

**CONTINUOUS PROFESSIONAL DEVELOPMENT ECHOCARDIOGRAPHY  
TRAINING IN SOUTH AFRICA**

**by**

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**in the**

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**Promoter: Dr C van Wyk**

## DECLARATION

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

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## **DEDICATION**

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I would like to dedicate this thesis to  
my loving husband, Andries van Schalkwyk and  
my son, Sebastian van Schalkwyk  
for the patience and dedication while completing my studies.

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## LIST OF ABBREVIATIONS AND ACRONYMS

'N'	The total number of participants
'n'	Number of participants who answered the specific question
2D	Two Dimensional
3D	Three Dimensional
4D	Four Dimensional
ACCME	Accreditation Council for Continuous Medical Education
2D	two dimensional
3D	three dimensional
4 D	four dimensional
ASE	American Society of Echocardiography
BSE	British Society of Echocardiography
CEU	Continuing Education Unit
CME	Continuous Medical Education
CPD	Continuous Professional Development
CVD	Cardiovascular Disease
ESC	European Society of Cardiology
ESE	European Society of Echocardiography
EvaSys	Education Survey Automation Suite
HPCSA	Health Professions Council of South Africa
QCHP	Qatar Council for Healthcare Practitioners
SA	South Africa
SACSSP	South Africa Council for Social Services Professions
TTE	Trans-Thoracic Echocardiography
WFME	World Federation for Medical Education
WHO	World Health Organization

## SUMMARY

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**Keywords: Continuing professional development, Echocardiography, Health Professions Council of South Africa**

Echocardiography is recognised as a highly valuable diagnostic tool, and a vast amount of information can be gathered using the procedure. The field of echocardiography has enjoyed rapid technological advances over the last few decades. The operator-dependent nature of the technique and the comprehensive knowledge needed to perform a complete and clinically useful study requires maintenance of skills to ensure competence in performing the procedure.

In South Africa, the requirements for continuous development (CPD) only specify CPD in general and not field-specific CPD, although the HPCSA recognises and endorses CPD as a means of ensuring provision of best possible practice to the public. This lack of field-specific CPD for echocardiography provided evidence for the need to investigate the possible prerequisites for CPD of echocardiography training in South Africa.

The overall goal of the study was to determine what is needed to implement echocardiography-specific CPD, and how it can be implemented.

A literature study was done to gain a deeper understanding of CPD with reference to health professionals and specifically echocardiography. A questionnaire was compiled, considering some barriers that were identified and which affect compliance with CPD regulations. The questionnaire was compiled electronically and printed in a hard copy using the Evasys system. The target population was echocardiographers who attend the annual New Horizons in Echocardiography congress during 2016, and echocardiography practitioners who were involved through reference from the attendees of the New Horizons in Echocardiography congress.

The study revealed that improved communication and access to continuous professional development activities, with specific reference to practical hands-on activities, were the main needs of echocardiographers. It also revealed that formal accreditation and training needs to be monitored more closely and that most echocardiographers did not feel up to date with the latest technology and procedures in the field. Although there were some

limitations during this study, it was evident that CPD accreditors, and CPD service providers need to plan, organise and provide information in advance for echocardiography practitioners to plan and be able to attend the CPD activities.

Addressing the needs of echocardiography practitioners with regard to CPD will contribute positively not only towards the workplace and profession, but to the community at large.

## OPSOMMING

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### **Sleuteltermes: Voortgesette professionele ontwikkeling, Eggokardiografie, Raad vir Gesondheidsberoepes in Suid-Afrika**

Eggokardiografie word erken as 'n waardevolle diagnostiese hulpmiddel waardeur 'n groot hoeveelheid inligting versamel kan word. Die veld van eggokardiografie het oor die afgelope aantal dekades vinnige tegnologiese vordering ervaar. Die operateurafhanklike aard van die tegniek en die omvattende kennis wat vereis word om 'n volledige en klinies nuttige studie uit te voer vereis dat eggokardiografiese hulle vaardighede op datum moet hou om te verseker dat hulle bevoeg is om die prosedure uit te voer.

In Suid-Afrika spesifiseer die vereistes vir voortgesette professionele ontwikkeling (VPO) net VPO in die algemeen, en nie veldspesifieke VPO nie, hoewel die Raad vir Gesondheidsberoepes in Suid-Afrika (RGBSA) VPO as 'n manier om te verseker dat die bes moontlike diens aan die publiek gelewer word, onderskryf. Hierdie gebrek aan veldspesifieke VPO vir eggokardiografie het bewys gelewer van die behoefte om die moontlike voorvereistes vir VPO in eggokardiografie-opleiding in Suid-Afrika te ondersoek.

Die oorhoofse doel van die studie was om te bepaal wat nodig is ten einde eggokardiografiespesifieke VPO te implementeer, en hoe om dit te implementeer.

'n Literatuurstudie is uitgevoer om 'n dieper begrip van VPO soos dit verband hou met gesondheidsorgprofessies, en eggokardiografie in die besonder, te ontwikkel. 'n Vraelys is opgestel om ondersoek in te stel na hindernisse wat geïdentifiseer is en wat nakoming van VPO-regulasies beïnvloed. Die vraelys is deur middel van die Evasys stelsel in elektroniese formaat opgestel en in hardekopie uitgespeel. Die teikenpopulasie was eggokardiografiese wat in 2016 die jaarlikse New Horizons in Echocardiography kongres bygewoon het, en eggokardiografiepraktisyne wat deur mense wat die New Horizons in Echocardiography kongres begewoon het, voorgestel is.

Die studie het gevind dat eggokardiografiese se behoeftes veral beter kommunikasie oor en toegang tot VPO-aktiwiteite, spesifiek praktiese aktiwiteite, behels het. Die

deelnemers het ook aangedui dat formele akkreditasie en opleiding meer noukeurig gemoniteer moet word. Die meeste eggokardiografe was van mening dat hulle kennis van die jongste tegnologie en prosedures wat in die veld gebruik word nie op datum is nie. Hoewel hierdie studie sekere beperkinge gehad het, was dit duidelik dat VPO-akkrediteerders en VPO-diensverskaffers moet beplan en organiseer en betyds inligting moet verskaf sodat dit vir eggokardiografe moontlik is om te beplan om VPO-aktiwiteite by te woon.

Indien die behoeftes van eggokardiografiepraktisyns ten opsigte van VPO aangespreek word, sal dit nie net 'n positiewe bydrae in die werkplek en professie maak nie, maar ook in die gemeenskap.



# **CONTINUOUS PROFESSIONAL DEVELOPMENT ECHOCARDIOGRAPHY TRAINING IN SOUTH AFRICA**

## **CHAPTER 1: ORIENTATION TO THE STUDY**

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### **1.1 INTRODUCTION**

In this research project an in-depth study was done by the researcher with a view to determining what is needed to implement echocardiography-specific continuous professional development (CPD), and how it can be implemented.

Echocardiography is recognised as a highly valuable diagnostic modality performed using high frequency sound waves recreating cardiac structures for the evaluation of cardiac anatomy, function and haemodynamics. The operator-dependent nature and difficulty of practice command that the echocardiography practitioner functions at a professional level (Ehler, Carney, Dempsey, Rigling, Kraft, Witt, Kimball, Sisk, Geiser, Gresser & Waggoner 2001:77-84).

Since its discovery in the 1950's, echocardiography has enjoyed rapid technological developments and presently a remarkable amount of information can be gathered from different modalities within echocardiography (Beller 2006:1299-1303). Referring to both the vast difference in qualifications of Echocardiography practitioners and the level of skills required to perform an examination, echocardiography remains a largely operator-dependent technique – a comprehensive knowledge of cardiovascular anatomy and pathophysiology, as well as appropriate technical skills, are required to perform a complete and clinically useful study (Beller 2006:1299-1303).

According to Ehler *et al.* (2001:77-84) the increasing sophistication of echocardiographic instrumentation, together with the intricacies of the cardiac evaluation, render the primary pathway of on-the-job teaching inadequate. Thus, alternative training methods need to be explored.

The European credential and accreditation bodies for the practice of cardiac sonography, the European Society of Echocardiography (ESE), and the British Society of Echocardiography (BSE), dictate accumulation of specified credits in CPD. Both

credential bodies also recommend that the echocardiographic practitioner stays current in the field (Ehler *et al.* 2001:77-84).

South Africa currently does not have a dedicated regulatory body for governing echocardiography specifically, nonetheless, the Health Professions Council of South Africa (HPCSA) serves as the regulatory body across all professions. **The HPCSA requires all registered health professionals to participate in CPD activities and accumulate a predetermined number of CPD points over a period of time; this includes the accumulation of general CPD points obtained from completing any CPD activity, with no set recommendation to complete field-specific CPD activities to obtain field specific CPD points.** It is, however, important for individual echocardiography practitioners to take responsibility for their own continuous education in their specific field (Ehler *et al.* 2001:77-84).

Competence in the performance of Echocardiography examinations requires maintenance of skills in each area of practice, including B-Mode and Doppler. In order to ensure competence in the performance of echocardiography, CPD is needed in the skills area of practice (Biering, Ehler, Knoll & Waggoner 2006:471-474). CPD in echocardiography specifically was addressed in the present study.

## **1.2 BACKGROUND TO THE RESEARCH PROBLEM**

The background to the research problem will be discussed below.

### **1.2.1 The concept of continuous professional development**

CPD is a continuous process that enables individual health professionals to maintain and improve standards of medical practice through the development of knowledge, skills, attitudes and behaviour (WFME 2015:4).

In order to improve and uphold the healthcare of patients, the key purpose of CPD activities is to address the educational requirements of practitioners and other healthcare providers (Abratt, Eele, Goedhals, Rapoport, Slabber & Vorobiof 2003:728).

### **1.2.2 The purpose of continuous professional development**

It is clear that medical education should be responsive to community needs, and at the same time meet global standards (Beller 2006:1299-1303).

Health practitioners need to ensure that they maintain and improve the standards of their practice of healthcare, to ensure high quality patient care. Considering that medicine changes continuously, the knowledge that health practitioners acquire at health sciences faculties needs to be continuously updated throughout practitioners' careers to reflect changes in best-evidence medicine and variations in the needs of patients and healthcare systems (Beller 2006:1299-1303).

The general agreement across literature about the broad purpose of CPD confirms that CPD is a continuous process that enables individual health professionals to uphold and improve standards of medical practice through the expansion of knowledge, skills, attitudes and behaviours (HPCSA 2014:1).

### **1.2.3 Continuous professional development in echocardiography**

The field of cardiovascular imaging has experienced major growth and technological advances in recent years with respect to the long-standing, traditional cardiac-imaging procedures of echocardiography. It is now the time to consider changing the training paradigm for cardiology practitioners interested in emphasising cardiovascular imaging in their professional careers. According to Beller (2006:1299-1303) the thought leaders in these specific fields believed that a unique body of knowledge needed to be learned, and high technical proficiency acquired for the delivery of high-quality care.

In the old paradigm, physicians themselves are charged with identifying the criteria that constitute professional competence, and would evaluate their peers accordingly. Yet, according to Quinones (2003:687-708), the process of evaluating physicians' knowledge and competence is often constrained by the evaluators' own knowledge and ability to elicit the appropriate information. Clinical competence in echocardiography requires continuous maintenance of knowledge and skills. Continued medical education in echocardiography is essential for keeping pace with ongoing technical advances,

refinements in established techniques and applications of new methods (Quinones 2003:687-708).

According to Nihoyannopoulos, Fox, Fraser and Pinto (2007:80-87) the aim of CPD is to raise quality standards in practice, to protect staff working in echo laboratories from making incorrect diagnoses, and to protect patients from being given the wrong treatment. Thus, the echocardiographic practitioner, in an increasingly complex and demanding role, needs to maintain skills through participation in appropriate continuous education (Biering *et al.* 2006:471-474).

The primary role of the cardiac sonographer is to obtain diagnostic recordings of echocardiographic images and Doppler haemodynamic data. The technique is extremely operator-dependent and its optimal performance requires a highly skilled and well-educated person who can continuously integrate known clinical information, echocardiographical content and related physiological data to tailor the examination to ensure that it is comprehensive and accurate (Ehler *et al.* 2001:77-84).

According to Ehler *et al.* (2001:77-84) the education and credentialing of cardiac sonographers are extremely important to the future of the field, to ensure the appropriate professional status of competent practitioners and to enhance the standard of the practice of echocardiography. Providing quality education is a complex task. It requires a substantial commitment on the part of the educator providing the education to providing the level of rigor and types of educational experiences necessary to ensure competence and a professional level of practice (Ehler *et al.* 2001:77-84).

It is important to highlight, again, that echocardiography has been recognised as a highly valuable tool, but that it is extremely operator-dependent. In all first-world countries standards and operating procedures have been established, and CPD specific to echocardiography has been shown to be the only way to keep practitioners up to date and current in their field. In South Africa, no CPD specific to echocardiography has yet been established.

#### **1.2.4 Continuous professional development from an international perspective**

When referring to the international perspective relating to echocardiography, the guidelines are clear about accreditation, reaccreditation and CPD, and three echocardiography-specific governing bodies are involved, namely, the BSE, ESE and the American Society of Echocardiography (ASE) (Nihoyannopoulos *et al.* 2007:80-87). More information about these governing bodies and their requirements will be provided in Chapter 2.

From an international perspective, the South African Heart Association formally represents all cardiologists and cardiothoracic surgeons in South Africa, and has an association with the European Society of Cardiology (ESE 2015:1-5). However, the governing of these Associations does not govern all health professionals practicing in the field of echocardiography.

#### **1.2.5 Continuous professional development in South Africa**

CPD is required for all healthcare practitioners in South Africa. The Medical and Dental Professions Board controls the CPD system under the jurisdiction of the HPCSA (HPCSA 2014:1).

It is important to understand that the CPD guidelines in South Africa only stipulate accumulation of general CPD points (on a general topic in the field of healthcare, not necessarily specifically echocardiography), irrespective of the field of practice. Therefore, an echocardiography practitioner can, for example, attend a women's healthcare congress and accumulate the required number of CPD points and continue to maintain an active status (HPCSA registration), despite the congress not covering specific subject matter. The lack in field-specific CPD, therefore, presented an opportunity to research the need for implementing echocardiography-specific CPD in South Africa.

### **1.3 PROBLEM STATEMENT**

CPD is the driving force behind updating and maintaining the knowledge and skills of the health sciences practitioner in a specific field. Without these developmental

opportunities, the knowledge and skills that professionals may already possess may become obsolete in practice (Beller 2006:1299-1303).

No recent study concerning what is needed for implementation of echocardiography-specific CPD in South Africa could be traced. The problem addressed by this research related to determining what is needed to implement echocardiography-specific CPD, and how can it be implemented.

#### **1.4 RESEARCH QUESTIONS**

The research was carried out and completed based on the following two research questions:

1. What is needed to implement echocardiography-specific CPD; and
2. How can echocardiography-specific CPD be implemented.

#### **1.5 OBJECTIVES OF THE STUDY**

To achieve the aim, the following objectives were pursued:

- To contextualise and conceptualise the current CPD activities available to echocardiography practitioners (a literature study were conducted);  
This objective addresses the first research question.
- To determine what is needed to implement echocardiography-specific CPD (a questionnaire were used);  
This objective also addresses the first research question.
- To determine how echocardiography-specific CPD could be implemented (the results from both the literature study and the questionnaire were used).  
This objective addressed the second research question and referred specifically to future requirements of echocardiography CPD.

## **1.6 RESEARCH DESIGN OF THE STUDY AND METHODS OF INVESTIGATION**

A descriptive quantitative study was conducted. According to Shields and Rangarajan (2013:71-108) descriptive research is used to describe characteristics of a population being studied; it does not answer the question of how/when/why, but addresses the “what” question. The purpose of descriptive research is to observe, describe and document aspects of a situation as it occurs naturally (Polit & Hungler 2004:46-55).

In this study an empirical research design, using the research methods of a literature study and quantitative descriptive measurements, exploiting a custom-designed questionnaire, was employed to determine what is needed to implement echocardiography-specific CPD, and explored how this concept could be implemented.

### **1.6.1 Design of the study**

A schematic overview of the study is given in Figure 1.1.



**Figure 1.1: A schematic overview of the study**

The detailed description of the population, sampling methods, data collection and techniques, data analysis and reporting, and ethical considerations are provided in Chapter 3.

## **1.7 OVERALL GOAL OF THE STUDY**

The overall goal of this study was to determine what is needed to implement echocardiography-specific CPD, and how it can be implemented, with a view to providing



recommendations and making a contribution to the possible implementation of a CPD programme for all practicing echocardiographers in South Africa.

### **1.8 AIM OF THE STUDY**

The aim of the study was to determine what is needed to implement echocardiography-specific CPD, and how it can be implemented.

### **1.9 DEMARCATION OF THE FIELD AND SCOPE OF THE STUDY**

This study was done in the field of health professions education and lies in the domain of CPD. Due to the application of the study in the field echocardiography, the study can be classified as interdisciplinary, as it spans health professions education and echocardiography in South Africa.

As far as the time frame is concerned, this study was conducted between 2015 and 2016, with the empirical research phase taking place from July 2016 to September 2016.

### **1.10 THE VALUE, SIGNIFICANCE AND CONTRIBUTION OF THE STUDY**

The value and significance of the study is related to making this study relevant and having an impact on field-specific CPD.

#### **1.10.1 The value of the study**

The value of the study lies in creating awareness among echocardiographers about their participation in echocardiography-specific CPD, as well as establishing if there is a need for echocardiography-specific CPD education in order to contribute to the improvement of general CPD activities, or a specific CPD programme for echocardiography-specific CPD activities.

### **1.10.2 Significance of the study**

The proposed study could contribute to specific CPD opportunities by establishing what is needed to implement echocardiography-specific CPD and how it can be implemented. This will ensure an increase in quality of routine echocardiography examinations performed in South Africa, thereby enabling echocardiographers to keep up to date with the most recent knowledge, skills and practices in the field.

### **1.11 IMPLEMENTATION OF THE FINDINGS**

This report, which contains the findings of the research, will be brought to the attention of the management of the HPCSA, which is the committee responsible for CPD. The findings can also be adapted to inform discipline-specific CPD initiatives across all other fields overseen by the HPCSA.

The research findings will be submitted to academic journals with a view to publication, as the researcher hopes to make a contribution to the quality of routine echocardiography examinations performed in South Africa. The research findings will also be presented at conferences.

### **1.12 ARRANGEMENT OF THE REPORT**

To provide more insight into the topic, the methods used to find solutions and the final outcome of the study will be reported as follows:

In this chapter, Chapter 1, **Orientation to the study**, an introduction and background to the study was provided and the problem stated, while the research questions were also specified. As an overview, the goal, aim and objectives were stated and the research design and methods that were employed were discussed briefly. The significance of the study for future improvements in standards and quality of routine echocardiography examinations was indicated.

Chapter 2, **Continuous professional developmental activities available to echocardiography practitioners**, provides a review of national and international

articles, books and theses. CPD activities available for echocardiography practitioners will be contextualised. This chapter will serve as a theoretical framework for the study.

In Chapter 3, **Research design and methodology**, the research design and methods applied will be described in detail. Data collection and analysis will be discussed.

In Chapter 4, **Description and discussion of the results of the questionnaire survey**, the researcher will deal with the results of the data analysis of the quantitative data. The discussion includes analysis, tables and graphs.

In Chapter 5, **Conclusion, recommendations and limitations of the study**, an overview of the study, conclusions, recommendations and limitations will be provided.

### **1.13 CONCLUSION**

Chapter 1 provided the background and introduction to the research undertaken regarding CPD for echocardiography in South Africa. The next chapter, Chapter 2, entitled, **Continuous professional developmental activities available to echocardiography practitioners**, will provide a synthesis of the relevant literature.

## CHAPTER 2: CONTINUOUS PROFESSIONAL DEVELOPMENTAL ACTIVITIES AVAILABLE TO ECHOCARDIOGRAPHY PRACTITIONERS

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### 2.1 INTRODUCTION

This chapter serves to provide a perspective on CPD, in general, with a specific focus on echocardiography CPD, which is the interest of the current study. Both national and international perspectives will be explored.

The importance of echocardiography and the need to remain up to date with knowledge and skills in this specific field were explained in Chapter 1 (*cf.* 1.1; *cf.* 1.2). The aim of the study was to determine what is needed to implement echocardiography-specific CPD, and how it can be implemented for a South African population. With this in mind, the current chapter will focus on what is needed to implement echocardiography-specific CPD, and how echocardiography-specific CPD should be implemented.

Figure 2.1 captures the main elements of this chapter schematically. The two headings on the left-hand side serve as the main concepts that will be discussed. Elements within each of the two concepts will then be detailed further. The flow of the literature study is indicated by arrows.

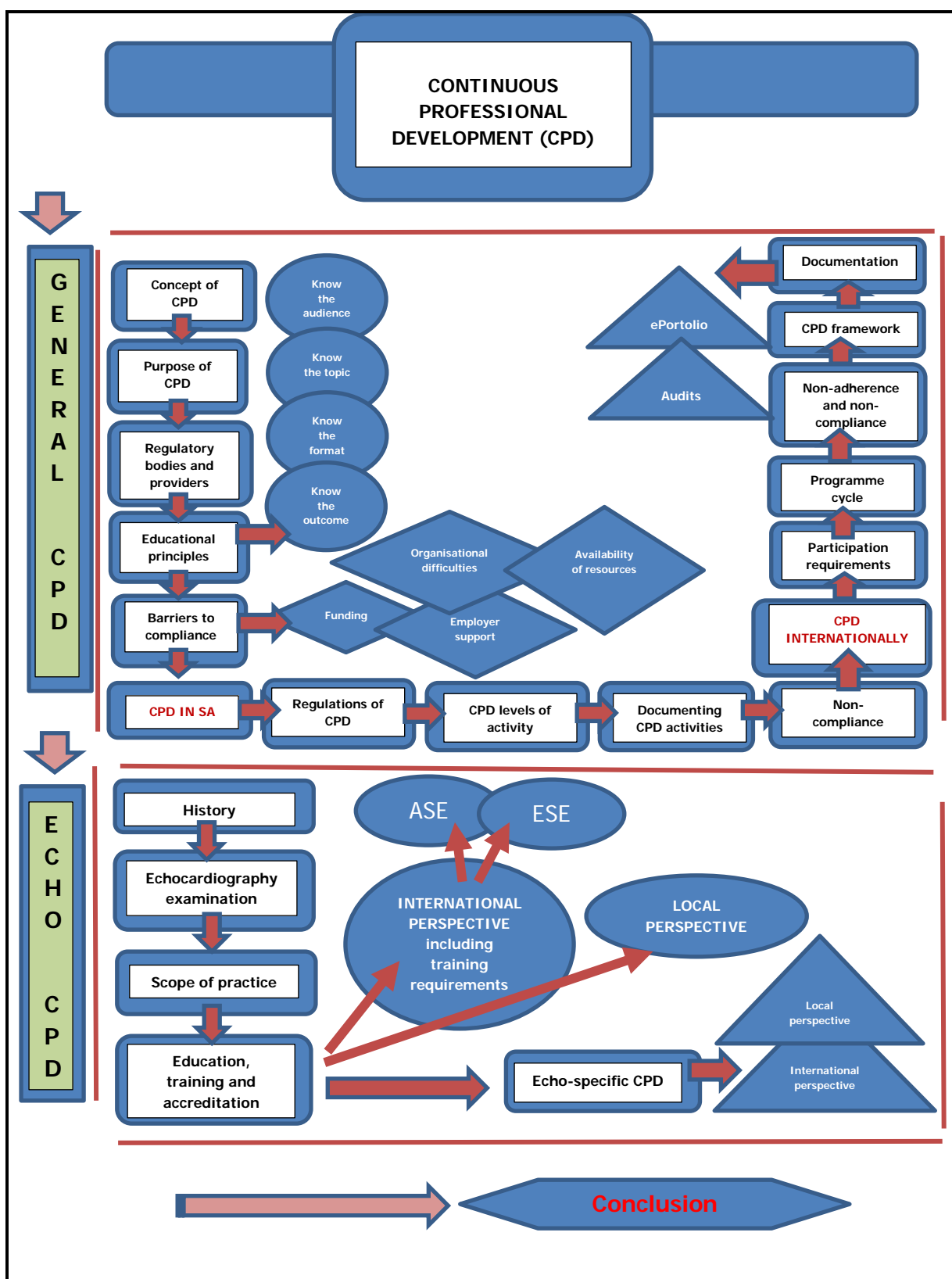


Figure 2.1: Diagrammatic overview of the different aspects discussed in Chapter 2

## 2.2 GENERAL CONTINUOUS PROFESSIONAL DEVELOPMENT

In this section general concepts of CPD are described. The CPD system for several healthcare workers in South Africa will then be documented, followed by a section that makes reference to some international CPD systems.

### 2.2.1 The concept of continuous professional development

CPD is the term used to describe various educational and professional learning activities that qualified professionals engage in to further develop and enhance a wide range of abilities/competencies that are required for best practice (Filipe, Silva, Stulting & Golnik 2014:135-136). CPD is also a platform from which professionals could learn about new and developing areas in their respective professions. The term is a broad term that is recognised globally and used not only in health sciences, but in a variety of professions.

“In an era of increasing demands for greater physician accountability, improved patient safety, and better quality of care, the introduction of strategies to enhance competence and produce measurable outcomes are reasonable and desirable” (Campbell, Silver, Sherbino, Cate & Holmboe 2010:657). Medical education aims to develop medical practitioners who would promote the “Health for All” initiative as instated by the World Health Organization (WHO) – an initiative that highlights the importance of the continuation of lifelong learning (WFME 2015:09). The World Federation of Medical Education (WFME) set global standards for three phases of medical education, namely, basic medical education, postgraduate medical education and continuous professional medical education (WFME 2015:3).

The term continuous medical education (CME) is generally used in the medical field, although it is important to note that the terms CPD and CME are often used interchangeably in the literature. The definition of CME provided by the Accreditation Council for Continuing Medical Education (ACCME 2006:online) is as follows: “Continuing medical education consists of educational activities which serve to maintain, develop, or increase the knowledge, skills, and professional performance and relationships that physicians use to provide services for patients, the public or the profession.” According to Filipe *et al.* (2014:136) there is a difference between the two terms. CME takes a more formal, episodic and teacher-centred teaching-learning approach, and the focus is generally on expanding medical (clinical) knowledge, skills, and attitudes; while the approach of CPD is focused

more on lifelong learning, and is learner-centred, it is presented using a variety of delivery modes, and is comprehensive in scope, since the focus does not include only medical (clinical) knowledge, skills, and attitudes, but a range of competencies required to practice, e.g. ethical and social responsibility, interpersonal skills and managerial skills. (Chan 2002:88-90; European Union of Medical Specialists n.d.:online; Linos 2013:online, all referenced by Filipe *et al.* 2014:136).

As discussed in Chapter 1, in the healthcare field “the goal of CPD is to ensure that physicians possess the required knowledge, skills, attitudes, and ability to maintain and enhance competence and improve performance within their professional roles” (Campbell *et al.* 2010:657). For the purpose of this study the term CPD will be used throughout, except when research is quoted and the quoted authors use the term CME.

