PREPARING PARAMEDIC GRADUATES FOR INDEPENDENT PRACTICE:

An assessment of the effectiveness of a Paramedicine degree from a university in KwaZulu-Natal

A dissertation submitted in fulfilment of the requirements for the degree of Master of Health Sciences in Emergency Medical Care in the Faculty of Health Sciences at the Durban University of Technology

Shaylee Mariano (née Bauer)

(Student no. 21349962)

Supervisor: Dr Kevin Govender
Co-supervisor: Mr Sageshin Naguran

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Abstract

Introduction

There have been major advances in prehospital emergency care policy, training and practice in South Africa (SA). One of the most notable changes is the transition of paramedic education from vocational technical training to university-based education. This change ultimately led to the development of the bachelor's degree in Emergency Medical Care (BHSc: EMC) which is a four-year professional degree offered at only four accredited higher education institutions (HEIs) in SA. Since its inception, the degree itself has undergone many changes; however, despite these changes, its effectiveness in achieving its intended and espoused goal has never been investigated. Emerging from this knowledge gap is the purpose of this study – to investigate the effectiveness of the BHSc: EMC degree, specifically at an HEI in KwaZulu-Natal, SA, in preparing students for independent practice.

Methodology

The study commenced with a critical appraisal of a collection of documents that comprehensively described the version of the BHSc: EMC curriculum delivered during the years 2016 to 2018. The aim of this review was to specifically address objective 1 of the study, which was to examine the content, the instructional design and the minimum competencies that graduates needed to show on successful completion of the degree. This review was then followed by a sequential mixed method exploratory design, which was conducted in two distinct phases, and included the total population of all 45 individuals who identified as 2016–2018 graduates. Phase 1 consisted of interviews designed to specifically elicit the emic views of a purposefully targeted and information-rich sub-group of individuals (n = 18) also from within the total population. The goal of this phase was to use the elicited information to develop a contextually valid, relevant and bespoke questionnaire that was to be used in phase 2, where quantifiable participant responses from the entire population (n = 45) were then collected. Data from phase 1 was qualitatively and thematically analysed and phase 2 data was descriptively and inferentially analysed. Significant results at $p < 0.05$ are reported.

Results

The critical appraisal of the curriculum revealed that there was an obvious lack in an espoused consensus on the minimum standards for the degree. There was also notable

misalignment between content and modules across subsequent and articulating years of the degree. A closer examination of learning outcomes revealed that they very rarely aligned with principles that ensured consistent clear and specific direction for what students could expect to learn at the end of the respective modules. The survey used to address objectives 2 and 3 achieved a 63% response rate. In relation to graduates' work readiness, described as students being equipped with the foundational entry-level skills and resources needed to be minimally qualified for a specific occupation as specified by a job description or occupational profile employability, graduates revealed that their paediatric and neonatal assessment and management skills, and their rescue abilities, were not at the level that rendered them adequately prepared for even entry-level jobs. With regard to graduates' employability, which while closely related to work readiness is defined as having the necessary skills and abilities that render candidates eligible for employment, graduates felt that while they met minimum job requirements, they lacked practical experience as well as confidence. They also alluded to the suggestion that certain aspects of the degree are not aligned with industry needs.

Conclusion

There is no doubt that the development of and compliance with minimum competency standards which are a result of national consensus will be the cornerstone for a more effective and efficient paramedicine degree. How those minimum standards are achieved and how and when content is delivered to achieve those minimal standards should also be a result of national consensus. In the absence of these standards, there exists the possibility that learning outcomes, content, learning and teaching strategies, assessments, alignment, educational philosophy and standardisation of the BHSc: EMC, which are core constructs for effective teaching and learning in SA paramedics, will continue to receive criticism as highlighted in this study.

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And finally, to my precious daughter, Mia Mariano, I dedicate this thesis to you. You are such a blessing, little one. On days when I was sure I was ready to give up, struggling to juggle completing my thesis and the demands of motherhood, your loving stare and joyous smile kept me going. I love you dearly sweet girl.

