in this guide have been reviewed
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Before You Begin

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Collate conflicts of interest in a separate section at the end of the article before the acknowledgements and do not, therefore, include them on the title page, as a footnote to the title or otherwise. If no conflict of interest exists please state: The author(s) declare no conflict of interest Conflicts of interests that require disclosure include, but are not limited to:
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c. Non-financial associations that may be relevant or seen as relevant to the submitted manuscript.
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Submission declaration and verification

Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see 'Multiple, redundant or concurrent publication' for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service Crossref Similarity Check.

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attributes such as age, gender, race, ethnicity, culture, sexual orientation, disability or health condition unless they are relevant and valid. These guidelines are meant as a point of reference to help identify appropriate language but are by no means exhaustive or definitive.

Authorship
All authors should have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

Changes to authorship
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Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors **after** the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

Clinical trial results
In line with the position of the International Committee of Medical Journal Editors, the journal will not consider results posted in the same clinical trials registry in which primary registration resides to be prior publication if the results posted are presented in the form of a brief structured (less than 500 words) abstract or table. However, divulging results in other circumstances (e.g., investors' meetings) is discouraged and may jeopardise consideration of the manuscript. Authors should fully disclose all posting in registries of results of the same or closely related work.

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their work. We are aware that this is due to many reasons, including that topics are concerned with www.afjem.com conditions which are largely irrelevant to other audiences. AfJEM is dedicated to supporting all authors who wish to publish on an African emergency care topic. In order to maintain and produce a high quality, international standard Emergency Medicine journal, AfJEM has devised Author Assist. AfJEM enlists the help of a team of experienced volunteers (Author Assistants) to help improve the quality of manuscripts before peer-review submission. Go to http://www.afjem.com/author-assistance.html for more information.

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Peer review and Referees

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Preparation

Peer review

This journal operates a double anonymized review process. All contributions will be initially assessed

by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of one independent expert reviewer to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. Editors are not involved in decisions about papers which they have written themselves or have been written by family members or colleagues or which relate to products or services in which the editor has an interest. Any such submission is subject to all of the journal's usual procedures, with peer review handled independently of the relevant editor and their research groups. More information on types of peer review.

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It is important that the file be saved in the native format of the word processor used. The text should be in single-column format. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. In particular, do not use the word processor's options to justify text or to hyphenate words. However, do use bold face, italics, subscripts, superscripts etc. When preparing tables, if you are using a table grid, use only one grid for each individual table and not a grid for each row. If no grid is used, use tabs, not spaces, to align columns. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier). Note that source files of figures, tables and text graphics will be required whether or not you embed your figures in the text. See also the section on Electronic artwork.
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been supplied, the manuscript will be returned to the author.

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Divide your article into clearly defined sections as per the guidance given in Types of Articles above. Numbers are not to be used for sections or subsections. Section headings should be in **bold**. Subsection headings should be in italics. Each heading should appear on its own separate line. Subsections in addition to the sections described in Types of Articles above should be used sparingly.

Clinical trial results

In line with the position of the International Committee of Medical Journal Editors, the journal will not consider results posted in the same clinical trials registry in which primary registration resides to be prior publication if the results posted are presented in the form of a brief structured (less than 500 words) abstract or table. However, divulging results in other circumstances (e.g., investors' meetings) is discouraged and may jeopardise consideration of the manuscript. Authors should fully disclose all posting in registries of results of the same or closely related work.

Discussion

This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

Conclusions

The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Appendices

If there is more than one appendix, it should be identified starting with Appendix B, C, etc. Do not use Appendix A. Formulae and equations in appendices should be given separate numbering: Eq. (B.1), Eq. (B.2), etc.; in a subsequent appendix, Eq. (C.1) and so on. Similarly for tables and figures: Table B.1; Fig. B.1, etc. All appendices will be considered online material only.

Essential Title Page Information

• ***Title.*** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.

• ***Author names and affiliations.*** Where the family name may be ambiguous (e.g., a double name), please indicate this clearly. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.

• ***Corresponding author.*** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. **Ensure that phone numbers (with country and area code) are provided in addition to the e-mail address and the complete postal address. Contact details must be kept up to date by the corresponding author.**

• ***Present/permanent address.*** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation

address. Superscript Arabic numerals are used for such footnotes.
• ***Word count.*** Please provide a word count
• ***Table/figure count.*** Please provide a table/ figure count

Abstract
A concise and factual abstract of no more than 300 words is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. Non-standard or uncommon abbreviations should be avoided, but if essential, it must be defined at the first mention. With the exception of a submission for Editorials, Practical pearl, Correspondence and Erratum, structured abstracts are required for all article types
Types of abstracts include:

- *Research abstracts* should adhere to the following format: Introduction, Methods, Results and Conclusion.
- *Narrative abstracts* are acceptable for non-research abstracts (concepts and commentary)

Keywords
The submission system will prompt authors to provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, "and", "of"). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

Abbreviations
Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

Acknowledgements
Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

Statistics
Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. References for the design of the study and complex or unusual statistical methods should be to standard works when possible (with pages stated). Commonly used methods such as the chi-square test, t-test, ANOVA, linear and logistic regression need not be referenced. Define statistical terms, www.afjem.com abbreviations, and most symbols. Technical statistical terms should ideally be replaced by simpler terms where possible and referenced if not. Specify the computer software used. The results section must be written so the average reader can understand the findings. The methods section is allowed to be more complex if unavoidable. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). For normally distributed data give means

and confidence intervals and for data that is not normally distributed give the median and interquartile range. Avoid relying solely on statistical hypothesis testing, such as p-values. If p-values are used, include 2 digits of precision (i.e. p=0.65) for values greater than 0.01. Give 3 digits for values between 0.01 and 0.001 and report values smaller than 0.001 as $p < 0.001$. Describing non-significant p-values as NS is not acceptable and a numerical value should be given. When using tables consider including counts and percentages. In general, including the chi-square statistic, t statistic, F statistic and degrees of freedom is not useful. Regression output should be limited to the most important findings. Estimates of variance explained (R^2, correlation coefficients, and standardised regression coefficients or effect size) should not be presented as the main result of the analysis.

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[a] Footnote 1, [b] Footnote 2

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Instructions:

At the bottom of the Title Page, please list each author's initials, followed by a declaration of the potential conflict. Please name the following information: 1. The funding source; 2. who received the funds (the author, a family member, or the author's employer); and 3) the reason for the funds (e.g., salary support, fees for consulting, paid participation in a speaker's bureau, paid participation in an advisory panel, grant funding for research, grant funding for educational activities, contracts, patents, stock ownership, or other).