### **2.2.2 The purpose of continuous professional development**

The South African Council for Social Services Professions (2005:online) explains that the fundamental value of CPD is to “maintain professional standards that promote excellence in practice”. More so by maintaining and updating professional competence health practitioners can contribute to ensuring best practices in serving the community. This could be done by ensuring that the public interest will always be promoted and protected (HPCSA 2014:online). This is endorsed by the Health Professions Act, 1974 (Act No. 56 of 1974).

The purpose of CPD thus directly translates to strategies available to assist health professionals to maintain and acquire new and updated knowledge, skills and ethical attitudes in a manner that it is always in the best interest of the individual patient and whole population. There is an increasing expectation that health professionals use evidence-based practice (integrating current best research evidence with patient values and clinical expertise) in all clinical decision-making processes. To practice in an evidence-based way, health professionals must have the necessary skills to seek, appraise and integrate new knowledge throughout their careers (Wong, McEvoy, Wiles & Lewis 2013: 107-114). For this reason, staying up to date with health sciences/medical knowledge, skills, and technological innovations is of the utmost importance.

Densen (2011:50) explains in the article, *Challenges and opportunities facing medical education*, that the time it takes for medical knowledge to double in volume has changed

over time; it escalated from a doubling time of 50 years in the 1950s to 3.5 years in 2010, and is projected to be a mere 73 days in 2020. The author explains further that, “students who began medical school in the autumn of 2010 will experience approximately three doublings in knowledge by the time they complete the minimum length of training (7 years) needed to practice medicine. Students who graduate in 2020 will experience four doublings in knowledge. What was learned in the first 3 years of medical school will be just 6% of what is known at the end of the decade from 2010 to 2020” (Densen 2011:50). As described by Khan (2010:online), “the rate and magnitude of change is such that the contents of texts books are out of date at the time of publication. Probably half of what you know is no longer true”. It should however be noted that most of the basic and working knowledge may not have such a rapid turnover and that in the health professions the authors are most likely referring to highly specialised knowledge, new technologies, prevention and treatment regimens to name a few that expands and changes rapidly.

Because knowledge expands “faster than our ability to assimilate and apply it effectively, Densen (2011:50) proposes that continuously changing and updating health education curriculums may not be the answer. Densen’s proposal highlights the purpose of CPD again, and emphasises the necessity of CPD becoming an imperative part of a lifestyle of lifelong learning for all healthcare practitioners. If CPD is expressed as lifelong learning, patient care and the overall health of populations will improve, which will, in turn, will lead to improved patient care and the overall health of a population (Shehab, Elnour, Sowaidi & Abdulle 2012:402).

### **2.2.3 Continuous professional development regulatory bodies and service providers**

CPD criteria, guidelines and policies are usually developed by specific regulatory bodies and/or professional associations. Examples of such bodies and associations will be provided in latter sections (*cf.* 2.5.4). These regulatory authorities regulate both CPD service providers and individual registered healthcare practitioners.

With reference to service providers, regulatory authorities are mandated to approve, appoint and accredit service providers in accordance with various rules and regulations. CPD service providers can be individuals/institutions (e.g. higher education institutions), organisations (e.g. medical aids), or societies that offer CPD learning activities to healthcare



practitioners (HPCSA 2014:online). The learning activities can be presented in any format, but should be reviewed and accredited by relevant regulatory authorities. Examples of CPD activities are organised activities, such as courses, seminars, panel discussions, workshops and conferences. In some instances, experiential or work-based learning, reading journal articles, participating in research etc. will also be accepted as activities contributing to CPD. Acceptable modes of delivery are face-to-face, online or through various electronic delivery modes. Service providers are also responsible for keeping records by means of attendance registers, and for distributing certificates as evidence of activities completed by registered healthcare practitioners. Quality checks of the services rendered by CPD service providers are conducted by regulatory authorities.

All registered healthcare professionals are required to participate in appropriate CPD activities. These healthcare professionals are responsible for keeping track and records of the skills, knowledge and experience they gain from all the CPD activities they participate in. An example of such a record could be a portfolio of evidence - "It's a record of what you experience, learn and then apply" (Schostak, Davis, Hanson, Schostak, Brown, Driscoll, Starke & Jenkins 2010:67).

#### **2.2.4 Educational principles of continuous professional development**

The WFME (2003:13) states that, "CPD must be based decisively on science and practical evidence". Healthcare professionals should be able to gain knowledge and data from evolving scientific evidence to improve their knowledge and advance their skills and way of practicing (WFME 2003:13).

The key principles of CPD are that it is self-directed; that it is based on learning needs identified by the individual; builds on an individual's existing knowledge and experience; links an individual's learning to his/her practice; and includes an evaluation of the individual's development. CPD requires professionals to identify their learning needs based on an evaluation of their practice against recognised professional standards; develop a learning plan based on the needs identified; participate in CPD activities that meet these learning needs; and, finally, reflect on the value of these activities to their practice (Schostak *et al.* 2010:67-77).

Distance education may be defined as a method of instruction and learning designed to overcome barriers of time and space by allowing learners to study in their own homes or at local facilities, often at their own convenience, using materials available electronically or by mail. This format enables learners to stay close to their jobs and families, and presents an exciting opportunity for librarians and information professionals to meet CPD needs (Gruyter 2001:16-25).

With this in mind, CPD activities should be carefully planned and be relevant to the current and the future professional practice and performance of the specific healthcare professional. In the 4<sup>th</sup> AMEE Medical Education guide published in 1992 authors Harden and Laidlaw (1992:409) highlight the importance of effective CME. In this article reference is made to the work of Ronald Harden, who had already described criteria to determine the effectiveness of CME programmes in 1982, at the Association for Medical Education in Europe/Association for the Study of Medical Education meeting, which was held in Cambridge at the time (Harden & Laidlaw 1992:409).

These criteria were referred to as the CRISISS criteria, an acronym for Convenience, Relevance, Individualisation, Self-assessment, Interest, Speculation, and Systematic. Table 2.1 elaborates briefly on each concept. This information was taken directly from Harden and Laidlaw (1992:409).

**Table 2.1 Benefits of each individual criterion in the acronym CRISISS**

Convenience	"makes voluntary participation easy"
Relevance	"reflects the user's day-to-day role in medical practice"
Individualisation'	"allows learners a say in what is learnt and to adapt the programme to their own needs"
Self-assessment	"encourages doctors to evaluate their understanding of the subject and to remedy any gaps identified"
Interest	"arouses attention and encourages learners to participate in the programme"
Speculation	"recognizes controversial and grey areas in medicine"
Systematic	"offers a planned programme, with coverage of a whole subject or an identified part of it"

Source: Harden and Laidlaw (1992:409)

As observed by Schostak *et al.* (2010:73), “learning is more effective when it is undertaken through activities that are active rather than passive and when it meets the individual’s needs”. In any professional activities, theoretical knowledge is interpreted in the form of applied knowledge and then translated practically. At the heart of this principle of application is CPD, which translates and puts into action, and recognises and accommodates the fact that effective learning entails strengthening through a variety of follow-up developmental activities (Schostak *et al.* 2010:73).

According to Schostak *et al.* (2010:71), “CPD and high-quality of care of patients are permanently intertwined”. CPD is directly responsible for keeping the clinician current regarding knowledge and practical skills, and for expanding the quality of care delivered. Unfortunately, Schostak *et al.* note that an increase in knowledge does not inevitably lead to a change in actions (2010:73).

CPD is the responsibility of the individual and is tailored exclusively, because it correlates with the professional’s learning requirements (Schostak *et al.* 2010:71). Health professionals are all qualified in one or another health sciences field and are considered to be adult learners. One characteristic of adult learners is that they are ready and willing to learn, especially if the learning is relevant to their current situation, and if they can take the newly gained knowledge and skills and apply it in their work situation immediately (Knowles 1970:39-49).

Considering these characteristics of adult learning in the second criterion, namely, relevance, means that the content of a CME programme should be directed to a specific target audience, and provided at a relevant level where application of knowledge and skills deems key; most of all, the content should address the learners’ learning requirements (Harden & Laidlaw 1992:410). To achieve this, the authors suggest creating a programme that addresses the required topic in such a manner that it is relevant to a specific area of practice together with competencies that the professional may not be fully competent in already (Harden & Laidlaw 1992:410).

According to Qatar Council for Healthcare Practitioners (QCHP) (QCHP 2016:online), “education principles guide healthcare practitioners to develop a professional development plan that will demonstrate their commitment to engage in learning activities that result in meaningful and measurable outcomes”:

- **Continuous improvement:** Practitioners should engage in activities on a continuous basis to enhance their skills, competencies and knowledge across their scope of practice;
- **Professional development:** To address their recognised CPD needs and improve their professional development, healthcare practitioners are obliged to participate in a diverse set of learning activities;
- **Relevance:** It is essential for healthcare practitioners to choose learning events that are pertinent to their professional roles and tasks, and contribute to their career growth;
- **Reflection:** It is essential that healthcare practitioners continuously reflect on the evidence of the impact or result of engaging in learning activities on their knowledge, skills, behaviours or patient outcomes, and
- **Self-assessment:** self-assessment is of vital importance to healthcare practitioners using external data sources with feedback and the impact of their learning activities on practice (QCHP 2016:online).

These concepts should all be carefully considered when identifying the learning requirements of healthcare professionals and developing CPD activities to address the learning requirements of individuals or groups in accordance with specific level standards. Davis, Goldman, Perrier and Silver in Dent and Harden (2013:32-35) suggest using a four-step process to increase the effectiveness of CPD activities or programmes, namely, (1) Know the audience; (2) Know the topic; (3) Know the format; and (4) Know the outcome. These concepts are depicted in more detail in sections 2.2.4.1 to 2.2.4.4. With the use of these steps CPD can be focused on and tailored to address specific learning requirements of healthcare professionals in specific disciplines, or a group of inter-professionals who share a common scope of practice. Although these are steps to be taken to ensure the effectiveness of an existing CPD programme the researcher propose the use of these steps in developing and implementing echocardiography specific CPD activities.

#### **2.2.4.1 *Know the audience***

CPD is aimed at the qualified healthcare professional. With this in mind, recognition should be given to prior learning. What this means is that CPD service providers should consider the knowledge and skills healthcare professionals obtained by completing a specific qualification. CPD activities can then be aimed at refreshing knowledge and skills that professionals are expected to possess already, or to update their competencies with reference to their specific disciplines or practices.

In addition, learning activities should be developed and presented in such way as to accommodate adult learners. This concept was detailed in the previous section (*cf.* 2.2.4).

#### **2.2.4.2 *Know the topic***

In developing CPD activities the educational focus should be on the practice competencies that practitioners are supposed to have, what practitioners want to learn, what they believe they require, as well as what is expected of the levels of standards.

Grant (2002:156) and Norman, Shannon and Marrin (2004:999-1001) distinguish between learning needs and educational needs. The authors explain that learning needs refer to the specific, personal needs of the learner and are recognised by the individual learner through practical experience, reflection, questioning, audits and self-assessment; while educational needs are the needs of a whole target audience and can be recognised through, among other methods, surveys and focus groups.

The challenge facing CPD providers is thus to create innovative strategies for needs assessment, and to increase the impartiality of learning needs assessments while making the process simple enough for providers and participants to conduct frequently (Grant 2002:159).

The flaw of needs assessment for individual learning is its bias, and the absence of existing standards in field-specific CPD; the biggest drawbacks of educational needs assessments are the non-individualised nature and the logistical intricacy of the exercise. Handfield-Jones, Mann, Challis, Hobma, Klass, McManus, Paget, Parboosingh, Wade & Wilkinson (2002:952) describe the educational needs assessment expansively as a gap analysis between the current situation and the ideal situation.

As noted by Schostak *et al.* (2010:13), from the view of an individual practitioner, the question to be addressed is, what are the themes that CPD should address? The literature suggests eight themes listed here:

- "Context and circumstances;
- Knowledge;
- Human factors/non-technical skills;
- Skills and practices (Clinical know how);

- Professional values and identities;
- Decision making;
- Realization and performance, and,
- Approaches to identifying learning needs" (Schostak *et al.* 2010:13).

It is important to note that, in the daily routine, none of these suggested categories work in isolation – they all interact to form a domain of multiple actions (Schostak *et al.* 2010:13).

#### **2.2.4.3 *Know the format***

Stross (2009:304) emphasises that adults will be more likely to participate in fruitful learning if their learning programmes recognise the following principles:

- The learning activity/programme is directly relevant to their backgrounds, abilities, needs and experiences;
- More active rather than passive learning is offered, and limitless one-way lectures are avoided;
- Theory is constantly linked to practice;
- Expectations about what will be conveyed, how learners will be measured and what support will be offered are managed efficiently;
- Ensure that learning continues logically or methodically, and is presented in digestible amounts;
- State the outcomes of the learning process clearly;
- Provide opportunities for following flexible pathways, by allowing learners to select modules or learning activities receptive to their needs;
- Ensure that feedback on assessment is well-timed, constructive, and detailed;
- Include opportunities for self-managed learning;
- Provide support that is reactive to the individual's needs; and
- Ensure that access to learning times, locations and resources makes involvement in the learning programme as opportune and productive as possible.

The nature of educational meetings is highly variable in terms of content, number of participants, degree and type of interactions, length, frequency, and targeted practices (Shehab *et al.* 2012:402).

#### **2.2.4.4 *Know the outcome***

The CPD service provider should determine whether healthcare practitioners who took part in the CPD activities on offer acquired knowledge, skills and attitudes. Davies and Harden (1999:138) recommend using various tests (or models) already available and validated and proposed by literature to acquire this information. One such model is The Kirkpatrick Model which offers four stages, also referred to as levels, of evaluation (Kirkpatrick 1977:9). The four levels include reaction, learning, behaviour and results. On planning for the implementation of echocardiography specific CPD activities the researcher propose that there should already be a working plan to indicate which level of evaluation will be used and therewith what evaluation methods in order to refine and improve future services.

#### **2.2.5 Barriers to complying with continuous professional development**

According to Friedman and Philips (2001:7) the most frequent barriers to complying with CPD experienced by participants are cost, time and access to CPD activities. These and additional barriers as detailed in the literature will be discussed in the section to follow. The barriers are included in this literature study because they have a direct influence on the uptake of CPD activities. It could be postulated that if these barriers are carefully considered and adequately addressed in the development and implementation of a CPD programme it could maximise the participation of health professionals in CPD activities.

##### **2.2.5.1 *Funding***

Over the last few years, CPD as presented all over the world has formed part of formal courses, workshops and symposiums. It is funded by medical schools at little or no cost to the learners. However, increased demand for CPD by healthcare professionals meant that fees of CPD programmes increased significantly, and could not be funded by employers any longer (Silva, Buhler, Maillet, Maisonneuve, Miller, Negri & Stonier 2012:225).

As Davids mentions (2006:37), a lack of money and study leave granted by the employer affects participation in CPD activities. Even though employers believe it important that their employees attend CPD activities to ensure their employees and practice stay abreast of the latest technology and changes, there are often constraints on the training budget Davids (2006:37).

According to Henwood, Yelder and Flinton (2004:254) healthcare professionals expect their employers to fund CPD activities, and justify their argument by stating that healthcare professionals who are financially supported and where supportive is provided by the employer are more likely to attend CPD activities and remain compliant with the requirements as set out by the governing body. However, in 2014 an African study done in Kenya by Kanamu (2014:online) argues that individuals should be accountable for funding their own CPD as it is their own responsibility to stay in touch with the latest knowledge in their respective fields.

According to the WFME (2003:14), CPD must be acknowledged and implemented as an essential part of a medical field, and should reflect in budgets, resource allocations and time schedules. This should also be taken into consideration by healthcare professionals who are self-employed. Healthcare professionals, in association with suitable stakeholders, should arrange and form a system for CPD activities to be financed and sustained in response to the needs as identified by the occupation (WFME 2003:14).

#### **2.2.5.2 *Employer support***

Employer support for CPD participation is of fundamental importance, as this support influences the level of skills and knowledge in the practice and, thus, has a direct influence on the quality of care provided to patients (Henwood *et al.* 2004:254). According to the Royal College of Nursing (2007:4) support provided by companies to meet governing boards' requirements is vital, in order to satisfy the increased demand for a suitably skilled healthcare workforce. Employers should support and provide sufficient time for the healthcare professionals to attend CPD activities; in this way employers ensure that the needs of both patients and healthcare professionals are met (Royal College of Nursing 2007:4).

According to Moynagh (2013:online) there are nine ways employers can provide support for CPD activities:

- The supervisors can be involved from day one. Experts will take continued education seriously if they are continuously supported by their employers and managers by means of an award or appraisal system.
- The individual's development must be linked to the individual's function at work. This will encourage the employees to identify and note the challenges that they encounter



in their daily work environment and to use CPD activities to overcome the challenges. Professionals' commitment increases if they are developed in the applicable roles involving their daily tasks, as well as for their future professional paths.

- It is of vital importance for employees to share the knowledge and skills they have acquired with their counterparts. This can be done by meetings or skills training. Cross-collaboration between professionals motivate them to learn from each other even further.
- Give professionals the opportunity to contribute to the way they learn. Allow them to recognise their own priorities and needs for attaining CPD, rather than supplying activities that may be irrelevant. The employer needs to understand what works and what is required by employees regarding CPD activities. If the podium for CPD activities exists, plan, manage and create opportunities for professionals to join in.
- Establishments can encourage regular CPD activities by offering different options and opportunities for attending these activities. A reminder and log for CPD activities can be kept and maintained by the employer.
- Having workouts or training sessions will assist specialists to develop a simpler working procedure than used previously. Evaluate the results to assess how CPD contributes to and influences the organisation and the level of care provided to the patients.
- A focus on the learning outcomes, and not the learning activities, will ensure that the CPD exercise is more focused, and that the organisation will benefit from it.
- Identifying formal and informal CPD of a high standard could be achieved by giving a prize for outstanding CPD success rate and participation.
- Ideally the employer should motivate and encourage healthcare professionals by providing them with enough time off to attend CPD activities, especially if professionals work shifts (Moynagh 2013:online).

### **2.2.5.3 *Organisational difficulties***

For CPD to have an impact and desired effect, CPD must be part of the fundamental organisational strategy and planning (Dearnly & Matthew 2007:6). According to Dearnly and Matthew (2007:6) CPD should be seen as an investment in the skills and knowledge development of professionals. The practitioners' needs should be acknowledged and addressed. Learning should be assessed to measure the efficiency and effectiveness of the CPD activities.

Some companies continue to see CPD as a cost rather than an investment (Kanamunye 2014:online).

The responsibility for the organisational structure of CPD resides with the specific professional group (WFME 2003:21). These groups must take responsibility and leadership and assess these aspects consistently, to regulate whether the assignment and product of CPD activities, as defined, have been accomplished (WFME 2003:21).

#### **2.2.5.4 *Availability of resources***

According to Ndege and Kioko (2006:43) the barriers facing the rural workforce include “the distance from education facilities, work schedules, inaccessibility of conferences, lack of transport and finance, and staff replacement”. Resources of rural healthcare workers range from not being complete to being non-existent. This influences their engagement and participation in CPD activities and affects the quality of their services to patients (WFME 2003:18).

CPD activities require a certain minimum amount of funds and materials if they are to be effective and have the desired outcome. Financial aid ensures that logistical resources, including transportation to the venue, purchasing materials to use during the training and paying for the lodging of the attendees, of CPD activities can be covered (Selemani-Meke 2011:48).

Technology has steadily assisted in solving difficulties that mankind faces, and technology has now become a vital part of every profession (Cooper & Ramirez 2006:2). In research, technology has opened new prospects for data management needed to produce valuable material and facts. Computers can save vast amounts of information and material, and are making it easier to conduct research and collect data and information. Learners are able to quickly and efficiently search for information as needed, making it easier to retrieve the information than in the past, when paper storage was used (Plomp & Pelgrum 1991:254).

Therefore, in order to implement an echocardiographic CPD programme, financial means should be secured and the cost to the health professional should at most be reasonable. In view of the fact that such a variety of health professionals practice in echocardiography these type of specific CPD activities should be widely available in order to accommodate the

majority. Perhaps more innovative approaches such as blended-learning could be considered to also ensure that the majority of practitioners can take part in the activities. Furthermore employer buy in should be encouraged. These are a few aspects that require consideration when considering what is needed in a tailored CPD programme.

### **2.3 CONTINUOUS PROFESSIONAL DEVELOPMENT IN SOUTH AFRICA**

The Health Professions Act 56 of 1974 (amended by S. 57 of Act 29/2007) instigated the creation of the HPCSA with its 12 professional boards to “provide for control over the education, training and registration for and practicing of health professions registered under this Act; and to provide for matters incidental thereto” (RSA 1974:2).

The aim of the HPCSA is to safeguard the public and professionals (HPCSA 2014:5). According to the aim of the HPCSA (2011:online), “the Council guides and regulates the health professions in the country in aspects pertaining to registration, education and training, professional conduct and ethical behaviour, ensuring continuing professional development, and fostering compliance with healthcare standards” (HPCSA 2011:online).

All individuals practicing in any of the health professions included in the scope of the HPCSA are thus obligated by the Health Professions Act No. 56 of 1974 to be registered with this council (RSA 1974:8).

The 12 professional boards of the HPCSA are coordinating bodies for all the practitioners in the relevant fields registered with them. Each board deals with matters relating to that specific profession (HPCSA 2011:online). The 12 professional boards comprise the following professions:

- Dental therapy and oral hygiene;
- Dietetics and nutrition;
- Emergency care;
- Environmental health;
- Medical and dental;
- Medical technology;
- Occupational therapy, medical orthotics, prosthetics and arts therapy;
- Optometry and dispensing opticians;

- Physiotherapy, podiatry and biokinetics;
- Psychology;
- Radiography and clinical technology; and
- Speech, language and hearing professions.

Different committees represented by the HPCSA are responsible for various regulatory functions, e.g. CPD Committee. CPD is required for all healthcare practitioners registered with the 12 boards represented within the HPCSA.

The guidelines of the HPCSA for good practice in medicine, dentistry and medical sciences states the extensive purpose of CPD as: “Maintain and improve the standard of your performance by keeping your professional knowledge and skills up to date throughout your working life. In particular, regularly taking part in educational activities that relate to your branch or discipline of medicine, dentistry or medical sciences” (HPCSA 2011:online).

In 1999 the HPCSA CPD committee established a period-based system, which expected registered practitioners to accumulate 250 CPD points, referred to as continuing education units (CEU), over a period of five years to retain his/her registration. On completion of the five years a new cycle starts, and the requirement is that the registered practitioner accumulates another 250 CEUs over the next five years. The points-based system was evaluated and changed to a continuous points system. In 2004 the five-year system was changed to a two-year system with a new standard, with a 60 CEU cycle (HPCSA 2011:online).

Under these updated regulations for CPD, a registered practitioner needed to earn a total of 30 CEUs, of which five of the units must be on ethics (human rights and medical law), earned over a 12-month period. Under the new two-year cycle this, thus, translates into 60 CEUs, of which 10 should be ethics-specific CEUs. All points accumulated will be to the credit of the practitioner for two years from the date of attendance of the activity, after which the points will expire (HPCSA 2014:5).

### **2.3.1 Regulation of continuous professional development**

To regulate CPD, each professional board appoints profession-specific experts in each field to approve and accredit service providers, as set out in the HPCSA's CPD guidelines and criteria (HPCSA 2011:online). It is the responsibility of the professional board to ensure

that high standards are set and maintained for their accreditors and accredited service providers. These professional boards are also responsible for conducting quality checks in their respective health professions from time to time (HPCSA 2014:10).

#### **2.3.1.1 *Continuous professional development accreditors***

Accreditors are defined as “groups or institutions appointed by a Professional Board on the basis that they meet the criteria set out by the HPCSA CPD Committee” by the HPCSA (2014:8).

Accreditors have the responsibility to review and approve applications to provide CPD activities submitted by potential service providers; these applications could originate from either organisations or individuals who lack accredited service provider status. The role of the accreditors is to screen these CPD activities and to revise CEUs assigned if the provider is unsuccessful in abiding by the rules and regulations of the CPD guidelines (HPCSA 2014:8).

These guidelines ensure that the accreditors can standardise and ensure the effective and timeous fulfilment of accreditation (HPCSA 2014:8).

#### **2.3.1.2 *Continuous professional development service providers***

Service providers are subdivided into two categories: accredited service providers and service providers who are not accredited.

##### **Accredited service providers**

As defined by the HPCSA (2014:9), accredited service providers are higher education institutions and departments, associations and formal professional groups that are profession specific and meet the specified criteria and have been accredited by the board to present the CPD learning activities.

##### **Non-accredited service providers**

Any service provider that is not accredited but that wishes to present CPD activities must apply to accredited service providers, which will allocate an accreditation activity number

accordingly. This number should be quoted on any documentation related to the activity (HPCSA 2010:9).

### **Responsibilities of service providers**

Accreditation is a process and the service providers need to apply for accreditation by the professional board or its designated accreditor biannually. Accredited service providers will then be supplied with service-provider-specific identification numbers linked to the specific profession (HPCSA 2010:9). Accredited service providers can then offer CPD activities, though the practices and processes in this regard are still somewhat mandated.

As per the HPCSA guidelines (2010:9), an attendance certificate on completion of a CPD activity is mandatory. This is to be provided by the service provider and the following information should be included on the certificate:

- the accreditation and activity number (e.g. MDB001/12/09/2008);
- the topic of the activity where ethics, human rights and medical law should be specified;
- the level of the activity (e.g. Level 1);
- the number of CEUs for that activity;
- the attendance/completion date; and
- the name and HPCSA registration number of the attendee.

Service providers need to provide certificates of attendance to all participants, and should include all details as set out by the HPCSA above. If the certificate is not available on the date of completion of the course, the service provider must send the certificate to attendees within one month of the activity or event (HPCSA 2014:10). The service providers must, at all times, keep an accurate record of all attendees for every CPD event they offer. This record needs to be kept for three years after the activity for a compliance audit, if selected.

### **Audit of continuous professional development**

The HPCSA has a CPD committee that is responsible for overseeing all CPD regulations and practices. The committee, together with the various boards, has the authority to audit CPD service providers as well as registered healthcare practitioners. Audits are done randomly and there are consequences for non-compliance (*cf.* 2.3.4).

### 2.3.2 Continuous professional development activity levels

There are three levels for CPD learning activities:

- Level 1 CPD activities are offered only once and do not have measurable outcomes. The CEU is assigned according to time, for example, one CEU per hour to a maximum of eight CEUs per day (HPCSA 2011:online). Level 1 CPD activities can be achieved by attending workshops or seminars (face-to-face or online) that were specifically applied for by the provider with the HPCSA (HPCSA 2014:11).
- Level 2 CPD activities have formal, structured and measurable outcomes; activities include education, training, research and publications (HPCSA 2014:12). Table 2.2. refers to the various Level 2 activities and the allocated number of CEUs of each.