TABLE OF CONTENTS

List of Tables

List of Figures

Glossary of Terms

Advanced Cardiac Life Support course (ACLS): This two-day advanced resuscitation course is guided by the American Heart Association. Entry to the course requires a basic life support for healthcare provider's certificate. The main theme of the course is the recognition and intervention of cardiopulmonary arrest or other cardiovascular emergencies.

Advanced Life Support (ALS) paramedic: A paramedic who performs invasive and complex clinical procedures such as thrombolysis, advanced airway management, mechanical ventilation and advanced cardiac life support.

Advanced medical rescue (AMR): This refers to more complex Medical Rescue modules which require above average Medical Rescue knowledge. Examples include aquatic rescue and confined space rescue.

Bachelor of Health Sciences in Emergency Medical Care (BHSc: EMC): A four-year university-based paramedicine degree achievable from a higher education institution in South Africa.

Basic Ambulance Assistant (BAA) course: A six-week training course which included basic EMC skills and principles and allowed for registration with the HPCSA as a Basic Ambulance Assistant (BAA). This course has been phased out and is no longer available in South Africa.

Basic Life Support (BLS): Emergency care personnel who are trained to deal with basic medical emergencies such as uncomplicated dislocations and fractures where no intravenous therapy or drug administration is required. These personnel are also sometimes called Basic Ambulance Assistants (BAAs).

Basic Life Support for Healthcare Providers course (BLS HCP): This one-day course is guided by the American Heart Association and serves as a refresher on all the latest global basic life support resuscitation protocols.

Basic medical rescue (BMR): This refers to basic Medical Rescue modules which require basic Medical Rescue knowledge. Examples include Fire Search and Rescue and Vehicle Extrication.

Clinical practice: The scheduled clinical shift placements of undergraduate paramedic students to achieve on the job experience. This creates an opportunity for students to apply their theoretical knowledge in real-life scenarios on real-life patients.

Continuing professional development (CPD): Short programmes for medical professionals which are designed to assist in the maintenance and development of academic knowledge and skills. The purpose of these programmes is to keep medical professionals current on the latest developments and upgrades in their specific area of expertise, thereby enabling these professionals to remain effective and compliant with national and international standards.

Coronary Care Unit (CCU): A specialised unit within the hospital which exclusively cares for patients with coronary issues.

Emergency Care Practitioner (ECP): The highest level of ALS paramedic in South Africa.

Emergency Department (ED): This in-hospital department deals with the emergency management of patients with acute illness or injury. Patients are often brought to this department without prior notice and arrive with either an ambulance or personal transport. Other names for this department include casualty, accident and emergency department or the emergency room.

Emergency Medical Services (EMS): A network of services which provide emergency medical and rescue assistance. These services are staffed with personnel who are medically, and rescue trained and coordinate the treatment and transport of patients from primary response to definitive care.

Intensive care unit (ICU): A specialised unit within the hospital which exclusively cares for patients who are critically ill or injured and require advanced medical interventions such as mechanical ventilation.

Interfacility transfer (IFT): Transfer of critically ill or injured patients by ambulance between healthcare facilities.

Intermediate Life Support (ILS): Emergency care personnel who are trained up to the level of intermediate life support. Examples of training inclusions include intravenous

therapy, defibrillation and 50% dextrose administration. These personnel are also sometimes called Accident and Emergency Assistants (AEAs).

International Trauma Life Support (ITLS): This is a two-day course aimed at equipping participants with the latest trauma assessment techniques and performing of life-saving interventions.

National Qualifications Framework (NQF): A system used in SA to record the credits assigned to each level of learning achievement in a formal way to ensure the recognition of learnt skills and knowledge throughout the country.

Neonatal intensive care unit (NICU): A specialised unit within the hospital which exclusively cares for premature or critically ill neonatal patients.

Objective Structured Clinical Examinations (OSCEs): A type of examination used in health sciences to test the performance and competency of various clinical skills.

Physical preparedness: A physical fitness component of the BHSc: EMC that assesses and ensures maintenance of a certain level of physical fitness in students throughout the degree.

Rapid sequence intubation (RSI): An airway management technique which involves using pharmacology (an induction and neuromuscular blocker) to perform endotracheal intubation.