Examples:

The following examples serve as guides to report conflicts of interest:

a. No conflict of interest
[Author initials] reports no conflict of interest.

b. Consulting for commercial interests, including advisory board work
[Author initials] has received funding personally from [Company Name] for consulting.

c. Grant money for commercial research
[Author initials] reports grant money to [Institution name] to conduct research conceived and sponsored by [Company Name].

d. Grant money for investigator initiated research
[Author initials] reports grant money to [Institution Name] to conduct research conceived and written by [Author Name] from [Institution Name].

e. Founder or owner of a start-up company or proprietary interest or stock or ownership in a company with an interest for or against the subject matter

f. [Author initials] owns stock in a company [Company Name] that produces a product relevant to the subject material.

g. Patent or other intellectual property
[Author initials] is the inventor on a patent [patent or filing number] that is filed or issued by the United States Patent and Trademark Office relevant to the material in this paper.

h. Payment for writing independent of grant funding
[Author Name] received payment from [Entity Name] for writing part of this manuscript.

i. Employment
[Author initials] is employed by [Company Name], which manufactures a product related to the subject matter.

j. Multiple conflicts
[Author initials]'s institution has received grant funding from the National Institutes of Health for investigator-initiated research. [Author initials] institution, [Employer Name] has received contract funding from [Company] for industry-initiated research and has received contract funding from [Company Name] for investigator-initiated research.

*Policy on ghost writing. AEM E&T does not publish work that is written by a ghost writer, which is generally defined as an individual who was paid to write the paper and is not represented as an author on the Title Page.

2. Study Group Authorship Page. When authorship is attributed to a study group, all members must meet the criteria for authorship. Identify the members by responsibility or by institution on the study group authorship page.

3. Abstract. The abstract should contain no more than 300 words. Original research submissions require a structured abstract that defines the objectives, methods, results, and conclusions.

The abstract should not include references, figures, tables, or graphs.

4. Introduction. The introduction should briefly describe the study question, its scope and relevance to emergency medicine education and training, and the hypothesis and/or objectives of the investigation. The reader should have a very clear understanding of exactly what the study question or objective is after reading the introduction section.

5. Methods. The methods should include subsections with headings that detail the study design (include human subject or animal use committee review), study setting and population, study protocol, measurements or key outcome measures, and data analysis (include sample size determinations and other relevant information, the names of statistical tests, and software used). The role of funding organizations and sponsors in the conduct and reporting of the study should be included here. When equipment is used in a study, provide in parentheses the model number, name, and location of the manufacturer. If citing an in-press paper for the description of methods (i.e. when referencing methods used in a prior study, which is currently in press), please upload a copy of the in-press paper for the editor and reviewers. This in-press material will be handled with appropriate confidentiality. Research involving human subjects or animals must meet local legal and institutional requirements and generally accepted ethical principles such as those set out in the Nuremberg Code, the Belmont Report, or the Declaration of Helsinki. (See Biros MH, Hauswald M, Baren J. Procedural versus practical ethics. Acad Emerg Med 2010;17:989-990 for more information.) Manuscripts reporting data involving human subjects must indicate a positive review by an Institutional Review Board (IRB) or equivalent. This requirement includes studies that qualify for IRB expedited status. Most institutions require IRB review of studies that qualify for exempt status and that this determination be made by the IRB, not by the authors. The methods section of the manuscript must explicitly state that IRB approval was obtained, that the IRB determined the study was exempt, or that the study did not involve human subjects (e.g. publicly available and previously de-identified information from national data sets, or other studies not meeting the definition of human subjects research as set forth in US Code of Federal Regulations, Title 45, Part 46. Additional information available at **www.hhs.gov/ohrp/policy/cdebiol.html**).
The methods section should also indicate the type of consent used (written, verbal, or waived), and confirm that consent was obtained from all subjects (unless waived by the IRB).

6. Results. Results should be concisely stated and include the statistical analysis of the data presented. Results presented in tabular or graphic form should be referred to in the text, but the material should not be presented again. In addition to the data collected in the study, the results should also indicate the success of protocol implementation (e.g., was blinding successful, was there a high inter-rater reliability?).

7. Discussion. The discussion should put the study results in the context of current knowledge. An unbiased review and critique of previous relevant studies should be included and appropriately referenced. There is no need to restate the results in the first paragraph of the discussion; instead, simply start the discussion.

8. Limitations. Discuss shortcomings and biases related to study design and execution. Highlight areas where future investigations and/or different methods of analysis might prove fruitful.

9. Conclusions. The conclusions should not simply repeat the results, but rather answer the study question. Recommendations supported by the study findings may be included.

10. References. Citations and references should be listed in numerical order. Every reference must be cited at least once in the text. Use the NEJM reference style: all authors up to six, article title (and subtitle, if any), journal name (with no following period), year, volume number (and issue number if the journal's pages are not numbered consecutively throughout the year), and inclusive page numbers. (Examples a and b below) When there are seven or more authors, list the first three, followed by “et al.” (Example c below) Book references should include: authors as above, chapter title, if any, editor, if any, title of book, city of publication, publisher, and year. Include volume and edition, specific pages, and translators where appropriate. (Example d below) Website references should include the most recent date of access. (Example e below) Personal communications and unpublished data should be cited in the body of the paper in parentheses, not listed in the references section. Manuscripts that have been accepted for publication may be listed

as “in press”; manuscripts that have been submitted or are under revision but have not been accepted may not be cited as references. The use of abstracts that have not been published as full manuscripts is discouraged. Please do not capitalize each word in a reference title—only capitalize the first letter unless there is a proper noun or other word clearly needing capitalization in the title. Authors are responsible for the accuracy and completeness of the references and text citations.

a) Promes SB, Wagner MJ. Starting a clinical competency committee. J Grad Med Ed 2014;6(1)163-64.

b) Chou CL, Promes SB, **Souza KH**,**Topp KS**, **O'Sullivan PS**. Twelve tips for facilitating successful teleconferences. Med Teach 2012;34(6):445-9.

c) Schott M, Kedia R, Promes SB, et al. West J Emerg Med 2015;16(6):871-6.

d) Mohr NM, Moreno-Walton L, Smith-Coggins, R, et al. Generational Differences in Emergency Medicine. In Strauss R and Mayer R, eds. Emergency Department Management. NY, NY: McGraw Hill, 2014.

e) Coaching Program. Dallas, TX: Council of Emergency Medicine Residency Directors, 2016. (*Accessed on July 25, 2016 at* http://www.cordem.org/i4a/pages/index.cfm?pageid=3652*)*

11. Tables. Tables should be created using the table tool in MS Word. Tables must be referenced in the text in sequential order. Each table should be submitted on a separate page with a descriptive title. Define all abbreviations in a footnote to the table. Symbols related to the table contents (e.g., *) must also be defined in a footnotes.

12. Figures and legends. Figures must be referenced in the text in sequential order. Figures should clarify and augment the text. Put figure legends on a separate page. Figures should be prepared to 1 column (86 mm) or two column width (177 mm) for the journal. They should have a minimum resolution of 300 dpi for photos/images and at least 600 dpi for images with lines or text. Figures can be either BW (1 bit), greyscale (8 bit) or RGB (8 bit color). JPEG images are not recommended. We can accept TIFF, EPS, and PDF files. We also can accept images embedded in Word files, but they must still meet the requirements of file width and resolution quoted above before embedding. If compressed, use high-quality compress option while saving the image. If you are using Visio to create your charts or line diagrams, it is recommended that you save the file in EMF format and supply it separately along with your manuscript document. Figure reproduction cannot improve on the quality of the originals. Any special instructions about sizing, placement, or color should be clearly noted. Symbols, arrows, or letters used to identify parts of the illustration must be explained clearly in the legend. If a figure has been previously published, the legend must acknowledge the original source.