**Table 2.2: Number of CEUs earned per Level 2 CPD activity**

CPD activities	Number of CEUs
Principal author of a peer-reviewed publication or chapter in a book	15 CEUs
Co-author of a peer-reviewed publication or chapter in a book	5 CEUs
Review of an article/chapter in a book/journal	3 CEUs
All presenters/authors of a paper/poster at a congress/refresher course	10 CEUs
All co-presenters/co-authors of a paper/poster at a congress/refresher course	5 CEUs
All presenters of accredited short courses	10 CEUs
All co-presenters of accredited short courses	5 CEUs
Interactive skills workshop with an evaluation of the outcome	10 CEUs per presenter 5 CEUs per participant
Multiple choice questionnaires in journals, including electronic journals, with a pass rate of 70%	3 CEUs per questionnaire
Guest/occasional lecturer at an accredited institution	3 CEUs per lecture
Health personnel who regularly supervise undergraduates/interns/postgraduates in clinical/technical training in collaboration with an accredited training institution during the academic year (if not in the job description)	2 CEUs per student (max 16 CEUs per calendar year)
Part-time or external examiner of Master's and Doctoral theses on completion	5 CEUs per thesis
Dedicated workshops, lectures/seminars on ethics (excluding general presentations with so-called component on ethics)	2 CEUs per hour

Source: Reproduced directly from HPCSA (2011:online)

- Level 3 CPD activities have formally structured learning outcomes and are conducted by accredited training institutions. After completion of the activities the practitioners will earn 30 CEUs (HPCSA 2014:13).

It should be noted that the HPCSA guidelines for CPD points have two distinct exclusions:

- There is no relation to level-specific CPD requirements (QCHP 2016:online), and;
- There is no guideline with regard to discipline-specific CPD (ESE 2015:1-5).

Both these exclusions will be discussed in more detail in Section 2.5.4.

According to the HPCSA Continuing Professional Development Guidelines for the Healthcare Professional, the following activities do not qualify for CEUs: “time spent in planning, organising or facilitating any activity; published congress proceedings; non-referenced letters to the Editor of accredited journals; daily ward rounds; written assignments; compilation of student training manuals for internal use; staff and/or administrative meetings; tours and/or viewing of exhibits and technological demonstrations; membership of professional bodies, Professional Boards or associations; holding a portfolio on the professional body’s executive or council structure; and presentations and publications to the public, also including meetings arranged by pharmaceutical companies and manufacturers or importers of products and technical devices (including assistive device technology) or their representatives purely for the purpose of marketing and/or promoting their products are not eligible for accreditation” (HPCSA 2014:14).

### **2.3.3 Documenting continuous professional development activities**

Lifelong learning has always been the primary educational and development theme for healthcare practitioners. Even so, learning activities are mostly unplanned and incidental, therefore documentation is of vital importance to show what was learned (QCHP 2016:online).

As set out by the QCHP (2016:online) two reasons state the importance of CPD documentation:

- Documentation offers opportunity for improvement which could enhance the effectiveness and efficiency of future learning, and
- Documentation validates learning. “Validation of CPD activities requires the ability to document which areas of practice were reviewed, the processes used and the outcomes identified that contributed to or enhanced practice” (QCHP 2016:online).




The HPCSA suggests strongly that all registered healthcare practitioners keep record of all CPD activities they complete, in the form of a certificate or other proof of completion, and to keep it for the specific two-year cycle (HPCSA 2011:online).

In addition to collecting all certificates, the healthcare professional is also recommended to make use of standard HPCSA documentation referred to as a CPD activity record (Form CPD 1 IAR), on which the following information can be recorded:

- The name of the health professional;
- Their registration number;
- Details of the Accredited Service Provider including the individual activity accreditation number;
- The topic of the activity with ethics, human rights and medical law specified;
- The level of the activity;
- The number of CEUs; and
- The attendance/completion date (HPCSA 2011:online).

This formal documentation (see example of the form in Figure 2.2), together with copies of the certificates, is then requested when the practitioner is selected for assessment of compliance. This process commonly referred to as an accreditation process occurs randomly, health professionals are selected from a pool and informed that they are being accredited. Evidence of CPD compliance should then be posted or submitted electronically to the HPCSA (HPCSA 2011:online).

 <b>HPCSA</b> Health Professions Council of South Africa	<b>HEALTH PROFESSIONS COUNCIL OF SOUTH AFRICA</b>  <b>HEALTH PRACTITIONER'S INDIVIDUAL CPD ACTIVITY RECORD</b>
---	--

**Please complete and return to:** The CPD Officer, HPCSA, P O Box 205, PRETORIA, 0001 or submit the above with the supporting documentation electronically to cpd@hpcsa.co.za or fax to 012 3285120.

This record is the only record of CPD activities required of individual practitioners. It must be duly completed and accurately reflect CPD activities.

Please maintain certificates attend and attach certificates when audited.

<b>Professional Board</b>	
<b>Registration No. with HPCSA</b>	
<b>Surname</b>	
<b>First Names</b>	
<b>ID Number</b>	
<b>Date of the Audit</b>	

Please indicate the category in which you are currently working:

Public Service ☐ Training institution ☐ Private Practice ☐ Research ☐ Education ☐ Other .....

**CEUs accrued** (Please attach certificates)

Name of Provider	Description of Activity/Accreditation Number	Date		Lev 1	Lev 2	Lev 3	Ethics, Human Rights or Medical Law	Total
		From	To					

Name of Provider	Description of Activity/Accreditation Number	Date		Lev 1	Lev 2	Lev 3	Ethics, Human Rights or Medical Law	Total
		From	To					
TOTAL								

I, the undersigned, certify that the information contained in this Individual Activity Record and the attached certificates are correct in all respects.

**Figure 2.2: An example of the CPD activity record (Form CPD 1 IAR) of the HPCSA**

(Retyped but obtained directly from source: HPCSA n.d.:online).

### **2.3.4 Non-compliance to minimum requirements for continuous professional development activities**

The HPCSA conducts regular random audits for all healthcare professionals in South Africa (HPCSA 2011:online). The person that is being audited must supply documentary proof of the required CEUs obtained in the form of certificates and an HPCSA-compliant portfolio; this portfolio should be readily available and up to date.

The CPD section at the HPCSA will request the practitioner to forward the portfolio of evidence on CPD activities undertaken. If the healthcare participant is non-compliant, or does not meet the requirements of CPD, the practitioner may request an extension, and the CPD section may then afford the practitioner a further six months to become compliant (HPCSA 2011:online).

After six months, the CPD section may again audit those practitioners who had been non-compliant. Should the health practitioner still be non-compliant after the six-month extension period, the name of the health professional will be submitted to the relevant professional board for further action, which might be any of the following:

- “Changing the category of registration to Supervised practice; until proof of compliances with the CPD requirements are submitted;
- Successfully passing a Board exam;
- Suspension from the register until submission of proof of compliance with the CPD requirements are submitted; or
- Any other resolution by the relevant professional board” (HPCSA 2014:16).

If the healthcare professional again fails to respond within the six-month period, a registered letter will be sent to the practitioner, informing the person that the portfolio must be submitted within 21 days of the letter date to prevent the following steps being taken:

- “The health professional will be suspended from the register in terms of Section 19A(1)(d). The health professional will then have to apply to be restored to the register by duly completing the application form, Form 18. Upon receipt of the application for restoration the practitioner will have to pay the applicable restoration fee according to the restoration regulations applicable at that time.
- The health professional may not perform any duties related to his/her profession. Medical Aids will be informed of the suspension and so no claims by the professional will be paid by the Medical Aids during this time.

- The health professional will be audited again in the year of restoration to ensure compliance with the CPD requirements.
- Upon restoration proof of any CEUs accrued will need to be submitted.
- Action as recommended by the relevant Professional Board will apply" (HPCSA 2014:16).

## **2.4 CONTINUOUS PROFESSIONAL DEVELOPMENT: AN INTERNATIONAL EXAMPLE**

Considering CPD from an International perspective involves comparing the international standard to that of South Africa. Healthcare practitioners in any country are required to enhance their skills to increase the standard of medical care in the specific country and the world (QCHP 2016:online). The literature provides a wealth of information on the topic of CPD. The concept is not only used in health sciences, but in secondary and higher education and many other fields. On a single database (EBSCO Host Discovery Service via the University of the Free State's library) a total of 1 822 records are given on CPD in health sciences. A search conducted for continuous medical education in the same database rendered 5 212 records. In view of this abundance of information, a CPD example from the QCHP will be used to provide an overview. Several screenshots are included of important documents which are included in this section. On occasions where the screenshots were illegible the information in this document were retyped and this was declared. This specific CPF framework was selected since it offers detailed descriptions of the framework and what health professionals should comply with to keep their status quo. The example was selected as it serve as a good example to consider for use in developing a South African echocardiographic specific CPD programme.

### **2.4.1 Who must participate in the continuous professional development programme?**

Considering CPD from an international perspective, all healthcare practitioners need to participate in CPD activities. These activities should be relevant, practice-specific CPD activities and should be presented according to the relevant countries' policies and regulations as established by their respective governing bodies (QCHP 2016:online).

#### **2.4.2 Continuous professional development programme cycle**

According to the QCHP (2016:online) CPD is a continuous process that is important for maintaining and expanding competence. To renew a license a healthcare professional is required to maintain and acquire a certain level and number of CPD points within a certain timeframe. In the state of Qatar, the length of the CPD programme cycle is two years, and to maintain licensure, healthcare practitioners must meet the following requirements:

- “The annual CPD requirement: Healthcare practitioners must complete and document in a CPD e-Portfolio a minimum of 40 CPD credits each year.
- The CPD cycle requirement: Healthcare practitioners must complete and document in a CPD e-Portfolio a minimum of 80 CPD credits over each 2-year CPD cycle.
- Category-specific requirements: Healthcare practitioners must complete and document in a CPD e-Portfolio at least 40 credits in Category 1 and at least 40 credits across Category 2 and/or Category 3, in any combination” (QCHP 2016:online).

All healthcare professionals in the state of Qatar must record their CPD activities in a CPD “e-Portfolio” to qualify to receive CPD credit. This includes attaching all relevant documentation to demonstrate accomplishment of the CPD activity (QCHP 2016:online).

The system in Qatar is similar to that of South Africa in utilising a two-year cycle. What is different is that the number of CEUs that practitioners are required to accumulate is slightly more in Qatar, and healthcare practitioners are required to accumulate CEUs by participating in a variety of activity categories. In South Africa there is no specific requirement for the type and level of activities professionals participate in, as long as they accumulate enough CEUs within a given cycle. In addition, South African practitioners can submit their evidence in any format to the HPCSA, although a CPD portfolio of evidence might be the most popular format. It could be useful to start making use of an electronic approach, using e-Portfolios, in South Africa too.

#### **2.4.3 Non-adherence**

Healthcare professionals who fail to comply with the regulations regarding annual minimal CPD requirements are considered to be non-adherent. All non-adherent healthcare professionals are supervised by the CPD council throughout the remainder of the year and the

year following their CPD programme cycle and will be helped to become adherent (QCHP 2016:online). In South Africa, practitioners who were not successful in their audit have an opportunity to become compliant, however, this remains the responsibility of the practitioner and he/she is not supervised in the process.

#### **2.4.4 Non-compliance**

All healthcare professionals who fail to comply with the minimal expectations of a specific category or the specific cycle will be seen as non-compliant. Non-compliant healthcare professionals are subject to having their licenses to practice terminated, based on non-compliance with CPD regulations. They do, however, have the opportunity to appeal the termination of the license (QCHP 2016:online). This is similar to the South African situation.

#### **2.4.5 The continuous professional development framework**

The CPD framework comprises learning activities organised into three categories. Each category provides a definition, a description and the credit rating of each activity; there is also a reference to the documentation needed for credit validation. Each healthcare professional, full or part-time, who practices within the state of Qatar needs to comply with completed annual, category-specific and as-per-the-cycle requirements; this compliance is a prerequisite for the professional to maintain a license (QCHP 2016:online).

Figure 2.3 gives an example of a CPD framework similar to the one used in Qatar. There are three level of categories including Category 1: Accredited group learning activities; Category 2: Self-directed learning and Category 3: Assessment activities. In South Africa there are three level of activities which indicate types of activities that is generalised across all fields of health professionals and each activity carries a certain weight in terms of the number of CEU's (*cf.* 2.3.2). It is in the researcher's opinion that should an echocardiography-specific CPD programme be established in South Africa, the regulatory board and the specific associations involved should consider utilising an already existing and successful CPD framework to base their programme on; this framework presented in Figure 2.3 offers clear and detailed descriptions which could be useful.

Description		CPD Activities	Credit Rating	Supporting Documentation Requirements
Category 1 – Accredited Group Learning Activities				
Activities that have been deemed to meet a set of administrative, educational and ethical standards established by the Qatar Council for Healthcare Practitioners (QCHP-AD)		<ul style="list-style-type: none"><li>Conferences, symposia, seminars and workshops</li><li>Educational rounds (including morning report in healthcare facilities, grand rounds, morbidity and mortality rounds, tumor boards and case based discussions)</li><li>Journal clubs</li><li>Online synchronous and blended learning activities</li></ul>	1 credit/hour	Certificate of attendance or letter describing the total hours/credits completed from the responsible organization
Category 2 - Self-Directed Learning				
Clinical Practice	Self-learning activities are planned and implemented by a healthcare practitioner to:	<ul style="list-style-type: none"><li>Answering self-identified clinical questions</li></ul>	0.5 credits/hour	Document these self-learning activities in the CPD Portfolio or (where applicable) the provision of a transcript from a third party
	Address needs related to clinical practice	<ul style="list-style-type: none"><li>Reading journals, books or monographs</li></ul>	1 credit/hour	
		<ul style="list-style-type: none"><li>Completing self-learning modules</li></ul>	1 credit/hour	
		<ul style="list-style-type: none"><li>Viewing podcasts or webcasts</li></ul>	0.5 credits/hour	
Education and Training	Address needs related to engaging in education and training	<ul style="list-style-type: none"><li>Postgraduate degrees or diplomas or diploma programs recognised by a relevant professional body</li></ul>	25 credits/ semester/ course	Transcript of the course from the responsible organization
		<ul style="list-style-type: none"><li>Preparation for formal teaching activities</li></ul>	2 credits/hour	Teaching schedule from the responsible organization or academic institution
		<ul style="list-style-type: none"><li>Development of assessment tools or activities (including Objective Structured Clinical Examination (OSCE), MCQ or short answer questions</li></ul>	2 credits/hour	Letter describing participation in the development of assessment tools or activities from the responsible organization
		<ul style="list-style-type: none"><li>Educational sessions to enhance the skills of examiners</li></ul>	1 credit/hour	Certificate or letter of participation form the responsible organization
		<ul style="list-style-type: none"><li>Mentoring students, trainees, or peers</li></ul>	1 credit/hour	Letter from the responsible organization
Research and Quality Improvement	Address needs related to engaging in research and quality improvement	<ul style="list-style-type: none"><li>Development of a research grant or peer reviewed publication</li></ul>	1 credit/hour	Letter of acceptance of a grant or publication or letter of participation in peer review or participation in CQI from the other organization, journal of healthcare facility
		<ul style="list-style-type: none"><li>Peer review of a clinical practice</li></ul>	1 credit/hour	
		<ul style="list-style-type: none"><li>Peer review for journals or research grants</li></ul>	1 credit/hour	
		<ul style="list-style-type: none"><li>Participating in or leading quality improvement projects</li></ul>	10 credits/project	
Category 3 – Assessment Activities				
Activities provide individual, or groups of healthcare practitioners, or inter-professional health teams, with data and feedback on their knowledge, competence or performance. All accredited assessment programs, activities or instruments must meet the standards established by the QCHP-AD		Accredited Assessment		
		<ul style="list-style-type: none"><li>Knowledge assessment programs</li><li>Simulation</li><li>Clinical audits</li><li>Multi-source feedback</li><li>Direct observation of procedures or performance in practice</li></ul>	2 credits/hour	Certificate, letter or report of completion or participation from the responsible organization
		Other Assessment		
		<ul style="list-style-type: none"><li>Feedback from annual performance review</li><li>Feedback on teaching effectiveness</li></ul>	2 credits/hour	Summary of feedback from the responsible organization or participants

**Figure 2.3: An example of a CPD framework**

Retyped but obtained directly from source: QCHP (2016:online)



#### **2.4.6 Documenting your continuous professional development**

Although healthcare professionals have always shown an understanding of lifelong learning, the implementation thereof has sometimes been unplanned or incidental. Thus, documenting what was done is a new professional expectation. Even with the practitioners' understanding of lifelong learning, the need for documentation is still not understood (QCHP 2016:online).

Documentation is important for two main reasons:

- Documentation enhances the learning process. It provides for a second opportunity to review and enhance the efficiency and effectiveness of future learning.
- Documentation is essential for validating the learning process. Validation of CPD activities includes not only the documentation of the areas of practice, but also the process and outcomes that contributed to enhancement of the practice (QCHP 2016:online).

One of the barriers often noted regarding documentation of the learning activity is the time it is perceived to take to provide this documentation. To overcome this perception, healthcare professionals may choose to document only the learning activities that have an impact on both their personal and professional development and that enhance the quality of the professional care they provide (QCHP 2016:online).

#### **2.4.7 Continuous professional development e-Portfolio**

For the purpose of tracking and record keeping, Qatar uses a so-called e-Portfolio. This online tool enables professionals to record the activities they have completed and, at the same time, to reflect on the impact it has had on their professional practice. These online portfolios include all the information and supporting documentation to prove how each healthcare professional is meeting the requirements set by a respective body (QCHP 2016:online).

Figure 2.4 is a screenshot of the online tool used by Qatar, e-Portfolio. This showcases the information you can obtain from the e-Portfolio and the impact it has on learning activities and the tracking thereof. As the tool is not fully legible, Figure 2.5 presents a retyped copy of this example.



**Figure 2.4: A screenshot of the e-Portfolio online tool used in Qatar**  
Derived directly from source: QCHP (2016:online)

		Dr Saima Sallih MBBS Qatar Medi Care Co. License validity: 31 Jan 2015 to 31 Jan 2017 Record CPD Activity		
<b>My portfolio</b>	<b>My incomplete CPD Activities</b>	<b>My PDP</b>	<b>My Completed Activities</b>	
<b>QCHP CPD Program</b>		<b>CPD Cycle Credit Summary</b>		
The Accreditation Department, Qatar Council for Healthcare Practitioners has launched its awareness campaign for the National Continuing Medical Education and Professional Development (CME/CPD) Accreditation System preceding the Mandatory CME/CPD participation policy for all healthcare practitioners which will be implemented March 2016 for renewal of licence.		Category status	Required credits	Total credits
		Category 1	40	22.0
		Category 2&3	40	45.00
		Compliance	80	67.00
		Final credit submission		Credit summary
<b>Incomplete CPD Activities</b>		<b>CPD Activities Pending Documentation Upload</b>		
<b>Activity</b>	<b>Last updated</b>	<b>Activity</b>		
Cardiology technologist	22/11/2015	Cardiology Clinical Investigative		
Cardiology Clinical Investigate	22/11/2015	Annual performance review for 2015		
Annual Performance review for 2015	22/11/2015			
Seminar Cardiac Surgery	22/11/2015			
<b>Completed CPD Activities</b>		<b>My Educational Plan</b>		
<b>Activity</b>	<b>Date</b>	<b>Activity</b>		
Centre for Cardiovascular Science Seminars	23/11/2015	Attend annual medical conference		01/09/2015
BMJ online Training	22/11/2015	Certificate		30/03/2016
Teaching cardiology-technologist to Nurses				
Cardiac conferences 2015				
PG Diploma in cardiac rehabilitation				

**Figure 2.5: A screenshot of the e-Portfolio online tool used in Qatar**

Retyped but derived directly from source: QCHP (2016:online)

To receive credit every healthcare professional is responsible for recording his/her respective CPD activities on the e-Portfolio. Healthcare professionals are required to attach all supporting documentation described in the CPD framework and to ensure that the CPD activity

registration number is also provided. The CPD number will then be linked to the registration for the course and validated in this way (QCHP 2016:online). An e-portfolio like this can also be useful in the South African context.

#### **2.4.8 Continuous professional development e-Portfolio audits**

In this specific example, namely, the CPD governing body for Qatar, the QCHP-AD established a CPD portfolio audit process that compares the documentation healthcare professionals upload to the supporting documentation and references it to the CPD framework. "A random sample of healthcare professionals will be selected twice per year across all categories of practice and healthcare practitioners will be notified if they have been selected, as well as informed of any outcomes" (QCHP 2016:online).

### **2.5 ECHOCARDIOGRAPHY**

According to an online Medical Dictionary echocardiography is a diagnostic test that utilises ultrasound technology to present an image of the heart (Medical Dictionary 2016:online).

#### **2.5.1 History of echocardiography**

Echocardiography is a new imaging modality compared to its similar X-ray brother – the latter was discovered in 1895. In 1950, a German, W.D. Keidel, performed the first cardiac examination in an attempt to measure cardiac output, with the first echocardiogram of the human heart only performed in 1953 (Roelandt 2000:8-11).

It was only in the 1960s that great progress was made in developing real-time two-dimensional (2D) echocardiography, thereby conquering the great number of limitations relating to instrumentation. In 1968 the first electronic phased-array scanner was constructed and this marked the beginning of the revolutionary impact of ultrasound on clinical cardiology (Roelandt 2000:8-11). In 1974 the first advances in Doppler were made, and it was not until 1978 that it became possible to image both the cardiac structures in 2D and the blood flow in colour and real time (Roelandt 2000:8-11). As discussed by Roelandt (2000:8-11), "At present, M-mode, 2D, pulsed-wave, continuous-wave and colour Doppler flow are all combined in one

diagnostic console, and represent the most comprehensive cardiac diagnostic modality by providing integrated structural, functional and haemodynamic information."

Since the early 1970s numerous investigators have explored the feasibility of three-dimensional (3D) echocardiography, but it was only in 2004 that 3D echocardiography was used in real time and for diagnostic purposes. In the coming years, 4D echocardiography will further strengthen and increase the capabilities of cardiac ultrasound (Roelandt 2000: 8-11).

### **2.5.2 The echocardiography examination**

According to the ESE, an echocardiogram, also referred to as a cardiac-echo or simply an echo, is an ultrasound of the heart, done by means of standard 2D and 3D imaging (ESE 2015:1-5). The image of the heart is created by high-frequency sound waves and it shares similarities with prenatal ultrasounds (Gale Encyclopedia of Medicine 2008). Through this form of imaging the size and shape of the heart can be viewed, even the smaller parts of the heart, including the internal chambers and heart valves, can be seen. The heart's contraction and relaxation capabilities can also be measured (ESE 2015:1-5). Doppler echocardiography uses specialised equipment so echocardiographers can "measure and analyse the direction and speed of blood flow through the heart valves" (Gale Encyclopedia of Medicine 5<sup>th</sup> Edition 2008).

Echocardiography can thus provide a wealth of useable information, and can be used for the diagnosis, management and continuous follow-up of patients with any suspected or confirmed heart diseases. If the echocardiogram is done correctly a number of structural and functional abnormalities of the heart can be identified (e.g. thickened muscle wall, regurgitation and stenosis). Echocardiography is one of the most widely used diagnostic tests in cardiology, as it provides relevant information for diagnostic purposes, it is non-invasive, poses no risk, has no side effects and requires no aftercare (ESE 2015:1-5; Lancellotti, Price, Edvardsen, Cosyns, Neskovic, Dulgheru, Flachkamp, Hassager, Pasquet, Gargani, Galderisi, Cardim, Huagaa, Ancoin, Zamorano, Donal, Bueno & Habib 2014:26).

Echocardiography has also been described as a valuable resource in critical care/emergency medicine, because it helps to diagnose and monitor patients with acute cardiovascular conditions without delay (Australasian College for Emergency Medicine 2016:online;

Lancellotti *et al.* 2014:26; Price, Via, Sloth, Guarracino, Breitzkreutz, Catena, Talmor & World Interactive Network Focused on Critical Ultrasound ECHO ICU Group 2008:online).

As already explained in Chapter 1 (*cf.* 1.1) the technique is operator-dependent and practitioners should therefore be highly skilled (Ehler *et al.* 2001:77-84). The images recorded and information documented play an integral part in the accurate diagnosis of any cardiac damage or abnormality. The core knowledge, skills and practices central to performing echocardiography effectively include the need for a comprehensive and systematic scanning and reporting practice, a knowledge base in cardiac anatomy, physiology, haemodynamics, and the necessary pathology and echocardiography-related knowledge, such as that relating to the physics of ultrasound, knobology, image optimisation and understanding the artefacts and pitfalls inherent to the modality itself (Ehler *et al.* 2001:77-84; Herbst 2012:online).

Echocardiography in South Africa is important in view of the high number of people reportedly suffering from heart diseases in this country (Heart and Stroke Foundation of South Africa 2007:online). Cardiovascular disease (CVD), most commonly referred to as heart disease, is the number one cause of death around the world, with 1 in 3 deaths around the world resulting from CVD. In South Africa, non-communicable diseases, including CVD, are estimated to cause 43% of total deaths in South Africa; this means CVD accounts for almost 14% of deaths. The most predominant risk factors in South Africa are tobacco smoke, with 18%, then alcohol consumption, at 11 litres pure alcohol being consumed per person, and third, obesity, with a staggering 31.3% of South Africans being obese. In South Africa in 2003, 62% of men and 48% of women aged 15 years and older followed a sedentary lifestyle. People who have reported a first CVD incident suffer from increased general stress and depression are 55% more than people of a similar age and gender with no episode of CVD, as reference by data from 52 countries. These lifestyle factors account for the increase in the incidence of CVD expected in the future, directly related to the lifestyle choices (Heart and Stroke Foundation of South Africa 2007:online).

According to the Heart and Stroke Foundation of South Africa (2007:online), projections are that cardiovascular deaths will increase by 41% between 2000 and 2030, and will have an extremely negative impact on the economy. According to Zuhlke (2016:online), "in South Africa, 210 people die from heart disease every day. A lack of awareness around cardiovascular disease means many people go undiagnosed and untreated until it is too late".

### 2.5.3 The echocardiography practitioner's scope of practice

According to the literature on echocardiography, practitioners are commonly medical professionals or cardiac technologists. Literature published abroad, including the United States of America and Europe, commonly makes use of the terms diagnostic ultrasound professional, diagnostic cardiac sonographer and sinologist (ASE 2017:online; Australasian College for Emergency Medicine 2016:online; Ehler *et al.*: 2001:77-84).

According to the ASE a diagnostic ultrasound professional's scope of practice includes performing echo procedures, acquiring relevant data (ultrasound imaging etc.), analysing the data and providing a summary of the analysis to relevant medical colleagues involved in the management of the patient (ASE 2017:online). It is therefore not surprising that these professionals not only require the necessary knowledge and skills to perform the procedure, but should be able to communicate effectively with a patient, contextualise medical and family history information, obtain accurate results, integrate diagnostic information when analysing the results, apply independent judgment and problem-solving skills and communicate the findings effectively with the relevant parties (Ehler *et al.* 2001:77-84).

Internationally an echocardiographer is an individual who has obtained competence in echocardiography and is commonly accredited by a professional credentialing body. Competencies include academic and clinical experience of providing diagnostic patient care using ultrasound. "The scope of practice of the Echocardiography Professional includes those procedures, acts and processes permitted by law, for which the individual has received education and clinical experience, and in which he/she has demonstrated competency" (ESE 2015:1-5).

For the purpose of this study the term echocardiography practitioner will be used to describe all healthcare practitioners who practice echocardiography.