Response vehicle: A smaller EMS vehicle which is manned with an ALS paramedic with the purpose of reaching the patient as soon as possible. They are able to travel through traffic faster than an ambulance but are unable to transport patients.

Simulations: A simulated scenario which allows a student to perform a practical demonstration of the clinical assessment and management of various emergencies on a manikin.

South African Qualifications Authority (SAQA): The overseeing body of the National Qualifications Framework (NQF) which implements the NQF and ensures the achievement of its objectives.

The Health Professions Council of South Africa (HPCSA): A statutory body which regulates the various health professions within South Africa. Its purpose is to regulate the education, training and registration for practising the health professions registered under the Health Professions Act.

The Professional Board for Emergency Care (PBEC): A statutory board which falls under the HPCSA and regulates the education, training and registration for practising emergency medical care professions in South Africa.

CHAPTER ONE

1.1 Introduction

In the last four decades, there have been major changes in the South African Emergency Medical Services (EMS). These changes have not only been limited to and concerned with legislated EMS policies and clinical practice, but also with education and training. One of the most notable changes is reflected in the transition from vocational technical training to university-based education (Sobuwa and Christopher 2019). The bachelor's degree in Emergency Medical Care (BHSc: EMC) is an example of a professional university-based degree qualification. Offered at four accredited higher education institutions (HEIs) in South Africa (SA), on completion this degree entitles graduates to register with the statutory regulatory council for the profession as Emergency Care Practitioners (ECPs) – the highest recognised level of paramedic practice in the country (South African Qualifications Authority2021b).

The BHSc: EMC degree, in its current version, is a product of many years of iterative revisions and improvements in paramedic training in SA. Commencing with short skill-based courses as early as 1980, EMS training in SA has evolved into more formal programmes to align with the country's legislated National Qualification Framework (NQF) (Sobuwa and Christopher 2019). The framework classifies qualifications by level, based on learning outcomes, with each classification reflecting the knowledge and the behavioural and affective attributes graduates are expected to know, demonstrate and exhibit (South Africa. Department of Health 2017a; South African Qualifications Authority 2021b). As shown in figure 1.1, the first formal and established EMS qualification was a three-year National Diploma in Emergency Medical Care (Ndip: EMC). This over time evolved into a Bachelor of Technology in Emergency Medical Care (BTech: EMC) and finally the BHSc: EMC degree. Many of the short courses pre-dating the BHSc: EMC degree have now been phased out and while a one-year certificate and a two-year EMS training diploma still exist, the BHSc: EMC has become the touchstone for paramedic training in the country (Sobuwa and Christopher 2019).

This touchstone or gold standard for EMS training in SA is the focus of this thesis, specifically the BHSc: EMC degree offered by an HEI in KwaZulu-Natal (KZN), one of the four accredited HEIs to offer the programme in the country. This focus extends to investigating specifically whether this particular qualification from this one HEI in KZN, one of South Africa's nine and the fourth largest province, has produced graduates with

the knowledge, skills, qualities and understandings that they should have gained from the learning and experiences they engaged with whilst at the HEI.