13. Supplemental material. Authors may provide a supplemental file in PDF format. The supplemental file can contain more than one item, including figures, tables, or additional methods. Each item should be labeled and identified in the main manuscript by this label (e.g., “see Figure 1S in the supplement” or “see Table 1S in the supplement).. Supplemental material is not subjected to copyediting.

New Ideas in B-E-D-side Teaching

These are educational case reports. These may be single center reports which do not contain robust evaluation data. Authors are invited to describe innovations and techniques in bedside teaching that may include a focus on instructional methods, team and/or patient involvement, procedural teaching, and the art of clinical medicine. Submissions should follow the structure **B-E-D** as described below. Tips that may be generalizable to other clinical settings are most desirable.

1. ***B****ackground.* Provide relevant background information and literature review that led to the development of the bedside teaching tip.

2. ***E****xplanation:* Explain the technique in detail, including the roles of all persons involved (teacher, learner, patient, other team members, etc.).

3. ***D****escription*: Describe the outcomes realized by implementing the technique. These may include (but are not limited to) change in learner engagement, patient satisfaction, reduction of medical error, improved teamwork, etc.

See section entitled “Original Contributions and Brief Contributions” for specific guidelines for tables, figures and references.

Education Case Conference

Education Case Conference (ECC) articles describe the logical systematic evaluation and diagnosis of a problem commonly encountered between a teacher and a learner or one dealing with faculty development in the emergency medicine. Cases can involve learners at all levels. The manuscript format should consist of the following format: case presentation, discussion of the possible solutions, solution chosen, outcome and lessons learned (when applicable).

Educational Downloads

The Educational Downloads section is designed as a regular feature to make the journal's education content accessible and applicable to frontline educators. It is intended to promote a general understanding of important issues that affect teaching and learning in emergency medicine.

These manuscripts provide a snapshot view of a topic important to academic emergency physicians. Authors should frame the topic succinctly and may utilize images, figures, tables, and complementary text. Topics should be timely, of current and on-going interest, and evidence-based. These topics may not be new, but need to be presented in a unique way so as to provide new insights to AEM E&T readers.

Note: Authors may provide additional online conten**t.**

Commentary and Perspectives

This section includes commentary, perspectives, or opinions covering timely or important topics related to educational theory or advances that are relevant to emergency medicine. Proposals and submissions are welcome. Also included in this section are editorials that highlight and analyze a key research article published in the same issue. These are often solicited, although unsolicited editorials may be considered.

All letters that comment on a published work must be received by the end of the month following publication. An editorial decision regarding acceptance of the letter will be made after the author of the related work has had the opportunity to review the letter and comment. Letters regarding current issues in academic aspects of emergency medicine, but not related to a published work, are also encouraged. Research studies will not be accepted as correspondence. No tables or graphs should accompany letters to the editor. Contributions must otherwise conform to the relevant manuscript submission guidelines. The editors reserve the right to edit the length of letters, and the number of letters published on a given subject. In general, after publication of letters and the author reply (if any), further letters on the same subject will not be considered. General tips on writing letters to the editor can be found at: Golub RM. Correspondence course. JAMA 2008; 300:98-99.

Innovations Report

Innovation Reports describe novel strategies for addressing common educational problems. An Innovation Report should include the following sections: 1) Need for Innovation; 2) Background (which comprises of a succinct literature summary); 3) Objective of Innovation 4) Development Process (including a description of underlying conceptual frameworks or theories); 5) The Implementation Phase (e.g. what happened when you rolled this out?); 6) Outcomes (i.e. what is evidence of an impact or success of your innovation) or Evaluation (i.e. summary of formal program evaluation survey results). 7) Reflective Discussion (Potential for export to other sites, advice for others seeking to try similar, sustainability, Limitations/Lessons learned, Next steps).

Book and Media Review

Book/ Media reviews are solicited. Information regarding these reviews will be provided to authors by the editor at time of solicitation.

Canvas/Transitions

Canvas is a place for creativity outside the traditional realm of medical education. Authors are invited to submit creative writings, art, or reflections which augment to our lives as physicians, educators, and global citizens. Examples of material that will be considered include personal narratives, reflections on life transitions at points in medicine, poetry, creative writing essays, photographs, and original artwork.

SPECIFIC WORD COUNTS

Below is a listing of specific word counts based on manuscript types:

Original Contributions:
Article length - 5000 words maximum
excluding abstract
Abstract length - 300 words, structured abstract
Figures/Tables - 5 maximum
References - no maximum

Brief Contributions:
Article length - 1500 words maximum excluding abstract
Abstract length - 300 words, structured abstract
Figures/Tables – 1 figure or table
References – 12 references maximum

New Ideas in B-E-D-side Teaching:
Article length - 500 words
Figures/Tables – 1 figure or table
References – 10 references maximum

Education Case Conference
Article length - 1500 words maximum excluding abstract
Abstract length - 300 words, structured abstract
Figures/Tables – 1 figure or table
References – 12 references maximum

Educational Downloads
Length – maximum 750 words
Abstract – none required
Figures/Tables – to augment written content not to exceed 2 pages of material for download
References – 6 references maximum
Social Media – authors are encouraged to create a Podcast of the content and a Tweet and/or infographic.

Commentary and Perspectives
Length – 2,000 words for unsolicited pieces

Canvas/Transitions
Length – 600 words

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AEM E&T reserves the right to refuse publication of any submission that in the opinion of the senior editorial board duplicates a prior publication. AEM E&T uses Crosscheck® to assist in this decision.

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At the time of acceptance, journal staff or an editor may contact corresponding authors to obtain information to enhance dissemination of the work. For example, we may ask authors to provide a <140-character script for posting on the society's Twitter feed. If the paper is selected as the Editor Pick of the Month (EPOTM), the editor may contact the authors for a quote or other information. Additionally, journal staff may ask authors for an image, for publication on the cover of AEM E&T, that the authors believe to best captures the essence of their work.

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Guidelines for Authors

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Manuscript Categories

Medical Teacher invites the following types of submissions;

Articles

Articles are the primary presentation mode of communication in the Journal, and are usually between 2500–5000 words in length. All articles must include abstracts, practice points and notes on contributors. Glossary terms should be added if appropriate (see below for further details).

Short Communications

Short communications are brief articles on matters of topical interest or work in progress, limited to a maximum of 1700 words to include title, notes on contributors, abstract, text, references and one small table (optional).

Letters to the Editor

Letters should be a maximum of 400 words in length, including title, text, name and address of author(s), and maximum two references. Tables and figures are not permitted.

Twelve Tips

The 'Twelve Tips' series is popular with readers and submissions in this format are welcomed. The aim is to provide practical advice in the form of twelve short hints or tips for those working in a selected area.

Twelve Tips Guidelines

Personal View

Personal View articles address a topic in the area of medical/healthcare professions education that is likely to be of interest to Medical Teacher readers. They present and reflect the author's personal experience or viewpoint relating to the topic.