In South Africa, healthcare practitioners registered with only two of the 12 professional boards (the Medical and Dental Board and the Radiography and Clinical Technology Board) within the HPCSA currently practice echocardiography in their professions (HPCSA 2014:11). A few examples of healthcare practitioners registered with the Medical and Dental Board who perform echocardiography are cardiologists, paediatric cardiologists, radiologists, anaesthesiologists, internal medicine specialists and emergency medicine specialists (Herbst

2012:154; Keene, Fischer, Turton, Van der Westhuizen, Myburgh, Milner, Mdladla & Swanevelder 2012:158; Lamprecht 2012:157). Echocardiography is also included in the scope of practice of clinical technologists and radiographers who are registered with the Radiography and Clinical Technology Board (HPCSA 2014:11).

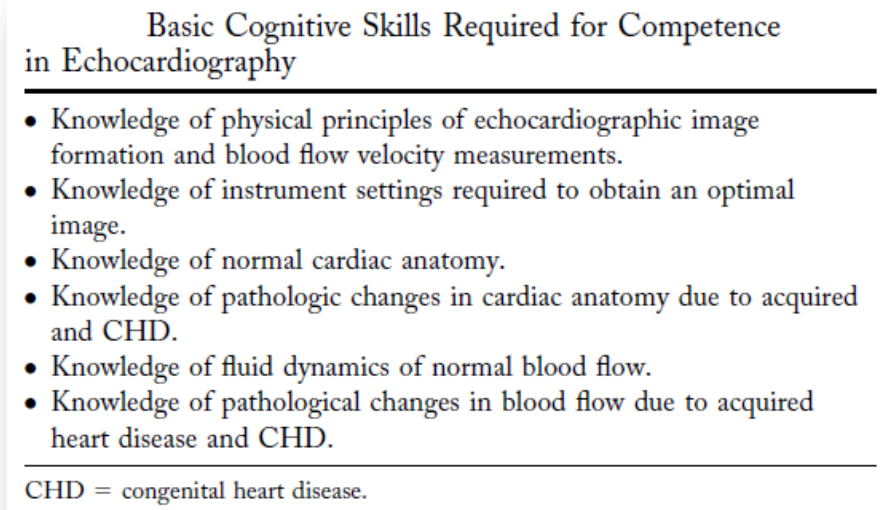
#### **2.5.4 International perspective on echocardiography formal education, training and accreditation**

The practice of cardiovascular medicine has been changed by echocardiography – it has led to a refinement of preventive medicine, diagnosis and management of numerous cardiovascular illnesses. It is the most commonly used procedure, based on its accessibility, equipment compactness, non-invasive nature and affordability, together with the great amount of information it provides (Popescu, Andrade, Badano, Fox, Flachskampf, Lancelotti, Varga, Sicari, Evangelista, Nihoyannopoulos & Zamorano 2009:893-905). It is thus clear that formal education, training and accreditation is of vital importance for setting standards for competency and excellence in the field of echocardiography (Popescu *et al.* 2009:893).

##### **2.5.4.1 *American Society of Echocardiography Guidelines***

Referring to transthoracic echocardiography specifically, the following formal education and training guidelines are presented in a clinical competence statement for echocardiography by the American College of Cardiology, which is endorsed by the American Society of Echocardiography (Quinones 2003:687-708). Regardless of the echocardiographic modality being used, a certain basic body of knowledge is required by any echocardiographer involved in performance and/or interpretation of echocardiograms, including knowledge of ultrasound physics and the use of instrumentation, anatomy, physiology, and pathology of the heart and great vessels (Quinones 2003:690). Figure 2.6 gives a screenshot of the basic cognitive skills required for competence in echocardiography for any practicing echocardiographer. The majority of health professionals could be competent in basic and working knowledge in the field of echocardiography, if it was included in their training. The researcher is of the opinion that if a health care professional is not additionally specifically skilled in highly specialised knowledge (e.g. using the equipment and interpreting findings after an echocardiography examination) in the field of echocardiography they may not be competent to practice effectively in the field.





**Figure 2.6: A screenshot of the basic cognitive skills required for competence in echocardiography**

Derived directly from source: Quinones (2003:690)

### **Minimum knowledge required for performance and interpretation**

According to Quinones (2003:691), “competence in performing and/or interpreting TTE [transthoracic echocardiography is the term used to describe the non-invasive echocardiogram where the probe is placed on the chest to acquire the imaging] in adult patients requires all the basic knowledge of ultrasound physics, of instrumentation, and of cardiac anatomy, physiology and pathology described in the section on General Principles.” Transducer manipulation has been noted as perhaps the most problematic and undervalued skill set to master when carrying out a transthoracic echocardiographic examination. Transducer manipulation is seen as the most important feature for obtaining optimum image quality in standard imaging planes. Suitable knowledge of ultrasound instrument settings, such as “depth, gain, time-gain compensation, dynamic range, filtering and display of received signals” is of vital importance for performing an optimal echocardiography examination (Quinones 2003:691).

Figure 2.7 presents a screenshot of cognitive skills required for competence in adult transthoracic echocardiography, expanding on what Figure 2.6 outlined as the basic knowledge required. This information shows that echocardiographers working with adult patients require additional competencies and this will most likely be true for paediatric echocardiography too.

### Cognitive Skills Required for Competence in Adult Transthoracic Echocardiography

- Basic knowledge outlined
- Knowledge of appropriate indications for echocardiography.
- Knowledge of the differential diagnostic problem in each case and the echocardiographic techniques required to investigate these possibilities.
- Knowledge of appropriate transducer manipulation.
- Knowledge of cardiac auscultation and electrocardiography for correlation with results of the echocardiogram.
- Ability to distinguish an adequate from an inadequate echocardiographic examination.
- Knowledge of appropriate semi-quantitative and quantitative measurement techniques and ability to distinguish adequate from inadequate quantitation.
- Ability to communicate results of the examination to the patient, medical record, and other physicians.
- Knowledge of alternatives to echocardiography.

**Figure 2.7: A screenshot of the cognitive skills required for competence in adult transthoracic echocardiography**

Derived directly from source: Quinones (2003:691)

### **Training requirements**

As noted by Quinones, "It is important to emphasize that the numbers of examinations refer to comprehensive two-dimensional and Doppler echocardiographic studies that are diagnostic, complete, and quantitatively accurate". The execution of echocardiograms and interpretation of echocardiograms are closely related, but vastly different, and a distinction has been made between the two. Agreement has been reached that all practicing echocardiographers involved in the examination or the interpretation of echocardiograms must be trained at a minimum level in the execution of echocardiograms (Quinones 2003:691). Figure 2.8 provides a summary of the training requirements for performance and interpretation of adult TTE. The training include many practical hours and experience to develop the previous stated competencies.

#### **Level 1 Training (3 months, 75 examinations performed, 150 examinations interpreted)**

Level 1 is the minimum training that must be completed successfully by all trainees in adult echocardiography. This basic training includes gaining an understanding of the physics of ultrasound, important technical aspects of the investigation, cardiovascular anatomy and physiology as it relates to echocardiography, and recognition of simple cardiac pathology and

pathophysiology. Level 1 learners are required to train in echocardiography for at least three months and to complete and understand a minimum of 75 2D and Doppler TTEs, and interpret an additional 75 2D and Doppler TTEs (total of 150 exams interpreted). It is important to note that Level 1 training is not enough for a trainee to perform or interpret echocardiograms independently (Quinones 2003:691).

Level 2 Training (6 months, 150 examinations performed (75 additional) and 300 interpreted (150 additional))

Level 2 training is needed for echocardiography practitioners to perform and interpret examinations independently. Level 2 requires a minimum of an additional three months of training in echocardiography (6 months cumulative) and the additional 150 transthoracic 2D and Doppler examinations interpreted (300 cumulative exams interpreted). Some experience in special procedures may be achieved as a part of Level 2; capability in these areas will need extra training beyond Level 2 (Quinones 2003:692).

Level 3 Training (12 months, 300 transthoracic 2D and Doppler echocardiograms performed (150 additional) and 750 interpreted (450 additional))

Level 3 entails a high level of expertise that would render an individual competent to serve as a manager of an echocardiography laboratory and be responsible for quality regulation and for the training of echocardiographers. Most echocardiographers who are Level 3 trained will also have extra training in TTE and stress echocardiography (Quinones 2003:692).

Training Requirements for Performance and Interpretation of Adult Transthoracic Echocardiography			
	Cumulative Duration of Training	Minimum Total Number of Examinations Performed	Minimum Number of Examinations Interpreted
Level 1	3 months	75	150
Level 2	6 months	150 (75 additional)	300 (150 additional)
Level 3	12 months	300 (150 additional)	750 (450 additional)

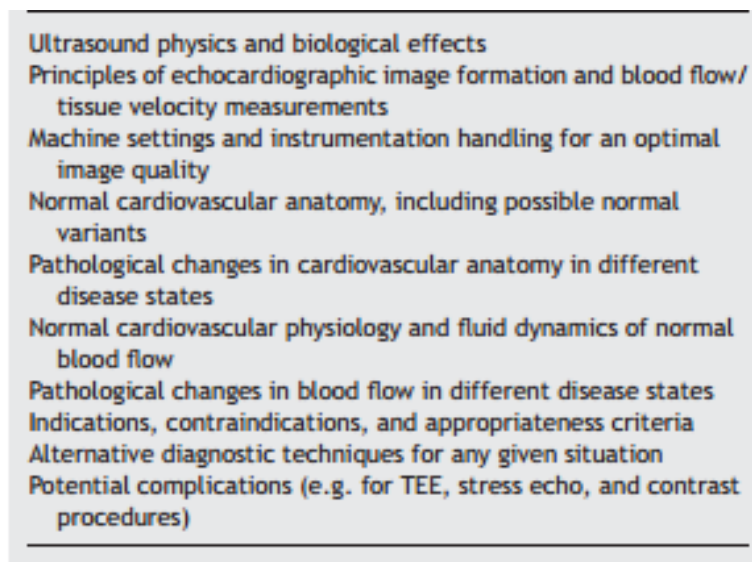
**Figure 2.8: A summary of the training requirements for performance and interpretation of adult transthoracic echocardiography**

Derived directly from source: Quinones (2003:691)

#### 2.5.4.2 *European Society of Echocardiography Guidelines*

Another set of guidelines was developed by the ESE with reference to education, training and accreditation of echocardiographers. These guidelines closely resemble the ASE guidelines set out in 2.5.4.1. There are, however, distinct differences between the two and this section serves to clarify these differences.

According to Popescu *et al.* (2009:894), “Irrespective of the echocardiographic modality used, there is a body of knowledge required by any person involved in performing or reading echocardiograms.” This basic knowledge is very similar to the basic cognitive skills required for competence in echocardiography provided in Figure 2.6, and is shown in Figure 2.9.



**Figure 2.9: A summary of the basic knowledge for competence in echocardiography**

Derived directly from source: Popescu *et al.* (2009: 894)

#### **Training requirements**

The ESE established recommendations for two levels of expertise in the training of echocardiographers: basic and advanced. The basic level of competence is meant to be achieved by every general echocardiographer, and the advanced level aims to address echocardiographers who wish to specialise mainly in this field. They should be able to perform complete and comprehensive echo examinations. Although there is reference to a timeframe

for the achievement of each level of competence, the emphasis is not on the duration of training, but rather on the acquisition of the required expertise. It is important to note that, although the number of studies is important, the case mix of patients is equally important – this is one of the biggest differences between the two sets of requirements (Popescu *et al.* 2009:894).

Figure 2.10 presents the training requirements for achieving both the basic and advanced levels of competence with reference to the minimum number of examinations, level of competence and minimum number of examinations performed/year to maintain competence.

Echocardiographic technique	Minimum number of examinations performed to become competent	Level of competence	Minimum number of examinations performed/year to maintain competence
TTE	350 (basic) 750 (advanced)	III III	Reasonable exposure 100 <sup>a</sup>
TEE	75 (advanced)	III	50
Stress echocardiography	100 (advanced)	III	100

Level III, ability to independently perform the procedure (unsupervised).  
<sup>a</sup>Details from reference 32.

**Figure 2.10: A summary of the training requirements to achieve basic and advanced levels of competence**

Derived directly from source: Popescu *et al.* (2009:895).

As mentioned, the one difference between the ASE requirements and the ESE is the case mix, with special reference to different diseases/pathology. Figure 2.11 shows this case mix for basic-level echocardiography practitioners.

Cardiac disease/clinical scenario	Knowledge and skills to be acquired
Valvular heart diseases	
Aortic stenosis	Display views for the diagnosis
Aortic regurgitation	Recognition of diagnostic features
Mitral stenosis	Evaluation/quantification of severity
Mitral regurgitation	Distinction between chronic and acute lesions (regurgitant lesions)
Tricuspid stenosis	Evaluation of the consequences on the size, geometry, and function of the cardiac chambers
Tricuspid regurgitation	Criteria and timing for intervention, amenability for surgical repair, and suitability for percutaneous intervention
Pulmonary stenosis	Echocardiographic (2D and Doppler) findings of normal function and malfunction of biological and mechanical valves
Pulmonary regurgitation	Judge the need for complementary diagnostic approaches
Prosthetic valves	Define the need for regular follow-up studies
Ischaemic heart disease	
Myocardial infarction	Recognition of the signs and consequences of myocardial ischaemia and infarction
Ischaemic cardiomyopathy	Localize segmental wall motion abnormalities in a standardized format
	Evaluation of infarct size and the amount of myocardium at risk
	Evaluation of global and regional LV systolic and diastolic function
	Diagnose mechanical complications of MI and their haemodynamic consequences
	Recognition of the prognostic implications of structural and functional parameters
Cardiomyopathies	
Dilated cardiomyopathy	Perform a complete M-mode, 2D, and Doppler examination which allows to establish the diagnosis, accurately quantify disease severity, and help to choose the proper therapeutical modality
Myocarditis	Make the differential diagnosis of athlete's heart vs. hypertrophic cardiomyopathy
Hypertrophic cardiomyopathy	Identify patients who are appropriate candidates for cardiac resynchronization therapy
Restrictive and infiltrative cardiomyopathies	
Heart failure	Outline echocardiographic features of cardiomyopathies, coronary heart disease, valvular heart disease, myocarditis, constrictive pericarditis, pulmonary hypertension, and other conditions associated with heart failure
	Identify causes of acute heart failure
	Recognize the prognostic implications of functional parameters
	Recognize typical complications in heart failure (spontaneous echo contrast and thrombus formation, pleural effusion, etc.)
Hypertension	
	Calculation of LV mass, relative wall thickness, evaluation of LV geometry
	Assessment of LV systolic function and diastolic function
	Estimation of LV filling pressures
Infective endocarditis	
Emergency echocardiography	
Simple CHDs	
Cardiac tumours and masses	
Sources of embolism	
Pulmonary embolism	
Pulmonary hypertension	
Diseases of the aorta	
Diseases of the pericardium	
Normal examinations	Not more than one-third of total studies

Level III competence in general adult TTE as recommended in the ESC Core Curriculum for general cardiologists.<sup>8</sup>

**Figure 2.11: Case mix for basic-level training in transthoracic echocardiography**

Derived directly from source: Popescu *et al.* (2009:895).

### Basic Training (6 months; 350 examinations)

A trainee with a basic level of competence in echocardiography should be able to perform a general echocardiograph independently. Full-time training in echocardiography over 6 months is the minimum recommendation for a training period to achieve this basic level of skill in echocardiography. If, for some reason, the trainee cannot achieve the required number of examinations within this time period, an extension is granted. The number of examinations

performed by the trainee should be at least 350 and should include the appropriate case mix (Popescu *et al.* 2009:896).

Advanced Level (12 months (6 months additionally); 750 examinations (400 examinations additionally))

The advanced level is aimed at the echocardiographer who has already completed the basic level but who wants to engage in more complex studies or become fully competent in the supplementary echocardiography examination, e.g. stress echocardiography. Competence at an advanced level requires an additional training period in echocardiography, of at least 6 months and performance of 750 examinations (Popescu *et al.* 2009:896).

#### **2.5.4.3 Key differences between the two sets of requirements for echocardiography**

As noted earlier, there are some key differences between the requirements as set out by the ASE and the ESE. Table 2.3 compares the two sets of guidelines (*cf.* 2.5.4.1; *cf.* 2.5.4.2).

**Table 2.3: Summary of key differences between the requirements of the American Society of Echocardiography and the European Society of Echocardiography**

Requirements	American Society of Echocardiography	European Society of Echocardiography
Levels of qualifications	Level 1 to Level 3 3 Levels: See Figure 2.8	Basic and Advanced levels 2 Levels: See Figure 2.10
Number of examinations	Distinguishes between observed and performed examinations	Only mentions minimum examinations
Composition of the examinations	Only mentions number of examinations	Dictates a case mix for the minimum number of examinations
Outcome levels	From a Level 1 non-independent echocardiographer practitioner to a Level 3 unit manager	Both levels reference independent practitioners, with difference in supplementary echocardiography procedures as distinction between the two levels



It is the opinion of the researcher that, of the two the ESE's requirements seems to be more descriptive as it offers the opportunity for the echocardiographer in training to be exposed to a variety of cases (*cf.* case mix Figure 2.11) and the echocardiographer can start with a basic level and where applicable advance to a next level.

### **2.5.5 Formal education, training and accreditation for echocardiography in South Africa**

In the words of Herbst, a consultant cardiologist in the Division of Cardiology, Department of Medicine, University of Stellenbosch and Tygerberg Hospital, South Africa: "Accreditation in echocardiography is an important and a necessary next step towards raising standards in the practice of all forms of echocardiography in South Africa" (Herbst 2012:154). According to this healthcare practitioner the development of an accreditation system will set a minimum standard of practice competency (Herbst 2010:86). This accreditation should then be used by all echocardiography practitioners to assess their specific level of practice competency, to identify gaps in their practice competencies and hopefully participate in educational opportunities, such as formal-qualification-based training or CPD. The development of an echocardiography-specific CPD programme with activities developed specifically to address the required practice competencies of South African echocardiography practitioners will thus be valuable. In essence, an echocardiography accreditation system will contribute to raising the level at which echocardiography is practiced, ultimately contributing to improving practice and ethical approaches to patient care (Herbst 2012:154).

At the time of writing this dissertation there had been no further publications referring to the accreditation of echocardiography in *The SA Heart Journal*. It is not clear from the literature how far the process of establishing echocardiography accreditation in South Africa has progressed. It is, however, still of the utmost importance to pursue further research in the field to investigate whether such accreditation will be feasible and accepted by echocardiography practitioners. It was recommended that the process of accreditation in echocardiography "should be voluntary and non-statutory/regulatory" – a similar approach to that taken by the BSE and EAE (Herbst 2012:154).



## 2.6 ECHOCARDIOGRAPHY-SPECIFIC CONTINUOUS PROFESSIONAL DEVELOPMENT

CPD has become a necessity to echocardiographers either actively practicing or teaching in the profession, as the ever-changing environment and technology ensures that echocardiography will remain a rapidly changing and evolving field. Echocardiography is a challenging and rewarding career that demands individual initiative, clinical judgement, critical thinking and commitment to ongoing professional development in the rapidly evolving field of echocardiography (Ehler *et al.* 2001:77-84).

The field of cardiovascular imaging has experienced major growth and technological advances in recent years with respect to the longstanding traditional cardiac imaging procedures of echocardiography. It is now time to consider changing the training paradigm for cardiology practitioners interested in emphasising cardiovascular imaging in their professional careers. According to Beller (2006:1299-1303) thought leaders in these specific fields believe that a unique body of knowledge needs to be learned and high technical proficiency is required for the delivery of high quality care.

In the old paradigm, physicians themselves were charged with identifying the criteria that constitute professional competence, and evaluate their peers accordingly. Yet, according to Quinones (2003:687-708), the process of evaluating physicians' knowledge and competence is often constrained by the evaluators' own knowledge and ability to elicit the appropriate information. Clinical competence in echocardiography requires continued maintenance of knowledge and skills. Continued medical education in echocardiography is essential if practitioners are to keep pace with ongoing technical advances, refinements in established techniques and application of new methods (Quinones 2003:687-708).

According to Nihoyannopoulos *et al.* (2007:80-87) the aim of CPD is to raise quality standards in practice, to protect staff working in the echo laboratories from making incorrect diagnoses, and to protect patients from being given the wrong treatment. Thus, the echocardiographic practitioner, in an increasingly complex and demanding role, needs to maintain skills through participation in appropriate continuous education (Biering *et al.* 2006:471-474).

The primary role of the cardiac sonographer is to obtain diagnostic recordings of echocardiographic images and Doppler haemodynamic data. The technique is extremely

operator-dependent and its optimal performance requires a highly skilled and well educated person who can continuously integrate known clinical information, echocardiographical content and related physiological data to tailor the examination and ensure that it is comprehensive and accurate (Ehler *et al.* 2001:77-84).

According to Ehler *et al.* (2001:77-84) the education and credentialing of cardiac sonographers are extremely important to the future of the field, to ensure the appropriate professional status of competent practitioners and to enhance the standard of the practice of echocardiography. Providing quality education is a complex task. It requires a substantial commitment on the part of the educator providing the education to provide the level of rigor and types of educational experiences necessary to ensure competence and a professional level of practice (Ehler *et al.* 2001:77-84).

It is important to note that, like clinical practice itself, the well prepared teacher in the CPD environment can bring about practice change and even affect healthcare outcomes on an immediate and rewarding basis. According to the Canadian Institutes of Health Research (Dent & Harden 2013:46-52) knowledge translation involves a complex set of interactions between the producer and users of new knowledge. More dynamic mechanisms that engage players whose decision-making would be informed by the research have shown to increase uptake and application of research (Dent & Harden 2013:46-52).

Echocardiography is recognised as a very valuable tool, but is extremely operator-dependent. In all first-world countries standards and operating procedures have been established, with CPD specific to echocardiography having been found to be the only way to keep practitioners up to date and current in their field. In South Africa, no CPD specific to echocardiography has yet been established.

This study investigated what is needed to implement echocardiography-specific CPD and how can it be implemented, by referring to the importance of the practitioner who is functioning on a professional level being up to date regarding the most recent technology and advances in the field.

### **2.6.1 Continuous professional development in echocardiography: An international perspective**

When referring to the international perspective relating to echocardiography, the guidelines are clear on accreditation, re-accreditation and CPD, and involves three echocardiography-specific governing bodies, namely the BSE, ESE and the ASE (Nihoyannopoulos *et al.* 2007:80-87).

From a local perspective, the South African Heart Association formally represents all cardiologists and cardiothoracic surgeons in South Africa, and carries an association with the European Society of Cardiology. Due to this association, the researcher will use the ESE as a reference in this study (ESE 2015:1-5).

According to the ESE (2015:1), the ESE is a world leader in finding and spreading best practices in cardiovascular medicine; it is a non-profit medical society led by expert volunteers (ESE 2015:1-5). The ESE requires an echocardiographer to comply with a standard of 50 CPD/CME points and 25 echocardiography-specific points, in addition to 250 echocardiography studies performed per year. The accreditation cycle runs for five years and re-accreditation needs to be applied for at least six months before the expiry date (Popescu *et al.* 2009:893). According to the ASE maintenance of competence requires the performance of a minimum number of procedures per annum and participation in CME. It is recommended that a practicing echocardiographer obtains a minimum CME credits represented by five hours per year in echocardiography specifically (Quinones 2003:691).

### **2.6.2 Continuous professional development in echocardiography: A local perspective**

At present there are no echocardiography accreditation or regulatory bodies or associations specifically for echocardiography in South Africa. However, as mentioned before, the South African Heart Association carries an association with the ESC. Through this association cardiologists and cardiothoracic surgeons could potentially obtain international accreditation. This will, however, accommodate very few healthcare practitioners who are involved in echocardiography in South Africa.

In view of the absence of accreditation opportunities for echocardiography there are currently no echocardiography-specific CPD guidelines for echocardiography practitioners in South Africa either. All healthcare practitioners should therefore adhere to the guidelines set by their respective HPCSA registered bodies with regard to generalised CPD (HPCSA 2014: 5).

Should an echocardiography-specific CPD programme with specific and focussed CPD activities relevant to echocardiography become available in the future the recommendation made by Schostak *et al.* (2010:67): "The emphasis should be on quality and the appropriateness of CPD to one's own practice and career development rather than accruing a number of credits or points", will be important to note.

### **2.6.3 Continuous professional development in echocardiography: What is needed**

Establishing CPD is a staged process that includes several role players. At present in South Africa there is no echocardiography-specific governing body such as the BSE, ESE and the ASE (*cf.* 2.6.1) to oversee and govern the registrations, practices, and continued learning of health care practitioners practicing in echocardiography. The requirements for all HPCSA registered and practicing health professionals with reference to CPD is the same (*cf.* 2.3) and to date the regulations do not explicitly stipulate that discipline specific CPD activities should be completed in order for health practitioners to update their knowledge and skills within their specific disciplines.

Before one can determine what is needed to establish an echocardiography-specific CPD programme with specific and focussed CPD activities relevant to echocardiography consideration should be given to whether such a programme is needed and if it will be feasible in South Africa. This should ideally be done through research as in the case of the current study, and further studies in the field is highly recommended before an echocardiography-specific CPD programme can actually be implemented.

Mash and Blitz-Lindeque (2006:26-28) list the following aspects that should be considered in the planning and execution of CPD activities for healthcare professionals:

- "Ascertaining the needs of attendees and selecting the topics.
- Determining the layout of delivery.
- Having opportunities for reflection.

- Selecting the idyllic content expert.
- Choosing the appropriate date and venue.
- Reservation of audio-visual simulation equipment that is required.
- Organising suitable catering.
- Timely accreditation for CPD and guidelines that is followed by the HPCSA.
- Sending out invitations on time.
- Attendance registers recording all important information.
- Receiving feedback on CPD activities presented."

However, when establishing a CPD programme set within a specific framework the Executive Secretary of the Commonwealth Nurses Federation, Jill Iliffe (PowerPoint presentation n.d.:online) call attention to eight aspects when it comes to establishing a CPD framework: "(1) Prepare your arguments and your brief; (2) Develop and implement a communication strategy; (3) Develop your CPD policy; (4) Develop your CPD framework; (5) Make any legislative change; (6) Take small steps moving forward toward your goal; (7) Remember: the process should be reasonable, achievable, fair, accessible, transparent, flexible, and inclusive; and (8) CPD should be relevant, current, available, accessible and affordable". In order to derive such a framework a multitude of stakeholders should be involved e.g. employers, regulatory bodies, professional associations, governments, and health professionals.

In the current study only the views of a small group of health professionals who are practising in echocardiography was considered. In order to identify what is needed to possibly implement an echocardiography-specific CPD programme with specific and focussed CPD activities relevant to echocardiography is therefore limited to one stakeholder only and more research in the field would be required.

## **2.7 CONCLUSION**

Chapter 2 provided the relevant literature for the research undertaken regarding CPD and the focus on echocardiography and echocardiography-specific CPD.

In Chapter 3, **Research design and methodology**, the research design and methods applied will be described in detail. In addition, the data collection and analysis will be documented.

## **CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY**

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### **3.1 INTRODUCTION**

This chapter provides information on the research design and research methodology used to analyse CPD training in South Africa. Firstly, theoretical perspectives on the research design are provided. This is followed by a comprehensive explanation and justification of the process that was applied for sample selection, the pilot study, data collection and analysis processes. This chapter will conclude with a discussion on the reliability and validity of and the ethical considerations applicable to this study.