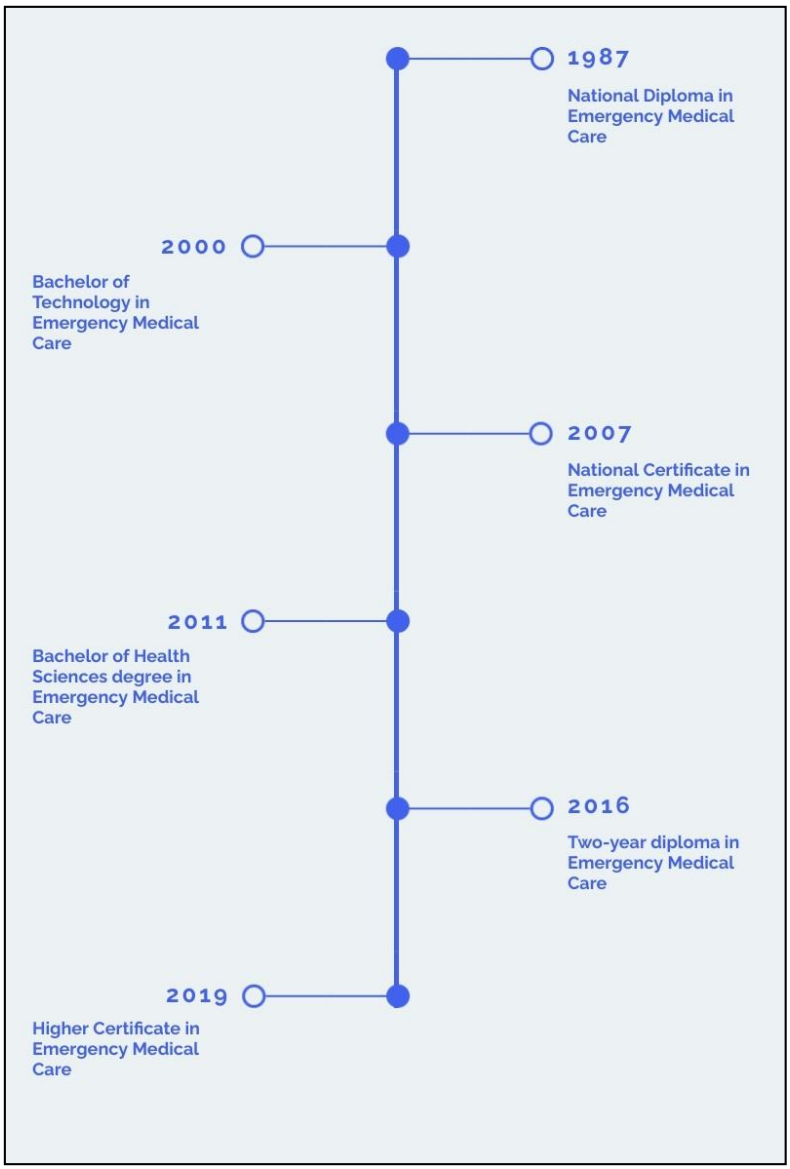

Figure 1.1: History of Paramedicine In South Africa

1.2 Background to the study

Like much of Africa, large parts of SA are still very rural with limited access to essential services, particularly healthcare facilities (McLaren *et al*. 2013). This results in many of the country's 50 plus million inhabitants becoming dependent on a functioning Emergency Medical Service to access help, which unfortunately is typically located in built-up urban areas (Hardcastle *et al.* 2013; Rakabe 2018). In addition, the significant burden of disease and high violent crime rate which continues to plague the country

places tremendous strain on an already burdened EMS, inevitably resulting in many patients not having access to an ambulance or often receiving one too late (Statistics South Africa 2011). As a result, the country has recognised the need to establish a contextually responsive EMS. This sentiment is echoed by the World Health Organisation (WHO) which has called for the establishment of EMS systems in Africa as one substantive and specific solution to reduce prehospital morbidity and mortality in the continent (Mould-Millman *et al.* 2017).

A contextually responsive EMS requires personnel who are trained to be ready to manage the burden of disease and injury SA nationals are most likely to suffer. It should also be ready to manage patient populations that suffer injury and illness in austere environments that may require access by other modes of transportation when roads are inaccessible (Govender 2015). Other possible requirements include personnel who can speak multiple languages, who are able to manage mass casualty incidents and who are trained in rescue activities, as essential rescue services are not frequently available across the country (Deumert 2010; Smith 2012).

The goal of the BHSc: EMC, as legislated, was to produce ALS professionals who would become independent clinical practitioners and rescue specialists within the emergency medical care and rescue environments (South African Qualifications Authority 2021b). While this goal represents the characteristics one would hope to see in personnel trained for the SA EMS context, there has never been any evidence to suggest that the BHSc: EMC degree has in fact been successful in realising this goal and creating the intended product. It must be highlighted that SA, like the rest of the world, has become increasingly more demanding in all areas of education, and simply conferring certificates, diplomas and degrees following adherence to “moderator standards” is no longer adequate to convince industry and statutory regulators that educational programmes are satisfying the needs of their constituents (South African Qualifications Authority 2021b). For this reason, it is not only the responsibility of government, educational authorities and professional bodies but also society, students and the medical community to demand that educational programmes do indeed produce the products they are intended to produce, and that they then be held accountable for them.