Personal View Guidelines

How We...

‘How we ...’ articles look at what is involved in implementing a practical idea or topic in medical education and

reflect the particular experience of the writer.

We are not currently considering submissions in this category.

How We... Guidelines

Around the World

Each paper in this feature area focuses on a particular country or region to look at medical education worldwide. The aim is to describe medical education from a wide group of countries; to demonstrate the positive and negative attributes of each country's educational system, from the perspectives of undergraduate, postgraduate and continuing professional development perspectives and to provide a starting point for future discussions. They should enable the reader to gain a greater knowledge of the problems faced and hopefully encourage a more structured and supportive approach to the globalisation of medical education. Papers should be around 3000 - 4500 words in length.

Commentaries

Commentaries/editorials are usually invited but we welcome unsolicited submissions too. Editorials are meant to reflect the views of the author, while reflecting what has already been written on the topic.

Manuscript Submission

All submissions should be made online at Medical Teacher's ScholarOne Manuscripts site. New users must first create an account. Once a user is logged onto the site, submissions should be made via the Author Centre. For assistance with any aspect of the site, please refer to the User Guide which is accessed via the 'Get Help Now' button at the top right of every screen.

A covering letter or email should be included indicating that the submission is made on behalf of all authors, although it is not necessary for each author to sign the letter. On receipt, the manuscript will be immediately acknowledged by email.

Manuscript Preparation

Style Guidelines Please refer to the quick style guidelines when preparing your paper, rather than any published articles or a sample copy.

References The reference style for Medical Teacher is T&F Standard CSE.

Title page The first page of the manuscript should contain the following information:

i) the title of the paper
ii) a short title not exceeding 45 characters for use as a running head
iii) names of authors
iv) names of the institutions at which the research was conducted
v) name, address, telephone and fax number, and email address of corresponding author.

Abstract All papers should be accompanied by an abstract of up to 200 words. The abstract should reflect the content of the paper including methods used, results, and conclusions drawn.

Text This should in general, but not necessarily, be divided into sections with the headings: ‘Introduction’, ‘Methods’, ‘Results’, ‘Discussion’ and ‘Conclusion’.

Practice Points Up to 5 short bullet points which summarise the key messages of the article should be included (not required for short communications). ‘Practice Points’ will be included in a box at the end of the article.

Notes on Contributors All articles should be accompanied by ‘Notes on contributors’, short biographical notes on each contributor to a maximum of 50 words per contributor.

Glossary Terms If you feel that there are terms or concepts central to your paper that the reader may not be familiar with, please include definition of these terms, giving if possible a reference. Your definitions will then be added in a box at the end of your paper and added to the MedEdWorld glossary.

Illustrations and tables Illustrations and tables should not be inserted in the appropriate place in the text but should be included at the end of the paper, each on a separate page.

Tables should be given Arabic numbers (e.g. Table 3), and their desired position in the text should be indicated. Tables should be used only when they can present information more efficiently than running text. Care should be taken to avoid any arrangement that unduly increases the depth of a table, and the column heads should be made as brief as possible, using abbreviations liberally. Lines of data should not be numbered nor run numbers given unless those numbers are needed for reference in the text. Columns should not contain only one or two entries, nor should the same entry be repeated numerous times consecutively. Units should appear in parentheses in the column heading but not in the body of the table. Words or numerals should be repeated on successive lines; 'ditto' or 'do' should not be used. Tables should be typed using single-spacing.

All photographs, graphs and diagrams should be referred to as Figures and should be numbered consecutively in the text in Arabic numerals (e.g. Figure 3). A list of captions for the figures should be submitted on a separate sheet (or where figures are uploaded as separate files, captions can be entered during the electronic submission process) and should make interpretation possible without reference to the text. Captions should include keys to symbols. Avoid the use of colour and tints for purely aesthetic reasons. Figures should be produced as near to the finished size as possible. All files must be 300 dpi or higher. Please note that it is in the author's interest to provide the highest quality figure format possible.

Any part of the manuscript labelled 'Appendix' or any table that is likely to take up more than one page in the journal will be published online as Supplemental Material, and will not appear in the print version of the journal. Supplemental Material is not typeset but is published in the form submitted by the author.

Please do not hesitate to contact the Publisher’s Production Department if you have any queries.

Acknowledgments and Declaration of Interest sections

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Acknowledgments section Any acknowledgments authors wish to make should be included in a separate headed section at the end of the manuscript preceding any appendices, and before the references section. Please do not incorporate acknowledgments into notes or biographical notes.

Declaration of Interest section All declarations of interest must be outlined under the subheading “Declaration of interest”. If authors have no declarations of interest to report, this must be explicitly stated. The suggested, but not mandatory, wording in such an instance is: The authors report no declarations of interest. When submitting a paper via ScholarOne Manuscripts, the “Declaration of interest” field is compulsory (authors must either state the disclosures or report that there are none). If this section is left empty authors will not be able to progress with the submission.

Please note: for NIH/Wellcome-funded papers, the grant number(s) must be included in the Declaration of Interest statement.

Click here to view our full Declaration of Interest Policy.

Additional Information Upon Acceptance

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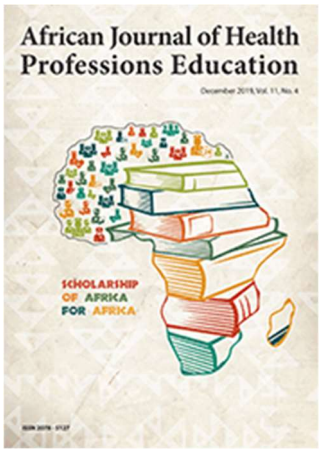
For further clarification on any of the above, contact the Editorial Office at medicalteacher@dundee.ac.uk or Pat Lilley, Managing Editor, Medical Teacher.

Appendix C4: Journal submission guidelines *African Journal of Health Professions Education*



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Author Guidelines

Please view the Author Tutorial for guidance on how to submit on Editorial Manager.

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To access and submit an article already in production, please see the guidelines here.

Author Guidelines

Please take the time to familiarise yourself with the policies and processes below. If you still have any questions, please do not hesitate to ask our editorial staff (tel.: +27 (0)21 532 1281, email: submissions@hmpg.co.za).

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Authorship

Named authors must consent to publication. Authorship should be based on: (*i*) substantial contribution to conceptualisation, design, analysis and interpretation of data; (*ii*) drafting or critical revision of important scientific content; or (*iii*) approval of the version to be published. These conditions must all be met for an individual to be included as an author (uniform requirements for manuscripts submitted to biomedical journals; refer to www.icmje.org)

If authors' names are added or deleted after submission of an article, or the order of the names is changed, all authors must agree to this in writing.

Please note that co-authors will be requested to verify their contribution upon submission. Non-verification may lead to delays in the processing of submissions.

Author contributions should be listed/described in the manuscript.