### **3.2 THEORETICAL PERSPECTIVES ON THE RESEARCH DESIGN**

The function of a research design is to ensure that the evidence obtained enables the researcher to answer the initial question as explicitly as possible. To answer the research question, the research design functions as a plan, structure and strategy. The main purpose of the research design is concerned with identifying or developing procedures that are required to conduct a study. It also upholds the importance of quality in the procedures followed, to ensure the validity, objectivity and accuracy of the study and its findings (Kumar 2005:95).

A descriptive quantitative study was conducted. According to Shields and Rangarajan (2013:71-108) descriptive research is used to describe characteristics of a population being studied. It does not answer the question of how/when/why, but addresses the “what” question. The purpose of descriptive research is to observe, describe and document aspects of a situation as it occurs naturally (Polit & Hungler 2004:46-55).

According to Burns and Grove (2005:23), “quantitative research is a formal, objective, systematic process in which numerical data are used to obtain information. This research method is used to describe variables, to examine relationships among variables and to determine cause-and-effect interactions between variables”.

The quantitative approach enabled the researcher to generate large amounts of data within a short period, to increase the immediacy and reliability of the results within the time frame set for execution of the research.

In this study an empirical research design involving the research methods of a literature study and quantitative descriptive measurements, exploiting a custom-designed questionnaire, was employed to determine what is needed to implement echocardiography-specific CPD and how it can be implemented.

### **3.3 RESEARCH METHODS**

The research method that forms the basis of the study was a literature study, while the empirical phase of the study consisted of a questionnaire, which was used to conduct a survey.

In this section, each method will be detailed and described.

#### **3.3.1 Literature study**

According to De Vos, Strydom, Fouché and Delport (2011:134) the aim of a literature study is to understand and develop a research problem and locate it in a body of theory. The authors further state that it also serves to put the researcher's effort into perspective, by situating the topic in a larger knowledge pool, thus creating a foundation based on existing, related knowledge (De Vos *et al.* 2011:134).

Babbie and Mouton (2016:411-431) comment that every research study should be placed in the context of the general body of scientific knowledge.

As part of this study, the literature study is aimed at ensuring that a solid scientific background is established on the topic of trends in CPD, and to gain a deeper understanding of current CPD activities available to echocardiographic practitioners. Furthermore, the literature study was utilised to develop the questionnaire, to establish what is needed to implement, and how to implement, a echocardiography-specific CPD programme in South Africa.



### 3.3.2 The questionnaire survey

A questionnaire is a systematic method of gathering information from entities for the purpose of constructing quantitative descriptors of the attributes of the larger populations of which the entities are members (Babbie & Mouton 2016:411-431).

According to Babbie and Mouton (2016:411-431) a questionnaire is the best method available to the social scientist interested in collecting original data for describing a population too large to observe directly. The questionnaire was employed in this study as a method to collect information.

The literature study was used as a guide to compile the questionnaire. The Question Appraisal System (QAS-99) is ideal for identifying and preventing miscommunication in questionnaires. This could be done by following eight steps as directly quoted from the QAS-99 user manual (Willis & Lessler 1999:online):

- **“Step 1: Reading** – Determine if it is difficult for the respondent to read the question uniformly;
- **Step 2: Instructions** – Look for problems relating to introductions, instructions or explanations from the respondents’ point of view;
- **Step 3: Clarity** – Identify problems related to communicating the intent or meaning of the questions to the respondent;
- **Step 4: Assumptions** – Determine if there are problems with assumptions or the underlying logic;
- **Step 5: Knowledge/Memory** – Check whether respondents are likely to be ignorant of or have trouble remembering information;
- **Step 6: Sensitivity/Bias** – Assess questions for sensitive nature or wording, and for bias;
- **Step 7: Response categories** – Assess the adequacy of the range of responses to be recorded; and
- **Step 8: Other** – Look for problems not identified in Steps 1-7”.

Two common questionnaire types are described by De Vos *et al.* (2011:171), namely,

- **Structured questionnaire** – Involves definite and concrete questions, prepared well in advance, and initiates a formal query; and

- **Unstructured questionnaire** – Compiled at the time of the interview, acts as a guide for the interviewer, and is very flexible in operation.

According to De Vos *et al.* (2011:181) the nature of the questions should also be distinguished as follows:

- **Open ended** – Respondents are free to express their views, do not provide any structure for the respondents' replies;
- **Closed ended** – Respondents are limited to the stated alternatives, respondents cannot express their own judgements;
- **Mixed** – Questions can be both closed and open ended; and
- **Pictorial** – Used very rarely, pictures are used to stimulate respondents' interest in answering the questions.

For the purpose of this study a structured, self-administered questionnaire was used to answer the research questions; mixed question types were used.

#### **3.3.2.1 *The questionnaire survey as used in this study***

In this study, the questionnaire was quantitative in nature and used mixed questions, including closed-ended, open-ended and scale-like questions.

The questionnaire was developed by the researcher by means of the EvaSys system. The EvaSys system is an electronic Questionnaire system with both questionnaire composition capability, and also data analysis capability. The electronic questionnaire was printed, and paper-based questionnaires were given to the participants to complete. Each questionnaire had a unique barcode that linked it to the study. An addition, a separate handout that served as an information sheet was attached to each questionnaire to inform participants of the study and to encourage their participation.

The questionnaire consisted of two main sections: a demographic section to obtain demographic information from the participants, and a professional development section to obtain information of current education and CPD. Some questions were open-ended questions, this open-ended question section of the questionnaire did not allow for the explaining or describing of answers, but was aimed at gathering additional quantitative data.

### **3.3.3 Study population**

This section detail the target population, description of the sample, sampling method and sample size.

#### **3.3.3.1 *Target population***

In this study the target population was echocardiography practitioners who attended the annual New Horizons in Echocardiography Congress during 2016, and echocardiography practitioners who were involved through references from the attendees of the New Horizons in Echocardiography Congress.

The New Horizons in Echocardiography Congress is an echocardiography congress held annually in Sandton, South Africa, attended by representatives of all echocardiography-related practices, ranging from clinical technologists and cardiologists to general practitioners and other specialists. The Congress programme relates to all levels of the echocardiographic examination. The Congress is mostly attended by representatives from all provinces in South Africa, although what it is common with most conferences is that they are represented most by individuals from the province in which the Congress is offered.

The following served as the inclusion criteria for the participants:

- Participants had to be registered with the HPCSA;
- They had to practice echocardiography;
- Participants had to be based in South Africa, and;
- Participants needed to be proficient in English, which is the official language used in the profession.

Those who did not fulfil the inclusion criteria required for the target population were excluded.

This study did not consider all health professionals practising echocardiography in Gauteng or in South Africa as the target population. The reason for this was that echocardiography practitioners do not need to be registered with any body for echocardiography specifically, and do not undergo a certified training programme, and consequently it is difficult: a) to determine the size of the population of echocardiography practitioners in South Africa, and b) to obtain the contact details of echocardiography practitioners. Furthermore companies

selling echocardiography equipment are private companies and their clients' information is protected. With all of the above in mind the New Horizons in Echocardiography conference offered the only opportunity to reach this particular population. After consulting with the Department of Biostatistics at the University of the Free State the two sampling methods as defined below deemed most appropriate for use in the current study. The target population thus represents a subset of a manageable size, which deemed appropriate for the purpose of this study.

### **3.3.3.2 *Description of the sample***

A sample is a subsection of the population that is selected to participate in a study. According to Jack, Hayes, Scharalda, Stetson, Jones-Jack, Valliere, Kirchain and LeBlanc (2010:163) a study sample must be representative of the group from which it is drawn. As stated in Paragraph 3.3.3.1, all echocardiography practitioners who attended the annual New Horizons in Echocardiography Congress in 2016 were considered for this study.

### **3.3.3.3 *Description of the sampling method***

Sampling involves a process of selecting a subsection of a population that represents the entire population, in order to obtain information regarding the phenomenon of interest (De Vos *et al.* 2011:223). For the purpose of this study non-probability sampling and specifically convenience sampling was used to select the sample from conference delegates.

According to Farrokhi (2012:784-792), a core characteristic of non-probability sampling techniques is that samples are selected on the basis of the subjective judgement of the researcher, rather than random selection, which is the cornerstone of probability sampling techniques. This non-probability sampling technique does not, however, give all the individuals in the population an equal chance of being selected.

Farrokhi (2012:784-792) describes convenience sampling as selecting people who are easy to reach. Subjects are selected because of their convenient accessibility and proximity to the researcher.

In all forms of research, it would be ideal to test the entire population but, in most cases, the population is just too large, making it is impossible to include every individual.

In order to reach more echocardiography practitioners the researcher was advised the Department of Biostatistics at the University of the Free State to include an additional data collection step to possibly increase the study sample. The sampling method used to approach echocardiography practitioners who meet the inclusion criteria and did not attend the Conference was snowball sampling. Snowball sampling or chain sampling is a non-probability sampling technique involving existing study subjects recruiting future subjects from among their acquaintances. As the sample builds up, enough data can be gathered to be useful for research. This sampling technique is often used for hidden populations that are difficult for researchers to access (Farrokhi 2012:784-792) and it was therefore deemed appropriate for this study.

#### **3.3.3.4 *Sample size***

The sample size was the total number of echocardiographic practitioners attending the New Horizons in Echocardiography Congress, as well as echocardiography practitioners who did not attend the Congress but who were referred by their colleagues, who met the inclusion criteria and took part in the study.

Delegates at this Congress in 2015 were calculated to number approximately 107, and a growth in attendance is experienced annually, thus creating the expectation that at least a similar or slightly higher number of delegates would attend in 2016. The sample size for this study thus constituted about 107.

The actual number of attendees at the 2016 congress numbered 109 participants, which was indeed similar to the number of delegates who attended in 2015.

#### **3.3.4 The pilot study**

The term pilot study refers to so-called feasibility studies that are small-scale versions or trial runs and that are done as preparation for the major study (Polit & Hungler 2004:467).

One of the advantages of conducting a pilot study is that it might warn the researcher where the main research project could fail, where research protocols are unlikely be followed or whether proposed methods or instruments are inappropriate or too complicated (Teijlingen & Hundley 2001:1-4).

To pre-test the questionnaire, a pilot study was done to ensure that the questions are clear and not biased, that the questionnaire is well-structured, and to define the amount of time needed for completion. To achieve the aim of clear and unbiased questions the questionnaire was given to five echocardiographic practitioners from five different echocardiographic practicing occupations, namely, a clinical technologist, a cardiologist, a specialist physician, a general practitioner and a radiographer. The pilot study data was used for the main study, as very small changes were made to the questionnaire. The single change made was a double-barrelled question being divided to two separate questions. No other changes were made.

### **3.3.5 Data collection**

The paper-based questionnaires, with an information sheet attached to each, were handed out to all conference delegates at the welcome session of the New Horizons in Echocardiography Congress. This session was held at the start of the Congress, when all the congress delegates were present. The delegates were informed of the study and asked to consider participating. Interested parties were then asked to complete the questionnaire in one sitting, in the month of July 2016. Throughout the Congress and in various sessions announcements by the researcher served as a reminder to take part in the study.

A box was supplied at the information desk at the congress venue where the delegates could return the completed questionnaires before the end of the Congress.

The participating delegates attending the Congress were also asked to refer any other echocardiography practitioners who were not at the Congress to participate in this study by completing questionnaires. These delegates took paper-based copies of the questionnaire with them after the Congress to give to the echocardiography practitioners they wished to ask to participate. A questionnaire in PDF format, which could be emailed or printed and delivered, was also available for cases where only the researcher's contact details were made available by the referring delegate. Completed questionnaires were posted and others collected as per the request of the participants. These questionnaires were included in the pile of completed questionnaires. A time period of two months after the conference was permitted for participation by members of the snowball sample.

Once the data collection time period had ended and all the completed questionnaires had been received, data capturing was done on an Excel spreadsheet.

### **3.3.6 Data analysis**

According to Babbie and Mouton (2016:411-431) descriptive statistics are suitable in descriptive research, as the data is presented in a tabular arrangement so that information is presented briefly and clearly to the reader.

The data captured on an Excel spreadsheet was used to sort and analyse the results. Descriptive statistics, such as frequencies and percentages, was calculated by the researcher and will be presented in figures and tables in Chapter 4. The Department of Biostatistics at the University of the Free State was consulted to confirm the accuracy of the analysed results, and then the results were reported.

## **3.4 ENSURING THE QUALITY, RELIABILITY AND VALIDITY OF THE STUDY**

In this section the researcher will describe the factors that confirm the quality of the study. The researcher will discuss the validity and reliability, which ensure that the conclusions drawn are valid, objective and accurate.

### **3.4.1 Validity**

Validity is defined as the extent to which the instrument measures what it intends to measure (Miller 2003:1) or how honest the research results are (Golafshani 2003:599).

According to Babbie and Mouton (2016:411-431) validity refers to the extent to which a specific measurement provides data that relates to commonly accepted meanings of a particular concept. In this case, a custom-designed questionnaire based on a literature study was used to collect data relating to what is needed to implement echocardiography-specific CPD, and how it can be implemented.

To ensure that the questionnaire would measure what it was designed to measure or to ensure validity, a panel of experts judged the questionnaire. Discussions were conducted with members of the panel to determine the scope and validity before the questionnaire was distributed.

### 3.4.2 Reliability

Reliability is defined as the degree to which a questionnaire, test, observation or any measurement procedure produces the same results in recurrent trials (Miller 2003:1-3). Golafshani (2003:602) defines reliability as the extent to which results are reliable over time and present an accurate picture of the total population being studied.

According to Babbie and Mouton (2016:411-431) reliability refers to the likelihood that a given measured procedure will yield the same description of a given phenomenon if that measurement is repeated. Leedy and Ormrod (2001:31) summarise it as the consistency with which a measuring instrument yields a certain result when the entity being measured has not changed.

Collins, Du Plooy, Grobbelaar, Puttergill, Terreblanch, Van Eeden, Van Rensburg and Wigston (2010:183) suggest that, to improve reliability, the following types of statements and questions should be avoided:

- **Double-barrelled questions** – a question that touches on more than one issue, yet only permits one answer;
- **Loaded language** – wording that attempts to influence a respondent by appealing to emotions or stereotypes;
- **Leading questions** – questions that subtly prompt the respondent to answer in a particular way;
- **Incomplete questions** – lack of some part of the question;
- **Ambiguous questions** – questions of which the meaning is unclear;
- **Lengthy statements** – lengthy statements that don't add value to the question; and
- **Unwarranted assumptions** – conclusion of an argument is based on a premise that is false or unwarranted.

Reliability was ensured by asking simple, relevant questions that participants would probably be able to answer due to the nature of the questions, namely, their own needs and preferences regarding CPD. Feedback from the pilot study also contributed by pointing out improvements to the questions.

### 3.5 ETHICAL CONSIDERATIONS



The term ethics implies preferences that influence behaviour in human relations, conforming to a code of principles, the rules of conduct, the responsibility of the researcher and the standards of conduct of a given profession (Babbie & Mouton 2016:411-431).

In this section the ethical process of this study is described. To confirm compliance with the code of ethics adopted by this research study, the following steps were taken.

### **3.5.1 Approval**

Approval for the research project was obtained from an Evaluation Committee and the Health Sciences Research Ethics Committee of the Faculty of Health Sciences at the University of the Free State. The dean of the Faculty of Health Sciences and the vice rector, Academic, both at University of the Free State, were informed of the study. Approval from the Congress chair was also obtained. In no way did the study limit, affect or impose on any human rights.

### **3.5.2 Informed consent**

An information sheet was offered to the participants to invite them to participate and to explain that their participation would be completely voluntary. It addressed confidentiality – the study was anonymous and used a barcode as identification, with no further identifying information. Participants had the right to stop participating at any time. Congress delegates who did not participate and participants who decided to discontinue their participation were neither harmed nor victimised. There was no form of compensation for input in the study.

### **3.5.3 Right to privacy and confidentiality**

Each questionnaire held a unique barcode and no personal information was present on any one of the questionnaires. The barcode was used to ensure the anonymity and confidentiality of the participants' responses. Completed questionnaires could not be traced back to the participants. All information was managed in a strictly professional and confidential manner. No names or personal identifiers appeared on any data sheet that was used for statistical analysis.

The researcher's details were available to participants who had any queries, for example, what will be done with the results from this study? The details of the ethics committee were also available if participants wished to raise concerns or ask questions.

### **3.6 CONCLUSION**

In this chapter, **Research design and methodology**, the methodology, research design and methods used to address the two research questions raised in the current study were explained and clarified.

In the next chapter, Chapter 4, entitled, **Description and discussion of the results of the questionnaire survey**, the results of the questionnaire used in the study will be reported and discussed.

## **CHAPTER 4: DESCRIPTION AND DISCUSSION OF THE RESULTS OF THE QUESTIONNAIRE SURVEY**

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### **4.1 INTRODUCTION**

In Chapter 3 the methodology that was used in this research study was discussed. In this chapter the results of the study will be presented by means of percentages and frequencies through text, tables and figures. This chapter also serves as the discussion chapter of this dissertation and will be followed by a conclusion chapter with a section that summarises the main results and discussion points together with recommendations drawn from the findings.

### **4.2 THE DATA COLLECTION PROCESS AND RESPONSE RATE**

A questionnaire was used to collect data for the present study. The aim of the study was to determine the requirements of echocardiography-specific CPD and how it can be implemented (*cf.* 1.8).

The questionnaire was developed on the EvaSys system by the researcher and consisted of two sections, namely (*cf.* Appendix B2),

- Section 1: Demographics; and
- Section 2: Professional development.

The sample population comprised 107 participants – an estimate of the potential number of congress delegates (*cf.* 3.3.3.4). The actual number of delegates who attended the Congress in 2016 was 109, which was close to the estimated number proposed when this study was planned. A total of 107 hard copies of the questionnaire was printed and distributed for completion at the 2016 Annual New Horizons in Echocardiography Congress. Details of the research methodology is available in Chapter 3.

The data was collected during the Congress over a period of approximately two days. Echocardiography practitioners who were not at the event also had the opportunity to take part in the study as part of a snowball sample. If practitioners indicated that they were

interested in participating in the study after the Congress, they were sent paper-based copies of the questionnaire. This approach had the potential to increase the participation rate in this study.

A total number of 42 completed questionnaires were collected (39 from the Congress and 3 from the snowball sample). Three of the questionnaires were partially completed, with two to three pages missing, and were therefore excluded from the final sample, leaving 39 complete questionnaires for analysis. This constituted a 35.7% response rate. The researcher was only allowed to inform the congress delegates about the study and request their participation at one sitting at the beginning of the conference. It is in the opinion of the researcher that if it was permitted to remind delegates to participate in the research by completing the questionnaire and returning it by the end of the congress the response rate could perhaps have been better. The data collection period was extended once in the snowball sample group but due to time constraints to complete the study more time was not possible. Extended data collection time may or may not have improved the response rate, however in this study the researcher was reliant on other participants to distribute the questionnaire between their colleagues.

The following sections present the results from each section of the questionnaire. In the results the total number of participants who consented to answer the questionnaire will be indicated by N, and the number of participants who answered a specific question, by n. Percentages are rounded off to one decimal point, for example, 23.68% is given as 23.7%. For this reason, some totals add up to 99.9% or even 100.1%.

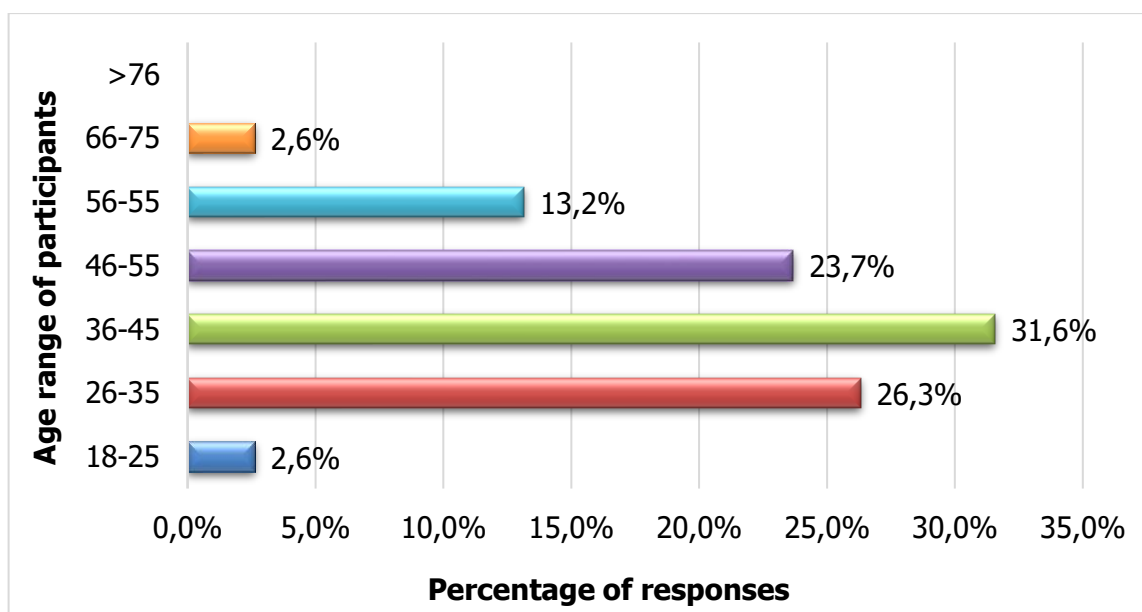
Each result is followed by a discussion and, where applicable, a cross reference, indicated by *cf.*, refers to information in different chapters or other sections of the current chapter.

### **4.3 SECTION A: DEMOGRAPHICS**

This section of the questionnaire consisted of 13 questions. The questions pertain to the age, educational background and practice information of participants, with specific reference to echocardiography. The congress participants

### 4.3.1 Ages of the participants

Figure 4.1 shows that the majority of participants (n=12; 31.6%) fall in the age group 36–45 years, followed by 26.3% (n=10) aged 26–35, 23.7% (n=9) aged between 46 and 55, 13.2% (n=5) aged 56–65 and 2.6% (n=1) aged 66–75, with only one participant (2.6%) younger than 25 years of age. One participant did not complete this question.



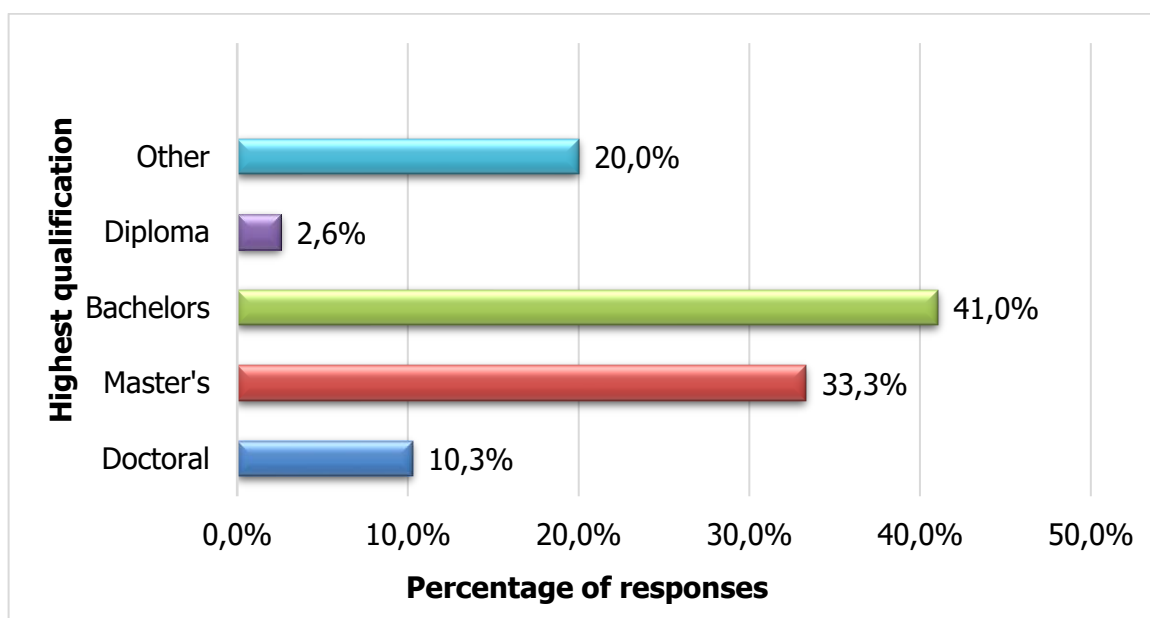
**Figure 4.1: Age range of the participants (N=39) (n=38)**

### Discussion

As expected, the ages of the participants vary greatly. In this sample there were several specialist doctors and the greater numbers of older participants confirm this. The New Horizons Echocardiography Congress is open to all healthcare professionals regardless of their disciplines and work experience. Ages were considered in the results for this study to determine if there was any correlation between the ages of the participants and the level of expertise and training received, also referring to their “era” of training and the curriculum followed. The only correlation is seen between the number of specialist doctors and the greater number of older participants, no direct correlation to echocardiography specific experience or training.

### 4.3.2 Educational backgrounds of the participants

Participants were asked to indicate their highest qualifications by making a selection from five options. In Figure 4.2 it can be seen that the majority of participants holds Bachelor degrees (n=16; 41.0%), closely followed by participants holding Master's degrees (n=13; 33.3%). The remaining qualifications are calculated at 10.3% (n=4) for Doctoral degrees, and 2.6% (n=1) for Diploma. Five participants (20.0%) selected the option of other, and considering their responses to other questions, of the five participants two were specialists (most likely with MMed – Master's degrees), one was a general practitioner (indicating a Bachelor degree) and the remaining two were clinical technicians (probably also holding Bachelor degrees).



**Figure 4.2: Highest qualifications of the participants (N=39) (n=39)**

The disciplines in which the highest qualifications were obtained are summarised in Table 4.1.

**Table 4.1: Highest qualification per discipline (N=39) (n=38)**

<b>Discipline</b>	<b>Number of responses</b>
Anaesthesiology	7
Cardiology	7
General practitioner	1
Internal medicine	1
Paediatric cardiology	4
Radiography	1
Sonography	7
Clinical technician (cardiology)	7
Unspecified	3

## **Discussion**

As echocardiography practitioners are not specified by profession or qualification in South Africa, the results confirm the expectation that there could be a vast difference in the qualification of one practicing echocardiographer and that of the next. This is clearly seen in the educational backgrounds of participants, which range from a diploma to a doctoral degree. Highest level of qualification was considered to establish any correlation between echocardiography practitioners, their relevant profession and if there is a specific profession practicing echocardiography on a more regular basis.

With reference to five of the participants who selected the option other, their highest qualifications were estimated with reference to their responses to other questions. It is likely that these five participants did not read the question properly or misunderstood the question. Another possible explanation for selecting other could be that their specific highest qualification was not provided by the options.

### **4.3.3 Year of graduation of the participants**

The years in which the highest qualifications were obtained ranged from 1970 to 2016. Four (10.3%) participants graduated in the 1970s, two (5.1%) in the 1980s, six (15.4%) in the 1990s and the remaining 27 (69.2%) graduated between the years 2000 and 2016.

## **Discussion**

As this is such a diverse group of participants it was expected that they would have obtained their highest qualifications over a wide range of time.