1.3 Rationale for this study

The ability to adequately train graduates for work readiness remains a challenge, as key workplace competencies often change at a pace training necessarily cannot follow (Thompson, Grantham and Houston 2015). Another reason relates to those “soft” skills

that training often cannot teach and inevitably has to come from lived experiences of relationships with people and interactions with patients. As a result, training will never be absolutely all that a graduate needs to be work ready (Padley *et al.* 2021). However, training should at least be adequate enough to ensure that graduates are skilled to the level of an entry-level practitioner and are suited for the context for which they are trained (Rush *et al.* 2013).

Since the introduction of the paramedic degree in 2011, its effectiveness in producing the graduate that is intended has not yet been investigated. As documented by Bleakley and Brennan (2011), this is essential as it not only ensures quality improvement but also has a positive impact on informing processes that promote the work readiness of graduates. The time is also right for such an investigation, as the position of the degree within the context of the profession's continuing education system becomes clearer.

And lastly, a more specific rationale for this study is predicated on the recent surge in published and unpublished research showing the exodus of trained paramedics from SA, and while better salaries are ranked as the leading factor contributing to why these trained individuals have left, the majority of which were degree graduates, poor working conditions and lack of essential resources also ranked at the top of the list of factors (Govender *et al*., 2012; Binks 2011; Hackland and Stein 2011). Poor salaries are difficult to address in the short term, but the question that is often raised with regard to poor working conditions and lack of resources is whether paramedic training and education in SA has inculcated the qualities, skills and understandings consistent with the communities which they are intended to serve. As this has never been examined – it remains unknown.

1.4 Problem statement

There has been a directional transition in paramedic education with education systems shifting from vocational technical training to HEI degree-based education (Edgerly 2013). SA has admirably followed suit with this global trend; however, there have been growing concerns around whether the shift may have swayed too far and resulted in training and education goals and objectives becoming incompatible with the needs of SA communities (Botha, Lourens and Stassen 2021). Paramedic education in SA should undoubtedly reflect some degree of standardisation to allow for the advent of globalisation, international recognition, migration, and the transition of healthcare workers across different healthcare settings. However, in a country that faces a substantial burden of disease, illness and injury, which results in numerous prehospital

deaths, a sustainable and effective EMS, staffed with trained paramedics who not only have the knowledge and technical proficiency in all skills necessary to fulfil the role of an entry level ECP in SA but also the personal attitudes and behaviours that are consistent with SA expectations, remains paramount.

There is no current evidence to suggest that the BHSc: EMC, the touchstone for training paramedics in SA, has in fact produced the graduate it is intended to produce. This should not continue to be the case, particularly as more, already scarce, resources are invested into producing more graduates who appear to only study the degree so that they can emigrate from SA and deplete an already struggling EMS workforce. For this reason, it is important to look into the effectiveness of paramedic training in SA and examine the level of alignment that exists between the work readiness of graduates and the needs and employability skills expected, as required by the EMS in which these graduates take up jobs.

1.5 Research purpose and objectives

The purpose of the study was to investigate the BHSc: EMC programme at an HEI in KZN regarding its effectiveness in preparing paramedic graduates for independent practice. To achieve this purpose, the following objectives were established:

1. Critically appraise the design and content of the BHSc: EMC programme.
2. Investigate the impact that the programme has had on graduate employability skills.
3. Examine graduate perceptions of the programme in rendering them work ready.

1.6 Structure of the dissertation

This dissertation is divided into multiple key sections but presented using the traditional thesis structure comprising six chapters. An overview of each of the six chapters in this thesis is as follows:

1.6.1. Chapter One: Overview of the study

The introductory chapter provides just that, an introduction to the study. To allow the reader to fully appreciate the significance of the study, the chapter discusses the background, rationale for the study, the problem statement, as well as the purpose and objectives of the study. The background includes information that supports the unique circumstances experienced in SA and the demands placed on SA to establish and maintain a contextually responsive EMS that is consistent with the needs of its people.