Conflicts of interest

Conflicts of interest can derive from any kind of relationship or association that may influence authors' or reviewers' opinions about the subject matter of a paper. The existence of a conflict – whether actual, perceived or potential – does not preclude publication of an article. However, we aim to ensure that, in such cases, readers have all the information they need to enable them to make an informed assessment about a publication's message and conclusions. We require that both authors and reviewers declare all sources of support for their research, any personal or financial relationships (including honoraria, speaking fees, gifts received, etc) with relevant individuals or organisations connected to the topic of the paper, and any association with a product or subject that may constitute a real, perceived or potential conflict of interest. If you are unsure whether a specific relationship constitutes a conflict, please contact the editorial team for advice. If a conflict remains undisclosed and is later brought to the attention of the editorial team, it will be considered a serious issue prompting an investigation with the possibility of retraction.

Research ethics committee approval

Authors must provide evidence of Research Ethics Committee approval of the research where relevant. Ensure the correct, full ethics committee name and reference number is included in the manuscript.

If the study was carried out using data from provincial healthcare facilities, or required active data collection through facility visits or staff interviews, approval should be sought from the relevant provincial authorities. For South African authors, please refer to the guidelines for submission to the National Health Research Database. Research involving human subjects must be conducted according to the principles outlined in the Declaration of Helsinki. Please refer to the National Department of Health's guideline on Ethics in Health research: principles, processes and structures to ensure that the appropriate requirements for conducting research have been met, and that the HPCSA's General Ethical Guidelines for Health Researchers have been adhered to.

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Information that would enable identification of individual research participants should not be published in written descriptions, photographs, radiographs and pedigrees unless the information is essential for scientific purposes and the patient (or parent or guardian) has given informed written consent for publication and distribution. We further recommend that the published article is disseminated not only to the involved researchers but also to the patients/participants from whom the data was drawn. Refer to Protection of Research Participants. The signed consent form should be submitted with the manuscript to enable verification by the editorial team.

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Ethnic/race classification

Use of racial or ethnicity classifications in research is fraught with problems. If you choose to use a research design that involves classification of participants based on race or ethnicity, or discuss issues with reference to such classifications, please ensure that you include a detailed rationale for doing so, ensure that the categories you describe are carefully defined, and that socioeconomic, cultural and lifestyle variables that may underlie perceived racial disparities are appropriately controlled for. Please also clearly specify whether race or ethnicity is classified as reported by the patient (self-identifying) or as perceived by the investigators. Please note thatit is not appropriate to use self-reported or investigator-assigned racial or ethnic categories for genetic studies.

Continuing Professional Development (CPD)

AJHPE is an HPCSA-accredited service provider of CPD materials. Principal authors can earn up to 15 CPD continuing education units (CEUs) for publishing an article; co-authors are eligible to earn up to 5 CEUs; and reviewers of articles can earn 3 CEUs. Each month, *AJHPE* also publishes a CPD-accredited questionnaire relating to the academic content of the journal. Successful completion of the questionnaire with a pass rate of 70% will earn the reader 3 CEUs. Administration of our CPD programme is managed by Medical Practice Consulting. To complete questionnaires and obtain certificates, please visit MRP Consulting

Manuscript preparation

Preparing an article for anonymous review

To ensure a fair and unbiased review process, all submissions are to include an anonymised version of the manuscript. The exceptions to this requirement are Correspondence, Book reviews and Obituary submissions.

Submitting a manuscript that needs additional blinding can slow down your review process, so please be sure to follow these simple guidelines as much as possible:

- An anonymous version should not contain any author, affiliation or particular institutional details that will enable identification.
- Please remove title page, acknowledgements, contact details, funding grants to a named

person, and any running headers of author names.
- Mask self-citations by referring to your own work in third person.

General article format/layout

Submitted manuscripts that are not in the correct format specified in these guidelines will be returned to the author(s) for correction prior to being sent for review, which will delay publication.

General:

- Manuscripts must be written in UK English (this includes spelling).
- The manuscript must be in Microsoft Word or RTF document format. Text must be 1.5 line spaced, in 12-point Times New Roman font, and contain no unnecessary formatting (such as text in boxes). Pages and lines should be numbered consecutively.
- Please make your article concise, even if it is below the word limit.
- Qualifications, ***full*** affiliation (department, school/faculty, institution, city, country) and contact details of ALL authors must be provided in the manuscript and in the online submission process.
- Include sections on Acknowledgements, Conflict of Interest, Author Contributions and Funding sources. If none is applicable, please state 'none'.
- Abbreviations should be spelt out when first used and thereafter used consistently, e.g. 'intravenous (IV)' or 'Department of Health (DoH)'.
- Numbers should be written as grouped per thousand-units, i.e. 4 000, 22 160.
- Quotes should be placed in single quotation marks: i.e. The respondent stated: '...'
- Round brackets (parentheses) should be used, as opposed to square brackets, which are reserved for denoting concentrations or insertions in direct quotes.

If you wish material to be in a box, simply indicate this in the text. You may use the table format –this is the *only* exception. Please DO NOT use fill, format lines and so on.

Preparation notes by article type

Research

Guideline word limit: 3 000 words (excluding abstract and bibliography)

Research articles describe the background, methods, results and conclusions of an original research study. The article should contain the following sections: introduction, methods, results, discussion and conclusion, and should include a structured abstract (see below). The introduction should be concise – no more than three paragraphs – on the background to the research question, and must include references to other relevant published studies that clearly lay out the rationale for conducting the study. Some common reasons for conducting a study are: to fill a gap in the literature, a logical extension of previous work, or to answer an important question. If other papers related to the same study have been published previously, please make sure to refer to them specifically. Describe the study methods in as much detail as possible so that others would be able to replicate the study should they need to. Where appropriate, sample size calculations should be included to demonstrate that the study is not underpowered. Results should describe the study sample as well as the findings from the study itself, but all interpretation of findings must be kept in the discussion section. The conclusion should briefly summarise the main message of the paper and provide recommendations for further study.

- May include up to 6 illustrations or tables.
- A max of 20 - 25 references

Structured abstract

- This should be no more than 250 words, with the following recommended headings:
    - **Background:** why the study is being done and how it relates to other published work.
    - **Objectives:** what the study intends to find out
    - **Methods:** must include study design, number of participants, description of the research tools/instruments, any specific analyses that were done on the data.
    - **Results:** first sentence must be brief population and sample description; outline the results according to the methods described. Primary outcomes must be described first, even if they are not the most significant findings of the study.
    - **Conclusion:** must be supported by the data, include recommendations for further study/actions.
    - Please ensure that the structured abstract is complete, accurate and clear and has been approved by all authors. It should be able to be intelligible to the reader without referral to the main body of the article.
    - Do not include any references in the abstracts.

Here is an example of a good abstract.

***Scientific letters*/short reports**

These are shorter length, scholarly research articles of no more than 1500 words. Single-institution, and/or studies with sample sizes <100 are better submitted as short reports.

Guideline word limit: 1500 words

- Abstract: Structured, of about 250 words, with the following recommended headings: Background, Objectives, Methods, Results, and Conclusion.
- May include only one illustration or table
- A maximum of 8 references

Forum articles

Are personal opinion pieces that address an area in health professions education that would be of interest to the readership. Forum pieces while reflecting the authors personal views, should be scholarly, and arguments well-supported.