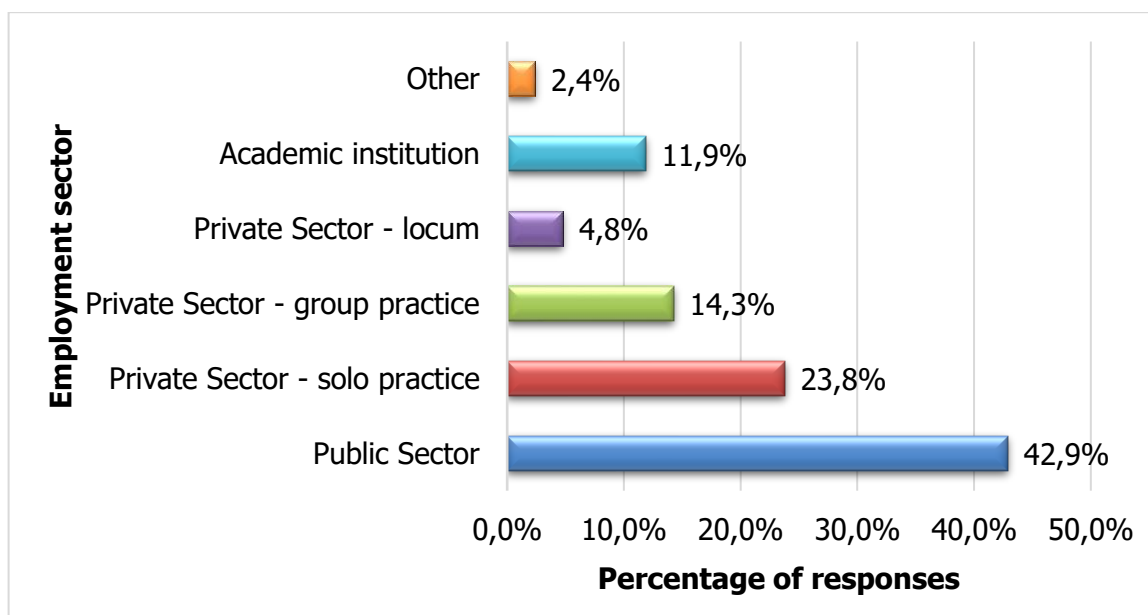
Echocardiography has been available as a field of study from the 1950s and over the years there have been many advances in the field, e.g., the use of 3D technology for diagnostic purposes has been available since 2004 (*cf.* 2.5.1). Even though the majority of participants graduated after 2000, there are still many new developments in the field of echocardiography, and all echocardiography practitioners should stay abreast of knowledge, skills and the available equipment.

### **4.3.4 Employment profile of participants**

Participants were asked to indicate which industry type they are currently working in. It should be noted that some participants indicated that they worked in more than one sector and therefore the number of responses (n) in this question was 40.

Figure 4.3 shows that the same number of participants work in the public sector (n=18; 42.9%) and in the private sector (n=18; 42.9%). Five (11.9%) participants work at academic institutions, and one of these also works in the private, and another in the public sector. Only one participant selected the option other and provided no additional information.





**Figure 4.3: Industry type of participants (N=39) (n=42)**

### **Discussion**

An equal number of participants were practising in the public and in the private sectors. Regardless of the sector where a practitioner works, it remains the responsibility of every HPCSA-registered healthcare practitioner to comply with the HPCSA's CPD regulations. These regulations were detailed in Chapter 2 (*cf.* 2.3).

Academic institutions work closely with the public sector to train people in the health sciences. It is thus common for academia to have communities of scholars, journal clubs, case presentations, and a variety of seminars available to undergraduates and graduates to participate in. Many of these activities in the academic and public sectors are CPD accredited and offer opportunities for professionals to accumulate the necessary number of CPD points.

Some healthcare practitioners working in both the private and public sectors do, however, experience barriers to complying with CPD requirements (*cf.* 2.2.5). An example of these barriers is the geographic distribution of practitioners (Sookram 2016:37). These geographically dispersed practitioners need to make the effort to attend CPD activities, where and when they are presented in their areas, or have to travel long distances to these activities.

For those practitioners who do not reside in the vicinity of academic and large private hospitals, where CPD activities are readily available, accredited case discussions and journal clubs could be options, though it will probably be more suitable for practitioners working in group practice. From the results it can be seen that 14.3% of the participants in this study work in private group practices.

All practitioners, regardless of where they work, can attend accredited workshops, symposiums and conferences. However, there are usually costs involved in attendance and, as most of these activities extend over a few days, taking time off from practice could be a problem (*cf.* 2.2.5.1). The barriers experienced by all participants in this study are presented later in this chapter (*cf.* 4.4.9).

#### **4.3.5 Years working in respective fields/disciplines**

Participants were asked how many years they have been practicing in their respective fields of work. The results show that, at the time of this study, 18 (46.1%) participants had practiced in their respective fields for 0-10 years; 15 (38.5%) for 11-20 years; five (12.8%) for 21-30 years; and one (2.6%) participant had practiced in his/her field for 32 years. The minimum time of practice was 7 months and the maximum 32 years.

### **Discussion**

The range of years of experience is significant, ranging from a lower range of 7 months to practicing for 32 years. This correlates with the participants' responses regarding when they graduated. The significance of the years working on respective fields are aimed at establishing the time period spent in echocardiography, if there is any correlation between years of practicing and years of practicing in echocardiography specifically.

#### **4.3.6 Time practicing in echocardiography**

In this question participants had to indicate, in an open-ended question, the number of years they have been performing echocardiography procedures. The responses to this question were analysed using the same year ranges as the previous question, namely, 0-10, 11-20, 21-30 and 31+ years. One participant did not complete this question (n=38). The results show that 25 (65.8%) participants had practiced for a period of 0-10 years;

nine (23.7%) for 11-20 years; three (7.9%) for 21-30 years; and one (2.6%) for more than 30 years. The minimum time was three months and the maximum 40 years.

In the majority of cases (22; 57.9%) the participants reported performing echocardiography procedures for a shorter time than the time they have been practicing in their specific fields. In 12 (31.6%) cases the time they have been performing echocardiography procedures and working in their respective fields were the same. Only four (10.5%) cases reported having spent more time performing echocardiography procedures than working in their current practices.

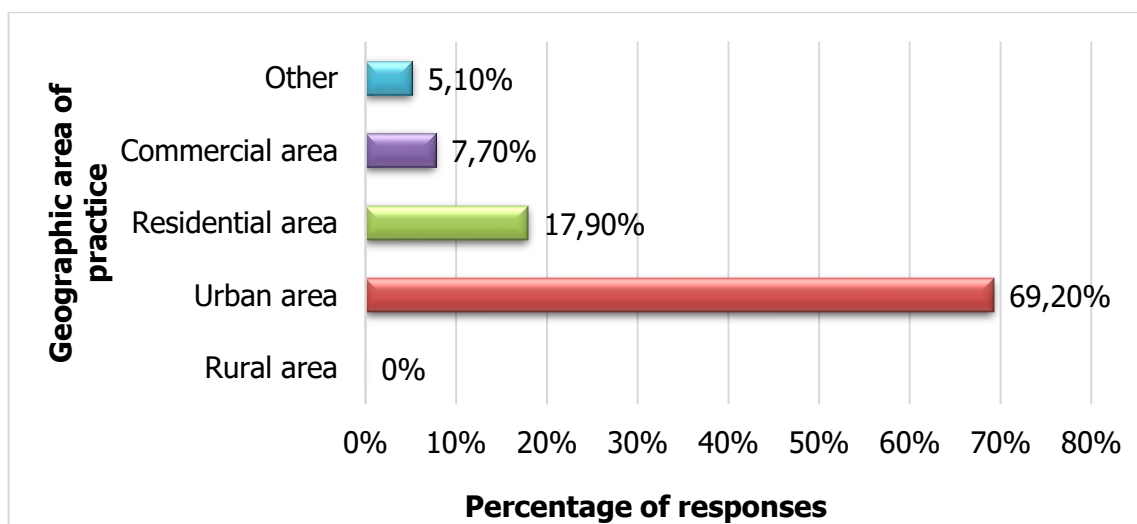
## **Discussion**

The results show that the majority of participants (88.8%) had at least 20 years experience performing echocardiography procedures. The field has grown and so too has the scopes of practice of various healthcare professionals (*cf.* 2.5.3); in addition, echocardiography equipment has become more readily available (*cf.* 2.5.1) – these are probably both reasons why many participants (22; 57.9%) only started performing echocardiography procedures later in their careers. Time practicing echocardiography and the increase in the number of echocardiography practitioners over the year, confirms the rapidly evolving nature of this profession and the availability of resources to perform the examination.

Regarding the 10.5% of cases where participants had spent more time performing echocardiography procedures than working in their current practices, the reasons could include that the participants had already performed echocardiography procedures during their final year (clinical years), internships and/or fellowship years.

### **4.3.7 Geographic profile**

Four options were provided for the geographical area in which the participants practice. The majority of participants indicated that they practice in urban areas (27; 69.2%) (*cf.* Figure 4.4). No participants selected the option of rural area, however, one participant selected the option other, and specified working in a township, which could be considered rural.



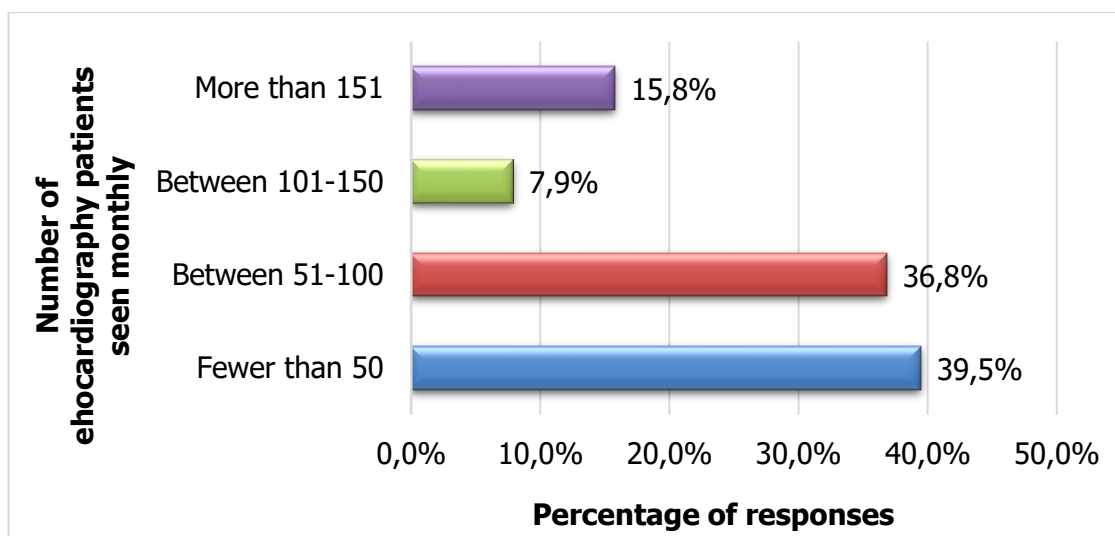
**Figure 4.4: Geographic profile of participants (N=39) (n=39)**

### **Discussion**

The geographic profile closely relates to and correlates with the information in Figure 4.3 (*cf.* 4.3.4), which refers to the employment profile of participants. Geographical information relates to both the availability of echocardiography as well as the diversity of examinations performed with an aim to establish if any correlation is seen between the average number of patients seen and the area of practice.

#### **4.3.8 Average number of echocardiography patients seen**

A total of 38 participants completed this question. A similar number of participants reported seeing fewer than 50 (15; 39.5%) and 51-100 (14; 36.8%) patients for echocardiography monthly. The result is illustrated in Figure 4.5.



**Figure 4.5: Number of echocardiography patients seen per month (N=39) (n=38)**

### **Discussion**

The question about the number of echocardiography patients seen monthly was asked with the aim of establishing a possible basis for a reference relating to an accreditation minimum, as per the requirement of the ASE and ESE (*cf.* 2.5.4).

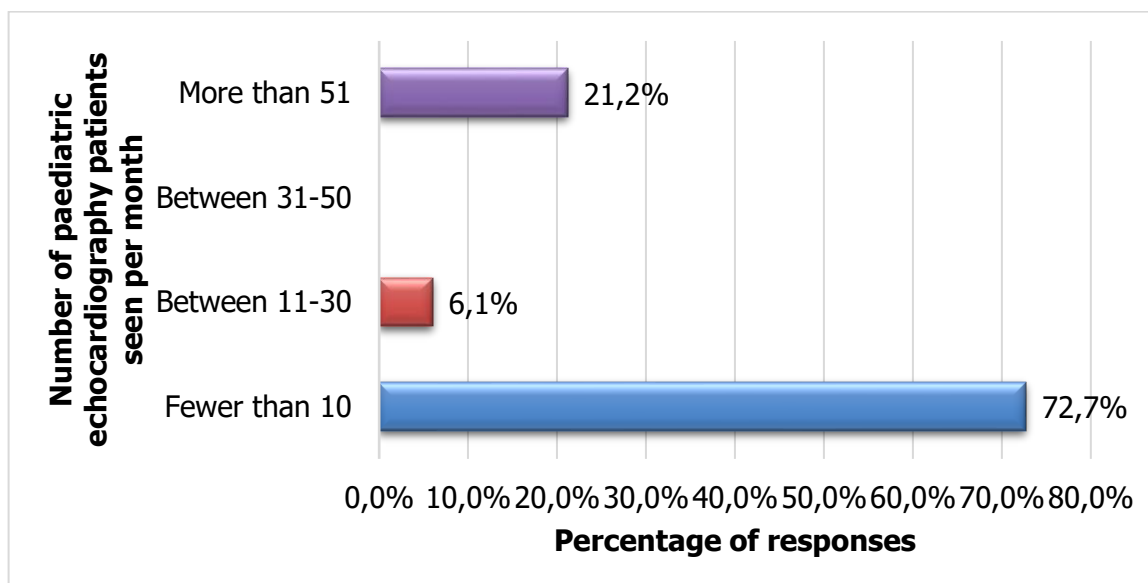
As described in Chapter 2 (*cf.* 2.5.4), the ESE (*cf.* 2.5.4.2) minimum requirement for echocardiography accreditation is that all practicing echocardiographers comply with a minimum set of standards. The minimum requirement for maintaining accreditation involves a combination of a specified time period, examinations to be performed and the case mix involved in the examinations performed. The ASE (*cf.* 2.5.4.1) requires a slightly different accreditation requirement, with both examinations performed and interpretation of examinations as independent determinants. Both requirements do, however, refer to the minimum set of hands-on echocardiography procedures needed to maintain a registration.

Results from the current study show that 39.5% of participants scan fewer than 50 patients per month, and 36.8% scan 51-100 patients per month.

### **4.3.9 Average number of paediatric echocardiography patients seen**

In Figure 4.6 the average number of paediatric echocardiography cases seen by the participants on a monthly basis can be seen. Only 33 participants completed this question.

The results show that the majority of participants see fewer than 10 paediatric cases for echocardiography in a month.



**Figure 4.6: Number of paediatric echocardiography patients seen per month (N=39) (n=33)**

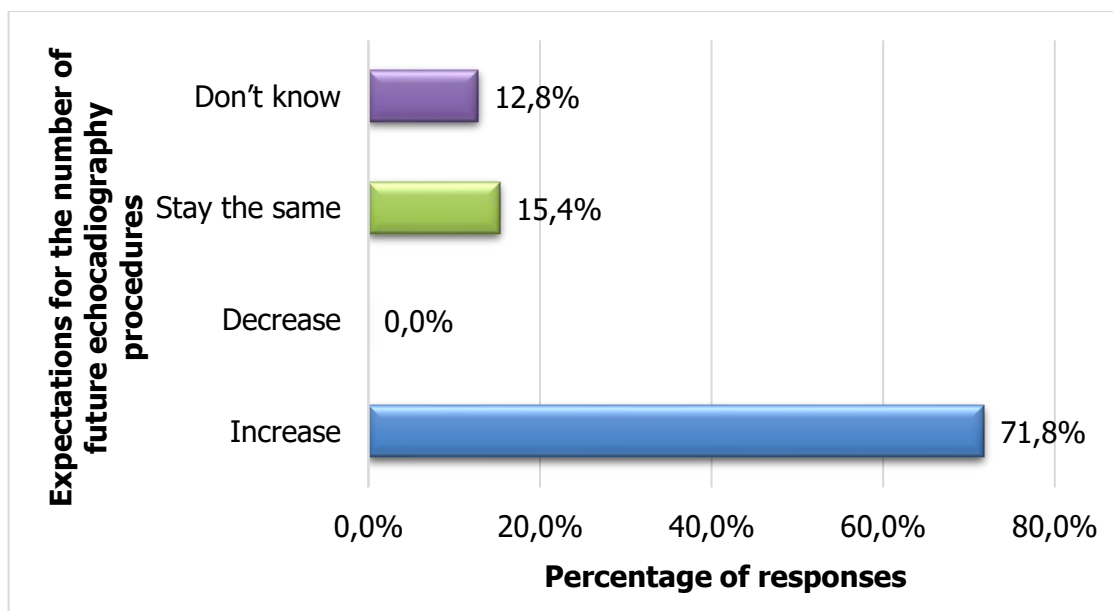
### **Discussion**

The seven (21.2%) participants who saw more than 51 paediatric patients for echocardiography procedures in a month mostly worked in urban areas, with one exception, who practices in a township. In addition, participants mostly practice in the public health system, once again with the exception of an academic colleague who has an own private practice. Not surprising was the finding that four of the seven participants were paediatric cardiologists.

Interestingly, the number of paediatric patients seen by this cohort was significantly fewer per month than the number of adult patients seen per month. This could be a shortcoming in the sample population, as the Congress might attract more echocardiographers who work with adult cases than who work with paediatric cases. Considering paediatric patient numbers, feedback on a comprehensive portfolio for CPD implementation can be established.

#### 4.3.10 Expectations of future echocardiography procedures

It was notable that 28 (71.8%) participants indicated that they expect to perform an increased number of echocardiography procedures in the next few years. No participants expected a decrease in the number of procedures. The results are presented in Figure 4.7.



**Figure 4.7: Expectations regarding future echocardiography procedures (N=39) (n=39)**

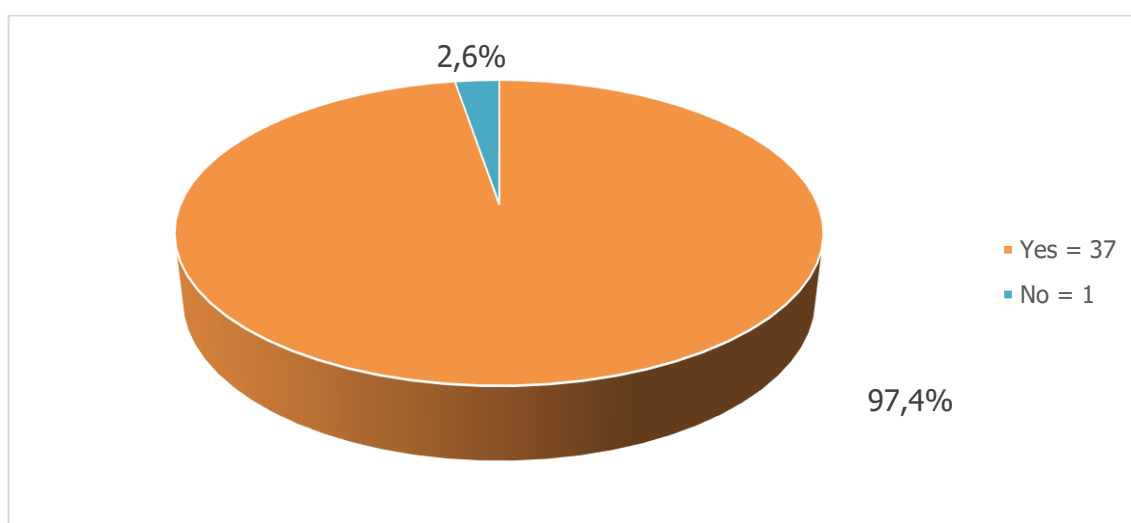
#### Discussion

According to the Heart and Stroke Foundation of South Africa (2007:online), projections are that cardiovascular deaths in South Africa will increase by 41% between 2000 and 2030. This implies there will be an increase in the number of cardiac diseases or conditions in the South African population. With a country-specific focus on preventive medicine all at-risk patients should be identified as early as possible and referred for echocardiography. It was thus due to a country focus on preventive care and early diagnosis that echocardiography practitioners expect an increase number of echocardiography procedures to be performed in the future.

This expected increase in the demand for echocardiography emphasises how important it is for CPD to uphold and develop capabilities of echocardiography practitioners further, so that they can meet the increased need among patients and the healthcare system.

#### 4.3.11 HPCSA registration

With reference to HPCSA registration, as expected, the majority (37; 94.9%) of participants are registered practitioners (*cf.* Figure 4.8). One participant did not complete this question and another selected the option no – this participant indicated that he/she worked in the academic and private solo-practice sectors, holds a Master’s degree (in the discipline cardiology), has practiced in the discipline for over 30 years, has been performing echocardiography procedures for 25 years, and is self-trained in the field of echocardiography.



**Figure 4.8: Participants with HPCSA registration (N=39) (n=38)**

The most common registrations were as medical practitioner, with 72%, followed by the seven participants who are registered as clinical technologists, at 18%. The result correlates well with that of a previous question (*cf.* 4.3.2).

Of the registered group, (n=38): one (2.6%) participant registered with the HPCSA in the 1970s; seven (18.4%) in the 1980s; 12 (31.6%) in the 1990s; and 16 (42.1%) since 2000. Two (5.3%) participants did not provide a data in this open-ended question.

### **Discussion**

Many healthcare fields in SA require practitioners to be registered with the HPCSA and required the practitioner to remain compliant with the HPCSA-stipulated CPD regulations (*cf.* 2.3). It was therefore extremely concerning that one participant is not only practicing echocardiography procedures, but works in a general health profession too, without being



registered with the HPCSA. Based on this participant's years of experience, it may be that this participant is soon to retire or is already retired and merely involved in education, in which case (if not practicing) probably no longer requires HPCSA registration. It was a positive note that this participant keeps up to date with information in the field of echocardiography by attending the New Horizons in Echocardiography Congress.

#### **4.4 SECTION B: PROFESSIONAL DEVELOPMENT**

This section deal with the details of participants' echocardiographic education and their participation in CPD and explores their interest in echocardiography-specific CPD.

##### **4.4.1 Echocardiography-specific training**

From previous results it is clear that almost all the participants practiced echocardiography procedures (*cf.* 4.3.6; *cf.* 4.3.8; *cf.* 4.3.9). It can be seen that 33 (84.6%) participants had received echocardiography-specific training. Those participants who had received training were asked, in an open-ended question, to indicate how long the training was. A total of 30 responses were provided. Training duration ranged from 2-5 days (2; 6.7%) to 5-18 months (4; 13.3%) and 1-4 years (2; 6.7%). An additional 13 participants (43.3%) gave a number without an indication of the unit of time [e.g. 1 (2); 2 (6); 3 (4); 15 (1)]. The remaining six (20.0%) indicated that their training is ongoing.

Of some concern were the six (15.4%) participants who had not received echocardiography-specific training. These six participants see, on average, 50 patients for echocardiography procedures in a month. Self-training, on-the-job training and private-practice training were the most common in this group. In addition, when required to self-report whether their knowledge and skills were up to date, this group believed their knowledge and skills ranged equally between somewhat up to date and not up to date (*cf.* 4.4.3). Of note, however, is that the participants in this group indicated a keen interest in echocardiography-specific CPD (*cf.* 4.4.8).

### **Discussion**

The fact that 84.6% of the participants had received echocardiography-specific training is a positive finding. On the other hand, 15.4% of the sample had not received any training,

yet reported practicing in the field. As echocardiography is an extremely operator-dependent technique, education and credentialing of practitioners are extremely important for the future of the field, to ensure competent practitioners and to enhance the standard of echocardiography (*cf.* 2.1; *cf.* 2.2).

Standardisation of echocardiography training in South Africa is based on education recommendations by societies such as the ASE's Sonography Training and Education Committee. Standardising training could contribute to establishing an echocardiography practitioner community that has the cognitive capacity and skills necessary to successfully "obtain and integrate accurate diagnostic information during the performance of the examination" (Ehler *et al.* 2001:77).

However, to encourage participation, it is important for training to be readily available and easily accessible. If training in South Africa is standardised there will also be a standardised time period for training, and the phenomenon of participants reporting a variety of training periods, as found by this study, will not be found. Of course, the most positive result in this section is the fact that all the participants who reported that they had not undergone echocardiography-specific training were interested in being trained and expressed interest in echocardiography-specific CPD activities.

#### **4.4.2 Formal qualifications in echocardiography**

Formal qualifications refer to any qualification with a dedicated echocardiography component. It was noteworthy that 24 (64.9%) participants do not hold formal qualifications in echocardiography. One of these participants indicated that he/she was busy with formal training to obtain a qualification in this field. Two (10.8%) participants did not respond to this question and the remaining 13 (35.1%) have the required qualification (which are all the respondents who reported having had echocardiography training).

With reference to where echocardiographic training had been received, nine options were provided, including the option of other. Of note was that participants selected more than one option – sometimes even three or four options. The option academic institution training was selected 25 times; international echocardiography training 10 times; on-the-job training 15 times; private-practice training five times; self-training six times; speciality courses 13 times; university five times and, lastly, university of technology once. The most prevalent

seems to be training by academic institutions, which can include any university and university of technology.

### **Discussion**

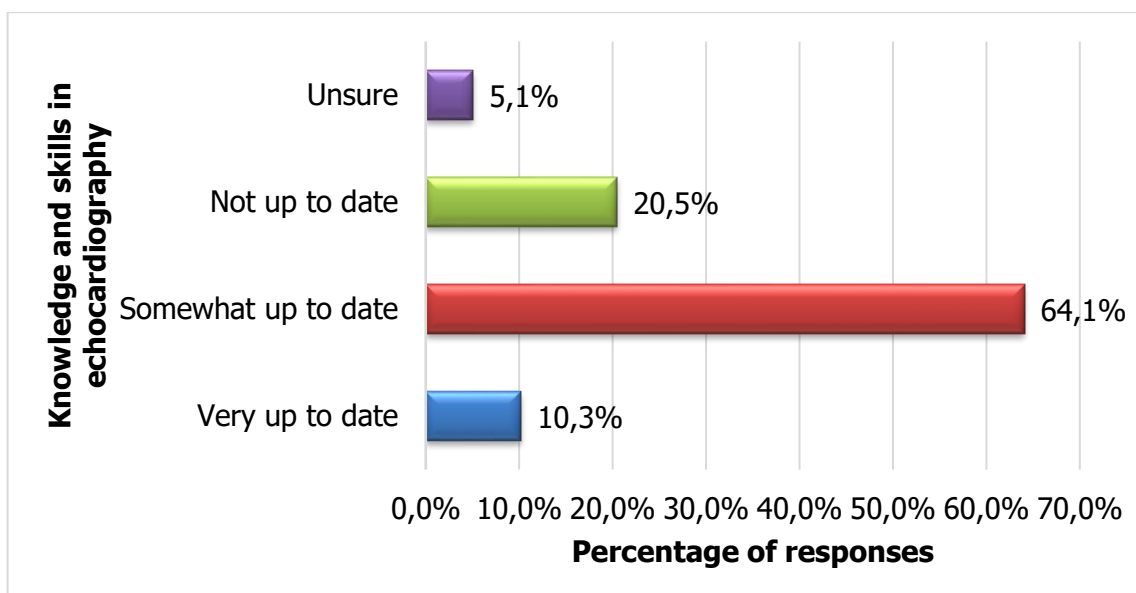
Considering the result of the previous question (*cf.* 4.4.1) about echocardiography training, it should have been expected that only a few participants would report having formal qualifications in echocardiography. This requirement for a formal qualification, of course, included all the clinical technologists, since these healthcare practitioners cannot practice without having a formal qualification and being registered with the HPCSA.