1.6.2. Chapter Two: Literature review

Chapter two presents the literature review undertaken for the study. It presents the review as a line of discussion across the two following key points: global and national paramedic education *and* paramedic preparedness and employability. The review highlights, among many already known and unknown conclusions, that new graduates continue to struggle most with transiting from mentored supervised practice to independent autonomous practice.

1.6.3. Chapter Three: Research methodology

In this chapter, a detailed description of the study methodology used is given which includes a discussion of the research paradigm and the research design. It also outlines the study population and justifies the sample and sampling method used. The study design and statistics applied are also covered along with the study limitations.

1.6.4. Chapter Four: Results

This chapter is divided into three sections. Section 1 addresses objective 1 and is subdivided into parts, A and B. Part A includes a critical appraisal of the BHSc: EMC curriculum that was used by the HEI in KZN to produce graduates during the period 2016–2018. Part B of section 1 presents the findings of the interviews and questionnaire that were administered in respect to objective 1, which focused on graduate perceptions regarding the effectiveness of the degree in achieving its intended aim.

Section 2 of chapter four addresses objective 2, which was to explore graduate perceptions on the impact the BHSc: EMC degree had on their employability skills level. The last section of the results, section 3, presents the findings pertaining to objective 3 which was to identify the impact that the degree had on graduates' work readiness.

1.6.5. Chapter Five: Discussion

This chapter presents a discussion of the study findings. This is done within the context of the literature reviewed in order to provide a broad, in-depth perspective of the topic and the conclusions of the study.

1.6.6. Chapter Six: Limitations, conclusion and recommendations of the study

Limitations of a study are presented to place the study findings in context. The conclusions are also presented in this chapter, and so too are the recommendations of the study which are made in respect to the key findings of the study.

1.7 Conclusion

The South African EMS has changed. In the last four decades changes to the way the EMS operates, the treatment that it renders and how its personnel are trained have occurred. The biggest change in paramedic education may very well be the transition from vocational technical training to university-based education. This change resulted in the phasing out of the short skill-based courses, and ultimately paved the way for formal qualifications which over time evolved into what is now the gold standard for paramedic training in SA, the BHSc: EMC degree. This study aims to determine the effectiveness of the BHSc: EMC programme at an HEI in KZN regarding its effectiveness in preparing graduates for independent practice.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Paramedic training and education appears to be transitioning from vocational training to university-based education (O'Brien *et al.* 2014). The transition, while still incomplete, has made significant strides with some HEIs now offering not only undergraduate but also postgraduate paramedic qualifications. There does not appear to be any foreseeable end in sight for this transitional trend and it seems quite likely that university-based education may soon become the entry point into the profession (O'Brien *et al.* 2014). The advent of this transitional shift in training has inevitably also advanced the paramedic profession towards becoming more professionalised (Sobuwa and Christopher 2019). However, while there have been many notable advantages of the transitional shift towards university-based training and therefore a more professionalised profession, in many ways, over a significantly shorter timespan when compared to other disciplines, concerns regarding the overall value and effectiveness of typically long, content-heavy, university-based programmes have often come to the fore. These concerns are largely around whether the transition in paramedic education has swayed too far and has resulted in training and education goals and objectives becoming incompatible with the needs of the profession, particularly with regard to South African communities (Botha *et al.* 2021). This chapter provides a critical review of the available literature on paramedicine education both globally and locally. It also discusses the need for benchmarking and contextualising training to meet the needs of communities in which graduates are created to serve. It lastly highlights the need for training programmes that aim to ensure the workplace readiness and employability of graduates, as well as the importance of workplace measures that support graduate transition in healthcare and the impact that not having these measures is likely to have on professionals who are graduates but are not employable.

2.2 Search strategy

To locate literature for this study, a search of PubMed, CINAHL, Embase, Scopus, Cochrane Library and Web of Science was undertaken using a list of contextually relevant keywords (Table 2.1) and index terms related to each of the three study objectives.