- They should not exceed 1000 words
- Up to 5 references are allowed.

Short communications

Are very brief articles that share work in progress, lessons learnt or innovations in medical education.

- They should be no more than 500 words in length
- A maximum of 3 references, and 1 table or figure.
- Short Communications should be structured under the following headings: Why was the idea necessary (Problem), What was tried (Approach) and What were the lessons learnt (Outcomes).

Correspondence (Letters to the Editor)

Guideline word limit: 400 words

Letters to the editor should relate either to a paper or article published by the AJHPE or to a topical issue of particular relevance to the journal's readership

- May include only one illustration or table
- Must include a correspondence address.

Obituaries

Guideline word limit: 400 words

Should be offered within the first year of the practitioner's death, and may be accompanied by a photograph.

Illustrations/photos/scans

- If illustrations submitted have been published elsewhere, the author(s) should provide evidence of consent to republication obtained from the copyright holder.
- Figures must be numbered in Arabic numerals and referred to in the text e.g. '(Fig. 1)'.
- Each figure must have a caption/legend: Fig. 1. Description (any abbreviations in full).
- All images must be of high enough resolution/quality for print.
- All illustrations (graphs, diagrams, charts, etc.) must be in PDF form.
- Ensure all graph axes are labelled appropriately, with a heading/description and units (as necessary) indicated. Do not include decimal places if not necessary e.g. 0; 1.0; 2.0; 3.0; 4.0 etc.
- Each image must be attached individually as a 'supplementary file' upon submission (not solely embedded in the accompanying manuscript) and named Fig. 1, Fig. 2, etc.

Tables

- Tables should be constructed carefully and simply for intelligible data representation. Unnecessarily complicated tables are strongly discouraged.
- Large tables will generally not be accepted for publication in their entirety. Please consider shortening and using the text to highlight specific important sections, or offer a large table as an addendum to the publication, but available in full on request from the author.
- Embed/include each table in the manuscript Word file - do not provide separately as supplementary files.
- Number each table in Arabic numerals (Table 1, Table 2, etc.) consecutively as they are referred to in the text.
- Tables must be cell-based (i.e. not constructed with text boxes or tabs) and editable.
- Ensure each table has a concise title and column headings, and include units where necessary.
- Footnotes must be indicated with consecutive use of the following symbols: * † ‡ § ¶ || then ** †† ‡‡ etc.

Do not: Use [Enter] within a row to make 'new rows':

Rather:

Each row of data must have its own proper row:

Do not: use separate columns for *n* and %:

Rather:

Combine into one column, *n* (%):

Do not: have overlapping categories, e.g.:

Rather:

Use <> symbols or numbers that don't overlap:

References

NB: *Only complete, correctly formatted reference lists in Vancouver style will be accepted. If reference manager software is used, the reference list and citations in text are to be unformatted to plain text before submitting..*

- Authors must verify references from original sources.
- Citations should be inserted in the text as superscript numbers between square brackets, e.g. These regulations are endorsed by the World Health Organization,[2] and others.[3,4-6]
- All references should be listed at the end of the article in numerical order of appearance in the Vancouver style (not alphabetical order).
- Approved abbreviations of journal titles must be used; see the List of Journals in Index Medicus.

- Names and initials of all authors should be given; if there are more than six authors, the first three names should be given followed by et al.
- Volume and issue numbers should be given.
- First and last page, in full, should be given e.g.: 1215-1217 **not** 1215-17.
- Wherever possible, references must be accompanied by a digital object identifier (DOI) link). Authors are encouraged to use the DOI lookup service offered by CrossRef:
    - On the Crossref homepage, paste the article title into the 'Metadata search' box.
    - Look for the correct, matching article in the list of results.
    - Click Actions > Cite
    - Alongside 'url =' copy the URL between { }.
    - Provide as follows, e.g.: https://doi.org/10.7196/07294.937.98x

Some examples:

- *Journal references:* Price NC, Jacobs NN, Roberts DA, et al. Importance of asking about glaucoma. Stat Med 1998;289(1):350-355. http://dx.doi.org/10.1000/hgjr.182
- *Book references:* Jeffcoate N. Principles of Gynaecology. 4th ed. London: Butterworth, 1975:96-101.
- *Chapter/section in a book:* Weinstein L, Swartz MN. Pathogenic Properties of Invading Microorganisms. In: Sodeman WA, Sodeman WA, eds. Pathologic Physiology: Mechanisms of Disease. Philadelphia: WB Saunders, 1974:457-472.
- *Internet references:* World Health Organization. The World Health Report 2002 - Reducing Risks, Promoting Healthy Life. Geneva: WHO, 2002. http://www.who.int/whr/2002 (accessed 16 January 2010).
- Legal references
- Government Gazettes:

National Department of Health, South Africa. National Policy for Health Act, 1990 (Act No. 116 of 1990). Free primary health care services. Government Gazette No. 17507:1514. 1996.

In this example, 17507 is the Gazette Number. This is followed by :1514 - this is the notice number in this Gazette.

- Provincial Gazettes:

Gauteng Province, South Africa; Department of Agriculture, Conservation, Environment and Land Affairs. Publication of the Gauteng health care waste management draft regulations. Gauteng Provincial Gazette No. 373:3003, 2003.

- Acts:

South Africa. National Health Act No. 61 of 2003.

- Regulations to an Act:

South Africa. National Health Act of 2003. Regulations: Rendering of clinical forensic medicine services. Government Gazette No. 35099, 2012. (Published under Government Notice R176).

- Bills:

South Africa. Traditional Health Practitioners Bill, No. B66B-2003, 2006.

- Green/white papers:

South Africa. Department of Health Green Paper: National Health Insurance in South Africa. 2011.

- Case law:

Rex v Jopp and Another 1949 (4) SA 11 (N)

Rex v Jopp and Another: Name of the parties concerned

1949: Date of decision (or when the case was heard)

(4): Volume number

SA: SA Law Reports

11: Page or section number

(N): In this case Natal - where the case was heard. Similarly, (C) woud indicate Cape, (G) Gauteng, and so on.

NOTE: no . after the v

- *Other references (e.g. reports) should follow the same format:* Author(s). Title. Publisher place: Publisher name, year; pages.
- Cited manuscripts that have been accepted but not yet published can be included as references followed by '(in press)'.
- Unpublished observations and personal communications in the text must **not** appear in the reference list. The full name of the source person must be provided for personal communications e.g. '...(Prof. Michael Jones, personal communication)'.

From submission to acceptance

Submission and peer-review

To submit an article:

- Please ensure that you have prepared your manuscript in line with the AJHPE requirements.
- All submissions should be submitted via Editorial Manager
- The following are required for your submission to be complete:
    - Anonymous manuscript (unless otherwise stated)
    - **Author Agreement form**
    - Manuscript
    - Any supple files: figures, datasets, patient consent form, permissions for published images, etc.
  - Once the submission has been successfully processed on Editorial Manager, it will undergo a technical check by the Editorial Office before it will be assigned to an editor who will handle the review process. If the author guidelines have not been appropriately followed, the manuscript may be sent back to the author for correcting.