On-the-job training, private-practice training, self-training and speciality courses are extremely valuable modes of training and ways of gaining experience, especially if done under the supervision of a qualified and/or experienced echocardiography practitioner; however, these training opportunities do not necessarily lead to formal qualifications.

Compared to the international perspective relating to training, accreditation and continuous education in echocardiography, is important. Both in America and in Europe, there is clear guidance on accreditation (which commonly requires formal training and a qualification) and CPD in respective fields (*cf.* 2.5.4.1). Consideration should be given to standardising echocardiography education and regulations of practice in South Africa.

#### **4.4.3 Knowledge and skills**

Figure 4.9 illustrates the participants' self-reported opinions on whether their knowledge of and skills in echocardiography are up to date. The majority (25; 64.1%) reported being somewhat up to date – a positive finding. Only four (10.2%) believed they were very up to date, and two (5.1%) were unsure. Of concern were the eight (20.5%) participants who reported practicing echocardiography-specific procedures and seeing on average 50 patients per month (some have up to 151), who reported that their knowledge and skills were not up to date. They do, however, at least have a keen interest in having their knowledge and skills updated (*cf.* 4.4.1).



**Figure 4.9: Up to date knowledge of and skills for echocardiography (N=39) (n=39)**

### **Discussion**

Initially, echocardiographic imaging started with 2D scanning, and rapidly evolved to the present era, where 4D scanning technology is around the corner (*cf.* 2.5.1). With technology and knowledge in the field evolving so rapidly it is, thus, important for echocardiography practitioners to stay abreast with developments in the field.

It was encouraging that most of the participants reported that their knowledge of and skills for echocardiography are somewhat or very up to date. The results were not surprising, considering that the participants of this study were attending the New Horizons in Echocardiography Congress at the time of the study, an event they attended to update their knowledge and skills in the field.

#### **4.4.4 Continuous professional development marketing material**

CPD activities are marketed in various ways and anyone with a healthcare qualification can attend. A total of 44 responses were received to this question – some participants selected more than one option. Results show that the most common mode by which marketing material was received was email (17; 38.6%); followed by postal mail (5; 11.4%); in person (3; 6.8%) and by telephone (2.3%). An astonishing 14 (31.8%) participants indicated that they have never received any advertising material.

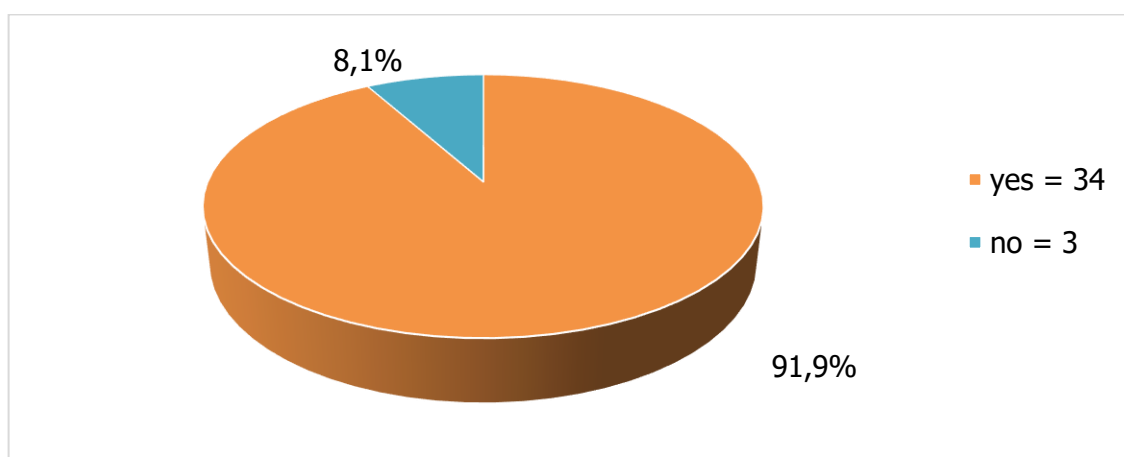
## **Discussion**

In order for CPD activities to be attended well, it is the responsibility of both accredited and non-accredited service providers to advertise the CPD activities they offer (HPCSA 2011:online). The results of this study suggest that there is a lack of communication, and that the marketing of CPD activities is probably not up to standard, because 31.8% of participants have never received marketing material related to CPD activities. This topic came up again in an open-ended question, which asked participants whether there are sufficient opportunities to be informed about echocardiography-specific CPD activities. Responses were, "Activities are not well advertised, if any" and "I am not aware of what opportunities there are" (*cf.* 4.4.7).

The results suggest that CPD service providers should spend time and resources on marketing CPD events more diligently. In addition, resources should be focussed on advertising modalities (e.g. email) that could reach the majority of the intended target population. If South Africa had an echocardiography governing body could use a dedicated website to advertise education and training opportunities available in the field.

### **4.4.5 General continued professional development activities**

The question asked "Do you participate in general CPD activities to obtain general or ethics CPD points?" This question was answered by 37 participants. Of these, 34 (91.9%) participants participated in general CPD activities to obtain both general and ethics CPD points. The remaining 3 (8.1%) responded no, indicating that they do not participate in general CPD activities. The results are illustrated in Figure 4.10.



**Figure 4.10: CPD activities participated in (N=39) (n=37)**

Table 4.2 shows that the study participants attended a variety of CPD activities over a period of one year.

**Table 4.2: Number of general and cardiology-specific CPD activities participated in annually (N=39)**

<b>Number of CPD activities</b>	<b>Number of responses for general CPD activities (n=32)</b>	<b>Number of responses for cardiology-specific CPD activities (n=35)</b>
0-5	21 (65.6%)	22 (62.9%)
6-10	5 (15.6%)	7 (20.0%)
11-20	3 (9.4%)	3 (8.6%)
21-40	1 (3.1%)	2 (5.7%)
50-100	2 (6.3%)	1 (2.9%)

## **Discussion**

Health professionals registered with the HPCSA are obliged to accumulate 60 CPD points over a period of two years. Of these points, 10 must be ethics points (*cf.* 2.3). Without HPCSA registration and compliance to specific requirements, no healthcare professional is allowed to practice.

In this section three participants selected the option no. One had already reported in a previous section that he/she is not registered with the HPCSA (*cf.* 4.3.11). Of the remaining two, one is a practicing medical doctor (specialist) and the other is a clinical technologist who is still in training.

Participants were asked how many general CPD activities and how many echocardiography CPD activities they attend, mainly to confirm whether there are sufficient CPD activities available for healthcare practitioners to attend so that they can accumulate sufficient CPD points in a year.

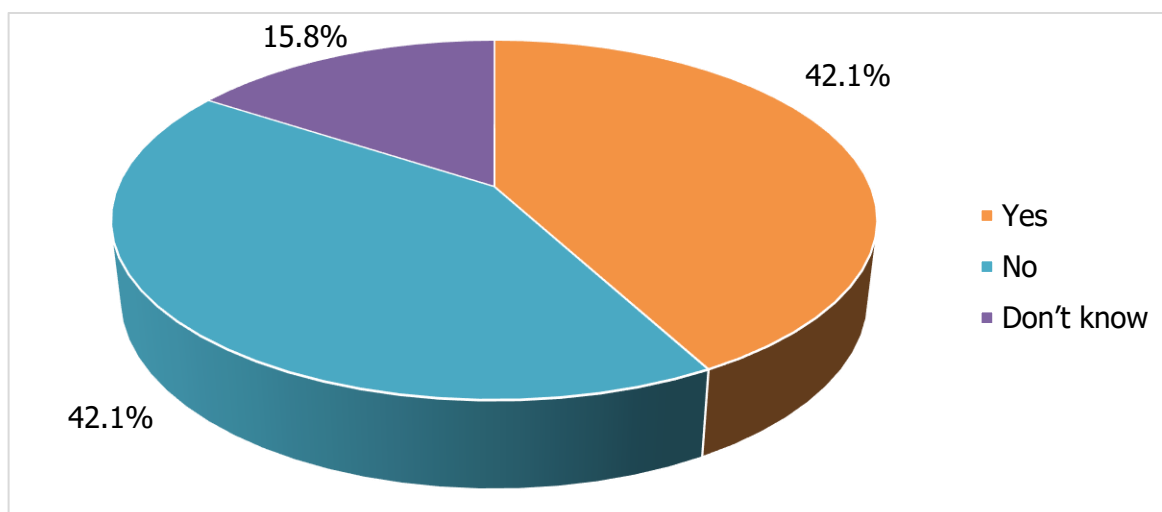
As previously explained, CPD activities are presented on different levels and, depending on a specific activity, a certain number of CPD points will be allocated. For example, a Level 1 CPD activity is worth one CEU per hour, to a maximum of eight CEUs per day. Level 1 activities are the most common activities attended. Assuming the average Level 1 CPD activity is two hours long and practitioners obtain two CEUs from the event, the participants

who reported attending up to five CPD activities per year may not necessarily have accumulated sufficient points for the year. However, it is likely that practitioners also attend conferences, participate in online CPD activities, and read journal articles that are CPD accredited, and by participating in a variety of types of activities they can accumulate enough points. Furthermore, education, training, research and publications (Level 2 CPD activities) offer more CPD points, and practitioners involved in further education or training or who are active in an academic sector can accumulate many points through involvement in these activities.

The results show that participants do attend CPD activities that are focused on cardiac-specific topics. Although there is no such thing as echocardiography-specific CPD points at present, the findings show that, should such a system be implemented in South Africa, there are already some opportunities for participants to obtain CPD points from activities that are specifically focused on echocardiography.

#### 4.4.6 Developments in echocardiography

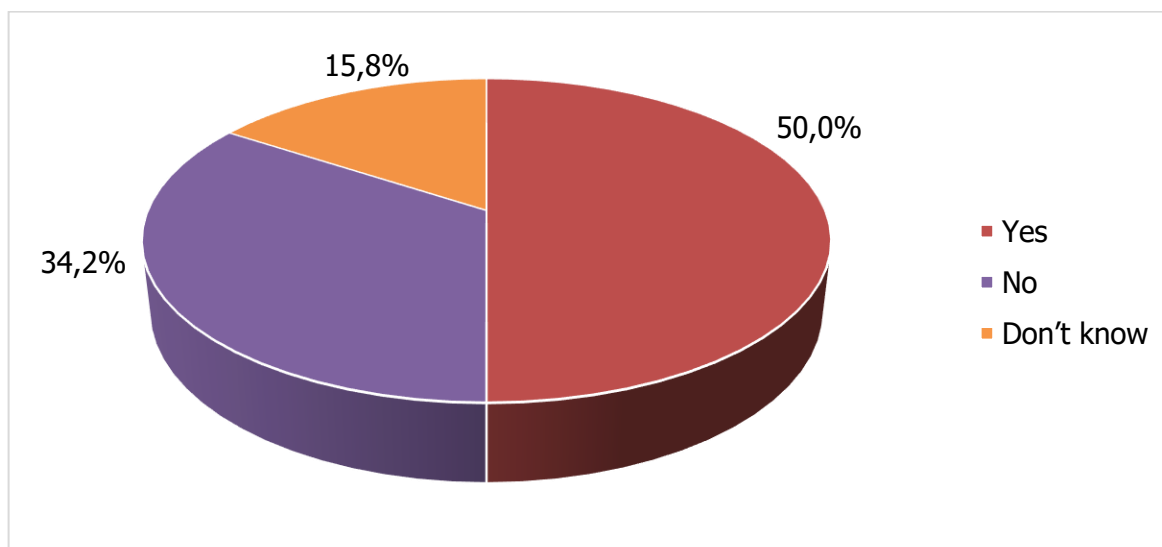
Figure 4.11 illustrates that an equal number of participants do (16; 42.1%) and do not (16; 42.1%) keep abreast of developments in the theoretical aspects of echocardiography. One participant did not respond to this question.



**Figure 4.11: Keeping abreast of developments in the theoretical aspects of echocardiography (N=39) (n=38)**

On the other side hand, 19 (50.0%) participants report keeping abreast of developments in the clinical practice of echocardiography, as opposed to 13 (34.2%) who do not keep

abreast (*cf.* Figure 4.12). Once again, one participant did not complete the question – this was not the same participant as the one who failed to answer the previous question.



**Figure 4.12: Keeping abreast of developments in the clinical practice of echocardiography (N=39) (n=38)**

### **Discussion**

Healthcare professionals who practice echocardiography should have a comprehensive knowledge of cardiac and thoracic embryology, anatomy, physiology, haemodynamics, pathophysiology, and ultrasonographic imaging (Ehler *et al.* 2001:77-78; Nicastro, Barletta, Conte, Fabiani, Morgantini, Lastrucci, & Di Bello 2013:8). As stated by Ehler *et al.* (2001:77), "This knowledge base is a prerequisite for the understanding of echocardiographic data and quantitation of derived parameters".

Many theoretical aspects of echocardiography do not change although our understanding thereof might change, e.g., the anatomy and physiology of the heart. With this in mind, echocardiographic practitioners may not necessarily need to be re-educated on these topics, though they could be reminded of some key theoretical components and any developments on the understanding of the subjects. This may explain why 42.1% of participants in the current study do not stay abreast of theoretical aspects of echocardiography. In a later section, only 18.2% of participants indicated an interest in theory refresher CPD activities (*cf.* 4.4.10.7).



On the other hand, evidence-based medicine and, as explained previously, medical knowledge, are developing rapidly (*cf.* 2.5.2; *cf.* 2.5.3; *cf.* 2.6) and new, updated information about pathophysiology and ultrasonographic imaging and best practices may become available. For this reason, there is a definite place for CPD activities that are focused on, a) refreshing academic knowledge; and b) updating academic knowledge in the field of echocardiography. It was therefore positive to see that 42.1% of participants do keep abreast of theoretical aspects of echocardiography.

It has been highlighted several times (*cf.* 2.5.2; *cf.* 2.5.3; *cf.* 2.6) that echocardiography is a technique that is extremely operator-dependent. Its diagnostic success relies not only on a well-rounded baseline knowledge of theoretical aspects, but also on various skills needed to perform scans correctly and collect the relevant data, which must be interpreted expertly and correctly and communicated with relevant individual(s) (Ehler *et al.* 2001:78). Practical experience in sonographic techniques and working with the equipment that is available is particularly important (*cf.* 2.6). Ehler *et al.* (2001:78) summarise this requirement well by stipulating that, "Continuous application of the principles of ultrasound physics and instrumentation during the examination is requisite to obtain optimal data. Accordingly, the cardiac sonographer must assume significant responsibility for the examination and therefore must exercise independent judgment, apply knowledge of clinical cardiology, and use problem-solving skills." It was therefore a positive finding that half the participants in the current study reported staying abreast of new developments in clinical practice in the field. This correlates with reports by participants that they are interested in CDP activities focussed on best practices, new equipment and new techniques (*cf.* 4.4.10.7). Thus, should more clinically focused and practical CPD-accredited training activities become available to echocardiography practitioners, it is probable that more practitioners will stay abreast of clinical practices.

#### **4.4.7 Being informed**

Participants were asked whether they believed that there are sufficient opportunities to be informed about the field of echocardiography, and an astounding 27 (69.2%) of participants indicated that there were not. Twelve (28.2%) indicated that there were enough opportunities.

Some of the responses provided in an open-ended section for giving reasons for responding that there were not enough opportunities, included the following:

**Non-availability of echocardiography-specific activities:**

- "Not enough seminars/workshops in modern echocardiography"
- "No echocardiography CPD activities available in my province"
- "Few echocardiography workshops/congresses available"
- "Unavailability of organised courses in paediatric echo"
- "Not all are echo specific only new horizons are echo specific at once a year"

**Course content:**

- "courses are usually basic, few advanced courses"
- "Changes occur on a frequent basis and do not have much opportunity to stay up to date"

**Cost involved:**

- "Price of echo courses"

**Available time:**

- "Time and opportunity challenges"

**Inadequate advertising:**

- "Activities are not well advertised: if any"
- "I am not always aware of what opportunities there are"

In this section three specific requests stood out, namely,

- "Would like to attend workshops more frequently or if we could ask for online help"
- "There is so much more I want to know and do correctly. I need a reliable source"
- "We would like more CPD activities specifically for sonographers to help us advance in the field of echo-sonography"

**Discussion**

The reasons echocardiographic practitioners gave for their opinion that there are not enough opportunities to keep informed in the field included few or no echocardiography-focused CPD events being presented, that the available events are not properly advertised, that they do not have time to attend CPD events, and the cost implications of events, which limit attendance. Lastly, participants indicated most events involve basic courses, and they wish to attend more advanced courses. These findings are not unexpected, because there is neither an echocardiography-specific CPD programme nor a regulatory body overseeing echocardiography specific CPD activities in South Africa at present (*cf.* 2.3). In addition, the findings support the practitioners' interest in doing more clinical practice, as reported in the previous section (*cf.* 4.4.6).

From the findings it can be suggested that practitioners are interested in having available more echocardiography-specific CPD activities. Consideration should also be given to costs, duration of the activity location and marketing of these sessions. Most of all, echocardiography-specific CPD activities need to address the learning requirements of the intended target population, and it should be more practically oriented.

One participant expressed a need for more resources available to use, and another suggested online help. The population of a study conducted by Shehab, Elnour, Al Sowaidi and Abdulle (2012:405) reported significant barriers to finding medical resources on the internet; they also struggled to use available medical search engines. With this in mind, and the explosion of knowledge available on the internet today, it is not advisable to expect practitioners to fend for themselves in obtaining relevant and correct information about echocardiography. A solution to this problem could be that a South African governing body similar to the ESE could provide a website with information relevant to South Africa, where up-to-date information and links to relevant resources could be shared. It could also serve as a place where echocardiography-specific CPD activities can be marketed.

#### **4.4.8 Specific echocardiography activities for continuous professional development**

The majority of participants (35; 89.7%) indicated that they are very interested in participating in echocardiography-specific CPD activities, and the remaining four (10.3%) are somewhat interested. No participant selected the option of not very interested or not interested at all.

When asked if current CPD activities meet the participants' educational needs, a total of 38 participants completed the question. More participants, 18 (47.4%), indicated no. Some of their reasons for this response include:

- "not on par with the rest of the world"
- "I feel that there isn't enough cpd activities, also for this one we received the invitation rather at short notice"
- "Most of it is based on cardiology and how cardiologist do echo's and is not specifically for sonographers"
- "Not enough hands on training in echocardiography"

Of the 38 participants who selected the option yes (16; 42.1%), who believe that current CPD activities meet their specific educational needs, some commented as follows:

- "Updated information is shared"
- "New horizons meeting annually"
- "Cape Town and WITS courses are appropriate"
- "always very informative and practical"
- "lectures on echocardiography and improving one's skills [are available]"
- "Annual teaching by South African Health Association, University of Stellenbosch"

## **Discussion**

It was extremely positive to find that 94.9% of participants agreed that they should stay abreast of the field by participating in more echocardiography-specific CPD activities, and that all participants indicated an interest in participating in echocardiography-specific CPD activities. This shows that there is a definite interest in echocardiography-specific CPD activities, and therefore CPD service providers should be encouraged to offer more CPD activities relating to this topic. This feedback, together with other findings presented in this section, address the first research question in this study and confirm that echocardiography-specific CPD is needed.

However, it is clear from this study that echocardiography practitioners want sessions that are more practical, hands-on and up to date (*cf.* 4.4.6). From the findings presented in Section 4.4.6 the clinical practice of echocardiography seems to be favoured, but practitioners do not want only basic courses, but more advanced courses too (*cf.* 4.4.6). It should be highlighted again that attention should also be paid to the specific target populations – this study identified that there is a specific need for echocardiography-specific CPD activities, particularly echocardiography for sonographers. Considering all these findings, recommendations for improvements to CPD offerings could be given to relevant CPD service providers for consideration when they develop and offer echocardiography-specific CPD activities.

Should a system be implemented in the future that requires all echocardiography practitioners (regardless of their disciplines) to collect echocardiography-specific CPD points, the echocardiography-specific CPD activities offered can serve as the setting. These points will have to be collected as per the CPD guidelines timeframe so that practitioners can prove that they are staying abreast of the field and will, ultimately, improve best

practices and patient care. This type of system is already in place in some countries and regulated by regulatory authorities (*cf.* 2.5.4), and much of what is done there can be considered for application in South Africa.

#### **4.4.9 Stumbling blocks facing continuous professional development activities**

Participants were asked to identify the stumbling blocks they experience when it comes to participating in CPD activities. Some participants selected two or more options. In Table 4.3 it can be seen that the most common stumbling block is a shortage in availability of echocardiography activities, followed by a heavy workload, which prevents participation.

**Table 4.3: CPD activity stumbling blocks (N=39) (n=52)**

<b>Stumbling blocks</b>	<b>Number of responses</b>
Shortage in availability of echocardiography activities	24 (46.2%)
Heavy workload precludes participation in CPD	13 (25.0%)
Shortage of money to participate in echo activities	13 (25.0%)
Activities not of high enough standard	2 (3.8%)
Do not see the need to participate in CPD	0 (0%)

### **Discussion**

The literature describes several barriers that healthcare practitioners experience to participating in CPD activities (*cf.* 2.2.5). This study found that, even though there are CPD activities that focus specifically on echocardiography (*cf.* 4.4.5), up to 46.2% of participants still believe that there are not enough echocardiography activities on offer. Another conclusion could be that the activities that are being presented are not always advertised well enough nor long enough before the presentation date (*cf.* 4.4.4).

The second most common barriers experienced by participants were a heavy workload that does not allow participants to take time off from work, and the high cost of participating in CPD events. If CPD activities are too expensive and extend over a long period of time it affects CPD attendance negatively. This was also reported in two Master's research studies conducted in the Free State province, where general practitioners and emergency medical

care practitioners gave these two reasons as factors influencing attendance of CPD activities (Botes 2013:75-79; Sookram 2016:37).

A possible solution to these barriers could be for CPD providers to be made aware of the obstacles that face practitioners. In developing an echocardiography-specific CPD programme consideration should be given to, a) the number of CPD points that must be accumulated; and b) the number of activities available in the programme, and then the activities should be offered in various provinces across South Africa to accommodate and reach as many echocardiography practitioners as possible. Presenting CPD activities in all the provinces will reduce travelling costs for practitioners. The cost of attending actual activities should not be excessive and, lastly, consideration should be given to the duration of the activities, in view of the fact that practitioners cannot be away from their practices for too long.

#### **4.4.10 Participation preferences for continuous professional development activities**

In this section the results from the 13 last questions in Section B are presented according to subheadings.

##### **4.4.10.1 *Preferred continuous professional development activities***

This question elicited 43 responses. Results show that most of the participants prefer to participate in formal activities that do not necessarily lead to formal qualifications (19; 44.2%); followed by formal activities that lead to formal qualifications (14; 32.6%); and informal activities that lead to CPD points (3; 6.9%). A total of seven (16.3%) participants selected all three the response options.

## **Discussion**

From the results relating to CPD participation preferences, the clear preference is formal activities, either leading to a formal qualification (32.6%) or not necessarily leading to a formal qualification (44.2%). This finding could indicate that an echocardiography-specific CPD programme should not involve only Level 1 CPD activities, but should also include Level 2 CPD activities. Examples could be accredited short courses or interactive skills workshops of which the outcomes are evaluated. It is advised that information is provided at all

echocardiography-specific CPD activities about where and how to obtain formal qualifications in the field.

#### **4.4.10.2 Preferred mediums for continuous professional development activities**

Table 4.4 shows the preferred mediums for CPD activities as indicated by the participants. A total of 128 responses were given, as some participants selected two or more response options. It is clear that the most preferred mode for CPD activities is workshops, and the least favourite mode is study groups.

**Table 4.4: Preferred mediums for CPD activities (N=39) (n=128)**

<b>Preferred mediums for CPD activities</b>	<b>Number of responses</b>
Workshops	30 (23.4%)
Congresses	19 (14.8%)
Seminars	16 (12.5%)
Formal qualifications (in person)	15 (11.7%)
Online activities	9 (7.0%)
Journals	5 (3.9%)
Formal qualifications (online)	4 (3.1%)
Study groups	3 (2.3%)

### **Discussion**

From the findings relating to the preferred mediums for CPD activities, it is interesting that 23.4% of the participants preferred workshops. This relates directly to feedback reported in Section 4.4.8, where a participant stated that there is, "Not enough hands on training in Echocardiography". Workshops are commonly more interactive in nature and designed in a way that incorporates groupwork activities. Groupwork activities encourage the development of problem-solving skills (Bryan, Kreuter & Brownson 2009:559) – a skill that is required of cardiac sonographers (Ehler *et al.* 2001:78). This type of activity offers the opportunity for practitioners to refresh theory, to learn actively while they are involved in sessions, and to learn from each other's experiences.

Conferences and seminars are also, to a certain extent, favoured by this group of participants. These events are ideal for updating knowledge and skills required in the field and for providing a platform to launch new information and equipment. Conferences also provide opportunities for research in the field to be presented. The ideal would be to include some pre- or post-conference workshops that offer opportunities for practitioners to use equipment, have case discussions, interpret scans and solve problems faced in the field under the guidance of more experienced and qualified experts.

A study completed by Sadler-Smith, Allinson and Hayes (2000:online) indicates that traditional and work-based methods of learning are favoured over self-directed learning methods. Even though work-based learning was not included in this section of the study many participants indicated that they trained in echocardiography by means of self-training, on-the-job training or private-practice training (*cf.* 4.4.1). If such training is standardised and accredited it will offer valuable opportunities for CPD through development of skills through practical experience.

#### **4.4.10.3 *Payment for continuous professional development activities***

Results show that 34 (87.2%) of participants are willing to pay for CPD activities, but only if the costs are reasonable. Only 5 (12.8%) indicated that they are not willing to pay.

### **Discussion**

As reported by the literature, most healthcare professionals expect their employers to fund CPD activities themselves (*cf.* 2.2.5.1), however, a study done in Kenya (*cf.* 2.2.5.1) correlates with the findings of this study, namely, that health professionals are of the opinion they are accountable for funding their own CPD activities and are, thus, willing to pay for such activities. It was therefore a positive finding to establish that the majority of participants in the current study are willing to pay for echocardiography-specific CPD activities, even though they admit that costs are a barrier to participating in CPD (*cf.* 4.4.10.3).

#### **4.4.10.4 *Time slots for continuous professional development activities***

Generally, there seems to be no specific preference (48.9%) for the time of year CPD activities can be attended. The percentages were calculated using a total of 47 responses,



as some participants selected more than one response. Similar responses were obtained for different months, e.g., January-March (8.5%); April-June (12.8%); July-September (12.8%) and October-December (10.6%).

Similarly, there were no specific preferences (35; 87.5%) in terms of in which week in a month CPD activities should be presented. This percentage was calculated using a total of 40 responses.

Finally, participants were asked to indicate which days of the week would suit them best to attend CPD activities. The percentages were calculated out of a total of 55. The most preferred days are Saturdays (17; 30.9%); Sundays (12; 21.8%); and Fridays (9; 16.4%), with 11 (20.0%) participants indicating no preference and the remainder selecting the other weekdays (6; 10.9%).

## **Discussion**

In terms of preferences for attending CPD activities, there is no specific preference for the time of the year, or the time of the month. The only preference was indicated regarding the days of the week – weekend days are favoured, probably because of the work schedules of practitioners. The barrier of time to attend these activities could be addressed by scheduling CPD activities on weekend days. The most important requirement, however, is to market the activities well enough and in advance, so that practitioners can plan their schedules ahead of time.

### ***4.4.10.5 Recommendations for echocardiography-specific continuous professional development***

An open-ended question asked participants to make recommendations for ways CPD programmes can be offered to address echocardiography specifically. Examples of some responses include the following:

- “theory validation; [invite] international speakers; [offer] practical sessions [even for] experienced sonographers”
- “[Host] workshops and mini-conferences with hands on sessions, more practical work as some of our challenges are to practice on our own what has been taught at these workshops”

- “The programmes should be offered to include basic, and updated skills for sonographers as well. Also sonographers should get involved more in ‘training’ and presenting [CPD accredited activities] cases”
- “Keep it simple, especially for sonographers. Help us to improve our ultrasound approach. It would be nice to have practical [experience] with hands on scanning”
- “[Host] local courses in areas such as Cape Town, Durban, and Johannesburg”
- “[The] New horizon [conference] must be held twice a year”
- “CPD programs can be offered using real machines that are used in our practices and also with humans as to be taught the skill on real life cases”
- “Online interactive sessions. Involvement of industry on visiting departments to introduce new equipment. Visiting experts to sites for practical training”
- “Hands on [training] in terms of correct placement of markers for measurements in 2D as well as Doppler. Also [focus on] now you have the information, what does it mean?”

### **Discussion**

The recommendations received from the practitioners clearly suggest that they require a more practical approach to training. Consideration could be given to approaching academic institutions that have skills and simulation units, and requesting them to put together practical and simulated training sessions that could be CPD accredited. An example of such a unit is the Clinical Simulation and Skills Unit at the University of the Free State. This Unit is not only known for its focus on undergraduate training, but also for its focus on CPD, for which the Unit presents sessions on various topics for all kinds of healthcare practitioners in the Free State province (UFS 2017:online). Participants also recommended that training is presented by experienced practitioners and that they sometimes also wish to learn from international experts.

Stumbling blocks reported here in relation to availability and accessibility correspond with previous findings (*cf.* 4.4.9). As discussed previously, for an echocardiography-specific CPD programme to be successful, the concerns of echocardiography practitioners should be considered carefully.

The last result from this section is about the need for trained sonographers to receive echocardiography-specific training too – the key is to offer training addressing their specific scope of practice.

#### **4.4.10.6 *Reasons and motivation for attending continuous professional development activities***

Reasons given for attending CPD activities are presented in Table 4.5. There were 116 responses to this question, since each participant selected several options.

**Table 4.5: Reasons for attending CPD activities (N=39) (n=116)**

<b>Reason</b>	<b>Number of responses</b>
Personal interest in the topic	35 (30.2%)
The content	28 (24.1%)
To obtain the required CPD points	19 (16.4%)
The presenter	11 (9.5%)
Place of the event	9 (7.8%)
The duration/length of the event	6 (5.2%)
Price of the event	6 (5.2%)
Time of the year	2 (1.7%)

In another open-ended question participants were asked what motivates them to take part in CPD activities. Some examples of their answers include the following:

- “[it is the] law [to do so]”
- “[for] professional progress and keeping abreast of developments in echocardiography”
- “[To] gain/improve knowledge and skills”
- “Keeping up to date”
- “[Attending CPD activities] helps with teaching my own students”
- “[Attending CPD activities provides the] opportunity to meet and ‘catch up’ with fellows and discuss common interest in echocardiography”
- “opportunities for research and further specialisation in imaging”
- “To improve my knowledge and protocol to be up to date correct and competitive”

### **Discussion**

Results show that the main forces encouraging participation in CPD activities include the practitioners’ interest in the specific topics presented, and the relevance of the content addressed. It can therefore be deduced that, if the content is correctly addressed and matches the individual’s interest, and if the recommendations identified in this study are

considered, it could lead to the successful implementation of an echocardiography-specific CPD programme that could contribute to the practitioner obtaining echocardiography-specific CPD points. Should a South African governing body that oversees all healthcare practitioners involved in echocardiography be established in the future, there will already be programmes in place for echocardiography practitioners to continue their learning in the field.

It was a positive finding that some participants are motivated to attend CPD activities, not only to update and/or increase their knowledge and skills, but also to be better equipped to train others in the field. Another motivation to attend CPD activities is the opportunity to meet with colleagues in the field. An established echocardiography-specific CPD programme will provide opportunities for practitioners to touch base with colleagues and to build networks of communities, encouraging lifelong, active and evidence-based learning.

#### **4.4.10.7 *Interest in types of continuous professional development activities***

The next table, Table 4.6, summarises responses about the type of CPD activities the participants would be interested in attending. Once again, the focus was mainly on echocardiography-specific CPD, and many participants selected more than two options.

With reference to the option of other, one participant suggested "hands-on practice" and another suggested "the topic of practical uses on patients".

**Table 4.6: Participation in different types of CPD activities (N=39)  
(n=121)**

<b>Type of CPD activity</b>	<b>Number of responses</b>
New techniques	33 (27.3%)
Best practices	22 (18.2%)
Theory refresher	22 (18.2%)
Ethics	14 (11.6%)
New equipment	12 (9.9%)
New theory development	12 (9.9%)
Legal	4 (3.3%)
Other	2 (1.7%)

## **Discussion**

Chapter 2 referred to the rapid technological developments in the field of echocardiography (*cf.* 2.6). Considering the technological developments that echocardiography as a profession is experiencing, the need and necessity to stay abreast of the latest developments in the profession is of utmost importance, thus, CPD in echocardiography specifically is of vital importance.

As an accurate diagnosis is very much dependent on the echocardiography practitioner's ability and expertise in scanning and on being able to "recognize abnormalities, form a preliminary set of differential diagnoses, and extend the scope of the examination to explore these possible pathologic conditions" (Ehler *et al.* 2001:78) it, thus, becomes very important for the practitioner to stay up to date with any new developments in the field. It was therefore a positive finding that the type of CPD activity that stimulates many participants in this study is addressing new techniques and best practices.

Theory refresher courses are also favoured, and this type of course is particularly important for medical doctors who do not perform echocardiography procedures on a daily basis. It is, however, advised that all CPD activities in an overall programme include elements offering the opportunity to refresh theory before new knowledge is offered and new skills are explored and practiced. Effective CPD programmes should be focussed on the required competencies of echocardiography practitioners and training should be tailored to address these and specific learning requirements of practitioners (*cf.* 2.2.4). The ideal is to identify the level of knowledge and skills with reference to a specific topic or competency before a CPD activity is offered, and then, after presentation, to evaluate whether the activity impacted learning (*cf.* 2.2.4).

### **4.4.10.8 *Final comments***

The final question was open ended and invited any additional comments that the participants might wish to make with regard to the topic at hand. Only five participants commented; the comments were as follows:

- "CPD points are good for individual professional development, the threat of the number [of] points not met by government [i.e. public hospitals] is the unacceptable move in/to our individual professions, considering that the government [public hospitals] does not pay for us to attend any workshops or conferences"

- “More workshops can be held in order to help echocardiography-sonographers to obtain more skills”
- “Basic hands on training for new graduates or those needing refresher course[s]. [In addition] Advanced hands on training for new development[s] and techniques [are] required”
- “Host more echocardiography programmes”
- “We are required to give information to specialist physicians, neurologists, oncologists etc. The field is broad and the more we can know and learn the better we can relay information”

## **Discussion**

The findings from these final general comments correlate with the results obtained throughout the other sections of this study, including that there should be a greater focus on removing the stumbling blocks experienced (*cf.* 2.2.5; *cf.* 4.3.4); that emphasis should be on opportunities to obtain more practical skills through hands-on types of sessions (*cf.* 4.4.10); that CPD activities should focus more on echocardiography topics of all types (*cf.* 2.6); and that CPD sessions offered should meet the needs of all types of echocardiography practitioners (*cf.* 2.6).

With reference to this last suggestion, instead of offering CPD activities specifically designed for cardiac sonographers, who are clinical technicians by training, and other sessions for medical doctors who perform echocardiography procedures, a echocardiography CPD programme should be developed in such a way that it focuses on inter-professional education. In this way members of all the disciplines can attend and learn from one another. This approach will address the last point raised, namely, “We are required to give information to specialist physicians, neurologists, oncologists etc. The field is broad and the more we can know and learn the better we can relay information”.

In conclusion, in the spirit of the true definition of CPD, education should not focus only on discipline knowledge and skills, but on all aspects of skill-building necessary to improve practices, e.g. problem-solving skills, interpersonal communication, and case management (*cf.* 2.2.1). Therefore, a echocardiography-specific CPD programme should identify and acknowledge competencies that all types of echocardiographers possess and wish to develop, and which they are required to have, before learning activities are developed.

## 4.5 SUMMARY OF THE MAIN FINDINGS

Addressing the aim of the study with regard to *what is needed to implement echocardiography-specific CPD* and *how it can be implemented*, the following findings were suggested throughout the study and at each of the correlating questions:

- Establish an **echocardiography practitioner community** and ensure consistent and continuous communication. Communicate early enough to enable proper planning and availability to attend (*cf.* 4.4.1).
- **Availability and accessibility:** Training should be readily available and easily accessible. Consider the time constraints related to the workload in the workplace and time availability. Cost, timeframe and location should be taken into consideration, together with the practitioners' increased workload and reduced timeframes. More resources and activities must be made available, thereby increasing the touchpoints and likelihood of attendance (*cf.* 4.4.1; *cf.* 4.4.7; *cf.* 4.4.9).
- Clear **guidance on accreditation** is needed. If there is a governing body, not only can clear guidance be given for accreditation, but the implementation and maintenance thereof can be monitored (*cf.* 4.4.2).
- **Standardisation of echocardiography practice** can be implemented and maintained by an accredited programme (*cf.* 4.4.2).
- Lack of **communication and marketing of activities:** Market well and early enough to ensure that the practitioner can plan to attend the meetings, especially considering the time limitations and resource constraints they face (*cf.* 4.4.4).
- **Practical and theoretical** knowledge: Pre and post-congress workshops are ideal for imparting knowledge about practical and theoretical aspects; combine the workshop's practical approach with the congress' theoretical approach (*cf.* 4.4.6; *cf.* 4.4.8; *cf.* 4.4.10.2).
- Offer not only basic courses, but also more **advanced courses**, thereby ensuring that the needs of practicing echocardiographers on all levels are addressed and all echocardiographers can stay abreast of the changes in their field, with relevance of topics as priority to ensure increased participation (*cf.* 4.4.7).
- **Implement** existing guidelines of similar bodies, e.g. ESE. As these guidelines have already proven their value, the implementation should be easier than starting from base to establish and build guidelines (*cf.* 4.4.7).
- **Weekend days** seem to be the most suitable for presenting CPD activities. Consideration should be given to timelines and constraints relating to workload and time

availability of practitioners, as courses offered on weekends will facilitate implementation (*cf.* 4.4.10.4).

- **Interest in specific topics and relevance of the content:** To ensure participation and successful implementation of lifelong learning, ensure that information is relevant to a specific community of echocardiographers (*cf.* 4.4.10.6).
- Touch base with colleagues and **build networks**. Offer regular touchpoints and interactive sessions, encourage practitioners to learn from one another and to share the vast experience present in the echocardiography community. Regular networking opportunities offer a solution for continuous improvement of skills (*cf.* 4.4.10.6).
- **Inter-professional education** across all disciplines and topics is vitally important. If practitioners understand the different aspects of other professions and where echocardiography fits in it could make a difference to providing optimal patient care (*cf.* 4.4.10).

## 4.6 CONCLUSION

In this chapter the responses of participants to the questionnaire were displayed in text, figures and tables, and the results were discussed in detailed. Attention was drawn back to the literature study in Chapter 2, and reference was made correlations and arguments that contribute to the discussion.

Chapter 5, ***CONCLUSION, RECOMMENDATIONS AND LIMITATIONS***, will present an overview of the study, the conclusion reached, recommendations and the limitations of the study.



## CHAPTER 5: CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

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### 5.1 INTRODUCTION

In Chapter 4, the results from the study were interpreted and discussed. Chapter 5 presents an overview of the study, the conclusions reached, recommendations and the limitations of the study.

### 5.2 OVERVIEW OF THE STUDY

Two research questions were considered in this study:

1. What is needed to implement echocardiography-specific continuous professional development; and
2. How can it be implemented?

In order to address these questions, three objectives were posed.

#### 5.2.1 Objectives of the study

**Objective 1:** To contextualise and conceptualise the current CPD activities available to echocardiography practitioners.

To address this objective, a literature study was conducted. The main findings of the literature study related to general CPD (*cf.* 2.2) and echocardiography-specific CPD (*cf.* 2.6). With regard to general CPD, the main findings of the literature study included the concept of CPD (*cf.* 2.2.1), the purpose of CPD (*cf.* 2.2.2), regulatory bodies and service providers (*cf.* 2.2.3), educational principles (*cf.* 2.2.4) and barriers to complying with CPD requirements (*cf.* 2.2.5). Specific reference was made to CPD in South Africa (*cf.* 2.3) and the findings went into more detail of CPD in South Africa. The findings also included information about the regulations of CPD (*cf.* 2.3.1), CPD activity levels (*cf.* 2.3.2), documenting CPD activities (*cf.* 2.3.3) and non-compliance to minimum requirements for CPD activities (*cf.* 2.3.4). The literature then referenced CPD from an international

perspective (*cf.* 2.4) with specific reference to who must participate (*cf.* 2.4.1), the programme cycle (*cf.* 2.4.2), non-adherence (*cf.* 2.4.3), non-compliance (*cf.* 2.4.4), the framework of CPD (*cf.* 2.4.5), documenting your CPD activities (*cf.* 2.4.6) and e-Portfolio (*cf.* 2.4.7).

The literature then investigated echocardiography (*cf.* 2.5) with reference to the history (*cf.* 2.5.1), the examination (*cf.* 2.5.2), and scope of practice (*cf.* 2.5.3); then both an international (*cf.* 2.5.4) and local (*cf.* 2.5.5) perspective on echocardiography formal education, training and accreditation were explored. The international perspective touched on American guidelines (*cf.* 2.5.4.1) and European guidelines (*cf.* 2.5.4.2), and compared the key differences between two sets of requirements for echocardiography (*cf.* 2.5.4.3). Lastly, the literature study considered echocardiography-specific CPD (*cf.* 2.6), with specific reference to the international (*cf.* 2.6.1) and local (*cf.* 2.6.2) perspective.

**Objective 2:** To determine what is needed to implement echocardiographic-specific CPD and **Objective 3:** To determine how echocardiography-specific CPD could be implemented.

A questionnaire was used to address the stated objectives. The main results are repeated within a short discussion to illustrate what is needed to implement an echocardiography specific CPD in addition to how such a concept should be implemented:

Before one can determine what is needed to establish an echocardiography CPD, consideration should be given to whether or not it is needed by health professionals practicing in the field of echocardiography. The literature study showed that there are clear benefits to CPD but more so it is a mandatory concept within the health professions field across the world. The question raised in the current study is whether discipline or field specific CPD is needed and the answer is yes as this will contribute to best practice and improved patient care in the field.

In South Africa echocardiography is practiced by various health professionals. The result in this study confirmed this phenomenon: There is a vast difference between one practicing echocardiographer and the next, including educational background (*cf.* 4.3.2), highest qualification (*cf.* 4.3.2) and experience in the field (*cf.* 4.3.6). But what is more concerning which support the notion that a regulatory body overseeing all health professionals practicing in echocardiography should be instituted in South Africa is that 64.9% of

echocardiography-practicing individuals do not hold formal qualifications in echocardiography (*cf.* 4.4.2). It can be seen that 33 (84.6%) participants had received echocardiography-specific training and six individuals indicated that they had only undergone self-training related to echocardiography specifically (*cf.* 4.4.2). There are excellent training platforms available in South Africa (*cf.* 2.2.4; 2.5.5) thus one would assume that the health professionals who had undergone formal training had adequate knowledge and skills to be practising, but as alluded to previously with new equipment, technologies and information in the field it will be of the utmost importance to stay up to date and this could be done through participating in echocardiography specific CPD.

Of concern was the 15.4% of the practicing echocardiography individuals who reported that they did not receive echocardiography-specific training, but who see an average of 50 patients for this procedure per month (*cf.* 4.4.1). One individual not only practices echocardiography, but works in a general profession as well, but was not registered with the HPCSA at all (*cf.* 4.3.11). This result illustrates the fact that a regulatory body like the ESE should be established in South Africa. Being governed by such an entity will allow for quality control to ensure that all practicing professionals received the required training, are adequately qualified, function as per set requirements and standards and keep up to date through continued learning. This regulatory authority should probably work closely with the HPCSA, taking into consideration their specific requirements to health professionals.

To develop and implement an effective discipline specific CPD programme with a combination of CPD activities should be established in South Africa. To do so one could draw from evidence, therefore the researcher proposes the use of the four-step process of Davis *et al.* (2013:32-35) (*cf.* 2.2.4):

#### Step 1: Know the audience;

In this study 20.5% of participants self-reported that their knowledge and skills in the field of echocardiography were not up to date (*cf.* 4.4.3). The majority of participants would like to stay up to date concerning echocardiography (*cf.* 4.4.7), with the same majority also agreeing that they should stay abreast (*cf.* 4.4.8), again with the focus on echocardiography CPD. From the results it can be postulated that the health professionals that participated in this study are indeed interested in keeping up to date with the field.

Furthermore, the echocardiographic practitioner in South Africa have various educational backgrounds and may or may not have a formal qualification in performing echocardiography. Therefore, CPD activities should be developed in such a manner that it address the learning needs of both the echocardiographic practitioner new to the field and the more advanced practitioners. This need was established considering the number of qualified and trained health professionals in the field, it was also recommended by some of the study participants' (*cf.* 4.4.10.5). Important to note however is that the practising echocardiographers in this study regardless of qualifications and formal training have experience in the field and thus CPD activities should not be formulated as an initial and basic training session in the field. Consideration should be given to what is already known and what is the specific skill level of the health professional practising in the field. This can only be established by conducting a formal needs analysis with a large number of practising echocardiography practitioners. This did not fall into the scope of the current study and further research should be conducted to ensure the successful development and thereafter implementation of echocardiography specific CPD in South Africa.

#### Step 2: Know the topic:

An echocardiography-specific CPD programme should address all practice competencies that practitioners are supposed to have (*cf.* 2.5). In evaluating the South African echocardiographer in this study against European echocardiography guidelines, 36.8% of practitioners in South Africa comply with the minimum requirements set for the practical aspects, but only 8.6% of practitioners comply with the minimum requirements set for theoretical aspects (*cf.* 4.4.5). In view of this consideration should be given to include enough theoretical knowledge into CPD activities to refresh the health care professionals' knowledge.

To encourage participation the topics presented should also address the specific learning needs of the echocardiography practitioners. This study show that personal interest in the CPD topic presented and the type of content in the CPD activity motivate attendance (*cf.* 4.4.10.6).

The order of importance of potential CPD topics that are specific to the field of echocardiography and to be included in an echocardiography –specific CPD programme include: New techniques, best practices, theory refresher, ethics, new equipment, new theory development and legal aspects (*cf.* 4.4.10.7). When launching this type of a

programme the topics considered of higher importance should perhaps be included earlier in the programme to secure interest.

#### Step 3: Know the format;

It seems that formal activities (although offering CEU) that do not necessarily lead to formal qualifications are favoured by this group of participants (*cf.* 4.4.10.7) and the type of activities that should be included in the CPD programme should be workshops, seminars, online activities and journal clubs (*cf.* 4.4.10.2). The way CPD courses are presented could be expanded to include more practical, hands-on training (*cf.* 4.4.10), including workshops and even simulations.

Congresses were also favoured by many of the participants as this provide a platform to not only opportunity to network but to learn what is new in the field and what research is currently underway. Furthermore it provide a space for collaboration.

There was no preference in terms of time of the year or time of the month for CPD activities, with the only preference shown for time of the week, namely, Saturday (*cf.* 4.4.10).

#### Step 4: Know the outcome;

In an existing CPD activity or programme this step entails evaluation of the activity or service provided. What should be taken from this is that in order to ensure the effectiveness of a CPD platform the evaluation should already be planned out before implementing a CPD initiative. The literature provide various models and tools which can be used to evaluate a CPD activity (*cf.* 2.2.4.4). Improvements to the service offered should be made after each evaluation.

It is in the opinion of the researcher that positive outcome of successful echocardiography specific CPD could be predicted if possible barriers which have a direct influence on the uptake of CPD activities are taken into consideration and is planned for while developing a working plan, even before echocardiography CPD is implemented.

One definite barrier is communication and reaching the intended target population to advertise CPD services. In this study participants indicated that the biggest barrier to CPD participation is not only the limited availability of activities in their area, but more so the fact that they are not aware of all possible CPD activities (*cf.* 4.4.9). A total of 31.8% of

participants indicated that they have not received any marketing material or information regarding CPD activities (*cf.* 4.4.4); and 69.2% of participants indicated that they are not sufficiently informed of available CPD activities (*cf.* 4.4.7). In implementing echocardiography CPD this barrier could be overcome if a specific South African echocardiography regulatory body in the form of an association or society is developed and ensure that all health practitioners who practice in the field should belong to this body. With this single platform the information of all members will be available and echocardiography CPD services could then easily be shared.

Another common barrier affecting CPD attendance is the financial implication (*cf.* 2.2.5.1). A reassuring finding in this study was that most participants are willing to pay for CPD activities (*cf.* 4.4.10). However this being said the cost of CPD services should be reasonable considering both the service provider/s and the users. Before an echocardiography-specific CPD service can be initiated clarity should be obtained about who will be responsible to drive and finance such a service.

It had already been indicated that the geographical distribution of professionals should be considered (*cf.* 4.3.4). Therefore echocardiograph-specific CPD activities should perhaps not only be presented in a single location but across multiple sites in all provinces in South Africa. A blended-learning approach could also be considered to reach more health practitioners practising in the field of echocardiography. This will entail having available online CPD sessions and a platform where relevant and new resources is shared. As discussed in the previous chapter the researcher proposed that if a South African governing body similar to the ESE is established they could have a website which offers the opportunity for a single platform where echocardiography practitioners can obtain information from (*cf.* 4.4.7)

In conclusion, to address the research questions of what is needed to implement echocardiography CPD and how this should be implemented more research should be done in the field and various systems should be developed and set in place. It is in the researcher's opinion that the following should be focused on first:

- A South African echocardiography society or association should be established;

- CPD guidelines should be implemented for echocardiography, specifically in South Africa, not only for generalised CPD as per the current HPCSA guidelines (*cf.* 4.3.2). The current, established ESE guidelines can serve as a guide for South Africa.
- More research should be conducted in the field so that evidence is available at the time when an echocardiography-specific CPD service is developed and implemented. This service should also be regulated by the South African echocardiography society or association.

### **5.3 RECOMMENDATIONS FOR FURTHER RESEARCH**

Recommendations for further research include:

- The training and practice paradigm for echocardiography practitioners in South Africa should be changed to include clear training and qualification guidelines for all echocardiography practitioners, including CPD guidelines specifically for echocardiography to raise the quality standards of care provided to patients (*cf.* 4.3.6).
- Research should be conducted in all the fields involving echocardiography. Formal training and CPD activities in these fields should be expanded, and the knowledge of echocardiography practitioners in these related fields must be expanded with the aim of relaying relevant information to these specialists more efficiently and with greater relevance (*cf.* 4.4.10)
- The findings of the study should be made accessible to the HPCSA, which is the South African regulatory body for healthcare professionals. The HPCSA should evaluate which of the needs as highlighted by echocardiography practitioners are viable to address.
- The findings of the study should be made publicly available by means of a presentation at a national conference for echocardiography, or published in a journal relevant to echocardiography, in order to encourage and address awareness and further research in this field.

## **5.4 CONCLUSION**

Therefore, from observing the summarised main findings, it can be concluded that CPD guidelines specific to echocardiography, an increase in availability of CPD activities, as well as improved communication and marketing (frequency and efficiency) are needed to implement echocardiography-specific CPD in South Africa.

## **5.5 LIMITATIONS OF THE STUDY**

The researcher recognises the following limitations of the study:

- The principal field of study was CPD, but it also touched on training and education in echocardiography (*cf.* 4.3.2). Some of the topics were only touched on, and can be extended and clarified by follow-up research or when the findings are written up for publication.
- It was found that there are limited resources for CPD in echocardiography specifically. Where applicable, literature on general CPD in other health professions was used as reference.
- Although an adequate response rate was obtained from participants, the general population of echocardiographers in South Africa is vastly bigger than the target population (*cf.* 4.2) and more responses could be obtained with a bigger target population that includes all practicing echocardiographers in South Africa. Results cannot be generalised, as the sample population was relatively small.
- The congress is generally well represented by delegates from across South Africa. The delegates were not requested to indicate the province they reside from. It is however postulated that the majority of delegates would have been from Gauteng, the province in which this year's congress was hosted. The researcher thus acknowledge this as a limitation of the study since the exact representation across South Africa is not known.



- The scope of the study did not include a detailed CPD training needs analysis in the field of echocardiography. This should be done in future research where a larger sample population is used and the sample is represented by participants from every province in South Africa. Only then the findings from the current study and additional studies can be used to establish echocardiography-specific CPD in South Africa.
- The questionnaire developed and used in the current study collected sufficient data to address only some aspects as to what is needed to implement echocardiography-specific CPD and how it should be done. More specific questions could have been added to obtain more comprehensive data. In view of this follow-up research is highly suggested.
- Although it was valuable to make use of Evasys for data analysis, in the absence of full support using it involves many challenges. Limitations included time constraints for data capturing, as no Evasys scanners were in working order at the University at time of completing this section of the study, and thus an Evasys report was not available.

## **5.6 CONCLUDING REMARKS**

With the rapid development and enhancement of echocardiography, the need for echocardiography-specific CPD has been established. To ensure that CPD is effectively and efficiently implemented the main objectives will be to establish guidelines for echocardiography-specific CPD, ensure availability of these activities, and to ensure activities are marketed successfully. There seems to be a need to establish a echocardiography association or professional board similar to the professional boards abroad, which can then regulate echocardiography services rendered in South Africa.

Addressing the need for CPD in echocardiography specifically will contribute positively to not only the workplace, but to the patients and the healthcare system too. This study serves as a directive for further research in the field to implement CPD for echocardiography specifically, to contribute to lifelong learning, and to uphold and develop the capabilities and standards of echocardiography practitioners.

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## APPENDICES

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APPENDIX A1	Approval Health Sciences Research Ethics Committee (HSREC) of the Faculty of Health Sciences at the University of the Free State
APPENDIX A2	Approval Evaluation Committee
APPENDIX A3	Approval Congress Chair
APPENDIX B1	Information sheet- participants
APPENDIX B2	Questionnaire

**APPENDIX A1      Approval Health Sciences Research Ethics Committee  
(HSREC) of the Faculty of Health Sciences at the  
University of the Free State**