Peer Review Process

All manuscripts are reviewed initially by the Editor-in-Chief and only those that meet the scientific and editorial standards of the journal, and fit within the aims and scope of the journal, will be sent for external peer review. Each manuscript is reviewed by two reviewers selected on the basis of their expertise in the field. A double blind review process is followed at AJHPE.

Authors are expected to receive feedback from reviewers and an editorial decision within approximately 6 weeks of submission. The time period of the entire review process may vary however depending upon the quality of the manuscript submitted, reviewers' responses and the time taken by the authors to submit the revised manuscript.

Manuscripts from review may be accepted, rejected or returned to the author for revision or resubmission for review. Authors will be directed to submit revised manuscripts within two months of receiving the editor's decision, and are requested to submit a point by point response to the reviewers' comments. Manuscripts which authors are requested to revise and resubmit will be sent for a second round of peer review, often to the original set of reviewers. All final decisions on a manuscript are at the Editor's discretion.

Production process

1. An accepted manuscript is passed to a Managing Editor to assign to a copyeditor (CE).
2. The CE copyedits in Word, working on house style, format, spelling/grammar/punctuation,

sense and consistency, and preparation for typesetting.
3. If the CE has an author queries, he/she will contact the corresponding author and send them the copyedited Word doc, asking them to solve the queries by means of track changes or comment boxes.
4. The authors are typically asked to respond within 1-3 days. Any comments/changes must be clearly indicated e.g. by means of track changes. Do not work in the original manuscript - work in the copyedited file sent to you and make your changes clear.
5. The CE will finalise the article and then it will be typeset.
6. Once typeset, the CE will send a PDF of the file to the authors to complete their final check, while simultaneously sending to the 2nd-eye proofreader.
7. The authors are typically asked to complete their final check and sign-off within 1-2 days. No major additional changes can be accommodated at this point.
8. The CE implements the authors' and proofreader's mark-ups, finalises the file, and prepares it for the upcoming issue.

Changing contact details or authorship

Please notify the Editorial Department of any contact detail changes, including email, to facilitate communication.

Errata and retractions

Errata

Should you become aware of an error or inaccuracy in yours or someone else's contribution after it has been published, please inform us as soon as possible via an email to publishing@hmpg.co.za,including the following details:

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- Article title and authors
- Description of error and details of where it appears in the published article
- Full detail of proposed correction and rationale

We will investigate the issue and provide feedback. If appropriate, we will correct the web version immediately, and will publish an erratum in the next issue. All investigations will be conducted in accordance with guidelines provided by the Committee on Publication Ethics (COPE).

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Send an email to publishing@hmpg.co.za, including the following details:

- Journal, volume and issue to which article was submitted/in which article was published
- Article title and authors
- Description of reason for withdrawal/retraction.

We will make a decision on a case-by-case basis upon review by the editorial committee in line with international best practices. Comprehensive feedback will be communicated with the authors with regard to the process. In case where there is any suspected fraud or professional misconduct, we will follow due process as recommended by the Committee on Publication Ethics (COPE), and in liaison with any relevant institutions.

When a retraction is published, it will be linked to the original article.

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Submission guidelines

Instructions for Authors

General

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Manuscript Submission

Manuscript Submission

Submission of a manuscript implies: that the work described has not been published before; that it is not under consideration for publication anywhere else; that its publication has been approved by all co-authors, if any, as well as by the responsible authorities – tacitly or explicitly – at the institute where the work has been carried out. The publisher will not be held legally responsible should there be any claims for compensation.

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Please take a look at these instructions if you are interested in proposing a special issue for HIGHER EDUCATION.

Please contact Editor-in-chief before you would like to submit your proposal for a special issue. Normally, a special issue contains six to eight articles.

When submitting your proposal for a special issue, please include the following information: 1) the names of the special issue editors with their short CV's; 2) the topic of the special issue (a 1-2 pages rationale for the topic); 3) the names of the authors of articles (with their short CV's), and 4) the abstracts (100-200 words) of the articles. We also invite you to suggest academics you think would be appropriate as reviewers for the special issue articles.

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A typical manuscript will not exceed 8,000 words including tables, figures, notes and references (this excludes abstract and keywords). Manuscripts that clearly exceed this will be critically reviewed with respect to length. Authors should include a word count with their manuscript.

Editorial procedure

Double-blind peer review

This journal follows a double-blind reviewing procedure. Authors are therefore requested to submit:

- A blinded manuscript without any author names and affiliations in the text or on the title page. Self-identifying citations and references in the article text should be avoided.
- A separate title page, containing title, all author names, affiliations, and the contact information of the corresponding author. Any acknowledgements, disclosures, or funding information should also be included on this page.

Title page

Title Page

Please use this **template title page** for providing the following information.

The title page should include:

- The name(s) of the author(s)
- A concise and informative title
- The affiliation(s) of the author(s), i.e. institution, (department), city, (state), country
- A clear indication and an active e-mail address of the corresponding author
- If available, the 16-digit ORCID of the author(s)

If address information is provided with the affiliation(s) it will also be published.

For authors that are (temporarily) unaffiliated we will only capture their city and country of residence, not their e-mail address unless specifically requested.

Abstract

Please provide an abstract of 150 to 250 words. The abstract should not contain any undefined abbreviations or unspecified references.

For life science journals only (when applicable)

Trial registration number and date of registration

Trial registration number, date of registration followed by "retrospectively registered"

Keywords

Please provide 4 to 6 keywords which can be used for indexing purposes.

Declarations

All manuscripts must contain the following sections under the heading 'Declarations'.

If any of the sections are not relevant to your manuscript, please include the heading and write 'Not applicable' for that section.

To be used for non-life science journals

Funding (information that explains whether and by whom the research was supported)

Conflicts of interest/Competing interests (include appropriate disclosures)

Availability of data and material (data transparency)

Code availability (software application or custom code)

Authors' contributions (optional: please review the submission guidelines from the journal whether statements are mandatory)

To be used for life science journals + articles with biological applications

Funding (information that explains whether and by whom the research was supported)

Conflicts of interest/Competing interests (include appropriate disclosures)

Ethics approval (include appropriate approvals or waivers)

Consent to participate (include appropriate statements)

Consent for publication (include appropriate statements)

Availability of data and material (data transparency)

Code availability (software application or custom code)

Authors' contributions (optional: please review the submission guidelines from the journal whether statements are mandatory)

Please see the relevant sections in the submission guidelines for further information as well as various examples of wording. Please revise/customize the sample statements according to your own needs.

Text

Text Formatting

Manuscripts should be submitted in Word.

- Use a normal, plain font (e.g., 10-point Times Roman) for text.
- Use italics for emphasis.
- Use the automatic page numbering function to number the pages.
- Do not use field functions.
- Use tab stops or other commands for indents, not the space bar.
- Use the table function, not spreadsheets, to make tables.
- Use the equation editor or MathType for equations.
- Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Manuscripts with mathematical content can also be submitted in LaTeX.

LaTeX macro package (Download zip, 188 kB)

Headings

Please use no more than three levels of displayed headings.

Abbreviations

Abbreviations should be defined at first mention and used consistently thereafter.

Footnotes

Footnotes can be used to give additional information, which may include the citation of a reference included in the reference list. They should not consist solely of a reference citation, and they should never include the bibliographic details of a reference. They should also not contain any figures or tables.

Footnotes to the text are numbered consecutively; those to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data). Footnotes to the title or the authors of the article are not given reference symbols.

Always use footnotes instead of endnotes.

Acknowledgments

Acknowledgments of people, grants, funds, etc. should be placed in a separate section on the title page. The

names of funding organizations should be written in full.

References

Citation

Cite references in the text by name and year in parentheses. Some examples:

- Negotiation research spans many disciplines (Thompson 1990).
- This result was later contradicted by Becker and Seligman (1996).
- This effect has been widely studied (Abbott 1991; Barakat et al. 1995; Kelso and Smith 1998; Medvec et al. 1999).

Ideally, the names of six authors should be given before et al. (assuming there are six or more), but names will not be deleted if more than six have been provided.

Reference list

The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should only be mentioned in the text. Do not use footnotes or endnotes as a substitute for a reference list.

Reference list entries should be alphabetized by the last names of the first author of each work.

Journal names and book titles should be *italicized*.

- Journal article Harris, M., Karper, E., Stacks, G., Hoffman, D., DeNiro, R., Cruz, P., et al. (2001). Writing labs and the Hollywood connection. *Journal of Film Writing, 44*(3), 213–245.
- Article by DOI Slifka, M. K., & Whitton, J. L. (2000) Clinical implications of dysregulated cytokine production. *Journal of Molecular Medicine*, https://doi.org/10.1007/s00109 0000086
- Book Calfee, R. C., & Valencia, R. R. (1991). *APA guide to preparing manuscripts for journal publication*. Washington, DC: American Psychological Association.
- Book chapter O'Neil, J. M., & Egan, J. (1992). Men's and women's gender role journeys: Metaphor for healing, transition, and transformation. In B. R. Wainrib (Ed.), *Gender issues across the life cycle* (pp. 107–123). New York: Springer.
- Online document Abou-Allaban, Y., Dell, M. L., Greenberg, W., Lomax, J., Peteet, J., Torres, M., & Cowell, V. (2006). Religious/spiritual commitments and psychiatric practice. Resource document. American Psychiatric Association. http://www.psych.org/edu/oth er_res/lib_archives/archives/20 0604.pdf. Accessed 25 June 2007.

For authors using EndNote, Springer provides an output style that supports

the formatting of in-text citations and reference list.

EndNote style (Download zip, 4 kB)

Tables

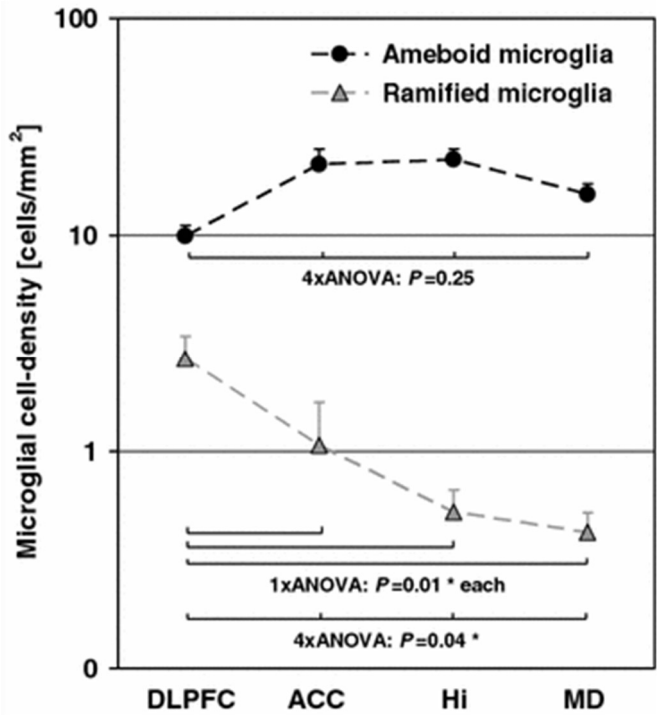
- All tables are to be numbered using Arabic numerals.
- Tables should always be cited in text in consecutive numerical order.
- For each table, please supply a table caption (title) explaining the components of the table.
- Identify any previously published material by giving the original source in the form of a reference at the end of the table caption.
- Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

Artwork and Illustrations Guidelines

Electronic Figure Submission

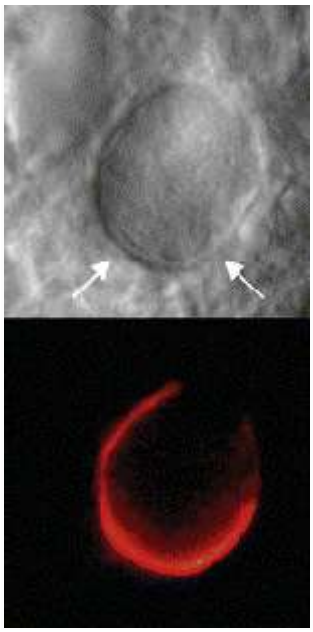
- Supply all figures electronically.
- Indicate what graphics program was used to create the artwork.
- For vector graphics, the preferred format is EPS; for halftones, please use TIFF format. MSOffice files are also acceptable.
- Vector graphics containing fonts must have the fonts embedded in the files.
- Name your figure files with "Fig" and the figure number, e.g., Fig1.eps.

Line Art



- Definition: Black and white graphic with no shading.
- Do not use faint lines and/or lettering and check that all lines and lettering within the figures are legible at final size.
- All lines should be at least 0.1 mm (0.3 pt) wide.
- Scanned line drawings and line drawings in bitmap format should have a minimum resolution of 1200 dpi.
- Vector graphics containing fonts must have the fonts embedded in the files.

Halftone Art



- Definition: Photographs, drawings, or paintings with fine shading, etc.
- If any magnification is used in the photographs, indicate this by using scale bars within the figures themselves.
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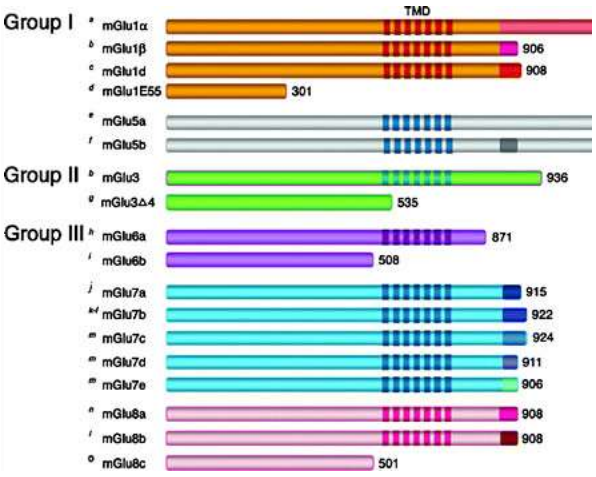

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