Table 2.1: List of keywords related to each objective

Objectives	Related keywords used for searches
To critically appraise the design and content of BHSc: EMC programme	Paramedic training programmes • EMS training • EMS education • Paramedic education Design of paramedic training • EMS curriculum design • Paramedic curriculum design Content of paramedic training • EMS course content • Paramedic education contents Core constructs of paramedic training • EMS training core components • EMS education • Paramedic education core concepts
To investigate the impact the BHSc: EMC degree has had on graduates' employability skills	Employability of paramedic graduates • Undergraduate paramedic employability • Employability of healthcare graduates Work readiness of paramedic graduates • Work readiness of undergraduate paramedics • Work readiness of paramedic final year students Curriculum design • Educational layout of paramedic programmes • Academic design of paramedic training Curriculum design impact on work readiness • Curriculum design effects on employability • Curriculum design effects on transition into the workforce Employability of graduates • Transition of graduates into the workforce • Readiness for the workforce
To examine graduate perceptions of BHSc: EMC regarding work readiness.	Graduate satisfaction with paramedic training programmes • Contentedness with EMS training programmes • Satisfaction with pre-employment model Graduate perceptions of work readiness • Paramedic perceptions of preparation for independent practice • Paramedic perceptions of transition into workforce Graduate transition into the workforce • Paramedic transition into independent practice • Entry of novices into workforce Transition support

	• Transition needs of healthcare graduates • Transition experience of paramedic graduates • Transition challenges of novice paramedics

2.3 Training of paramedics: An international perspective

While there is a wealth of information available on the training of healthcare workers across other disciplines, there is little locatable published research on paramedic training, particularly regarding the impact the work readiness and employability of graduates (Kennedy, Kenny and O'Meara 2015). As a result, little is known about how well-prepared paramedic graduates actually are when they first enter the job market. In a study by Devenish (2014), who examined paramedic graduates from Australia and the United Kingdom, it was found that while the paramedic course provided a solid theoretical foundation for students, they themselves reported that they felt underprepared in terms of practical skills. The students also expressed the need for more hospital placements to increase their exposure and understanding of in-hospital operations. In other studies, like the ones conducted by Hou, Rego and Service (2013) and Hickson, Williams and O'Meara (2015), it was found that students never really felt adequately prepared for more advanced training as they lacked a proper foundation. The authors further explain that one of the factors that contributed to this level of ill-preparedness was the age of graduates with younger ones generally feeling more ill- prepared than older ones.

O'Brien *et al.* (2013), in a study around the same time frame, found similar results whilst examining the perceptions of final-year paramedics completing degrees at Australia's University of Victoria where the perceptions of students regarding their readiness for the workforce was investigated. Students overwhelmingly felt "somewhat adequately" to "adequately" prepared for the workforce with the majority expressing the need for more practical training and more opportunities for clinical placements. Employed graduates, like those examined by Hickson *et al*. (2015), agreed that while they had a somewhat solid theoretical foundation, there was much more to be learnt, and this could only be obtained on the job. The general theme that emerges from these and other similar studies is the existence of a theory–practice gap which has not closed much despite pedagogical advances (Kennedy *et al.* 2015).

According to Henderson (2012) and supported by Hickson *et al.* (2015) and O'Brien *at al.* (2014), one of the reasons mitigating the closure of the theory–practice gap over the years, and in spite of pedagogical advances, is a dramatic shift in the student profile the profession seems to be now attracting. The authors discuss that the theory–practice gap is more prevalent in younger graduates who lack graduate maturity, an attribute typically plaguing students who enter paramedic training programmes as young school leavers. In comparison, older more experienced candidates typically have previous vocational or post-employment training, are already informal providers of prehospital care in some context and now want to advance their careers with more formal training. It is believed that older candidates may have been exposed to the misfortunes of patients, their own and others', and have developed an understanding that later assisted in coping with the social stressors and realities of the prehospital environment, which would not necessarily be present in younger graduates with no, or very little, contextually relevant life experiences. According to Alshammari and Jennings (2018), like Willis *et al.* (2010), road readiness extends further than just skills competency to include having the maturity to deal with day-to-day challenges within the prehospital environment on the first day of the job. Willis *et al.* (2010) mention that the way to improve paramedic university-based education and create a well-rounded paramedic is to not merely hope for an integration of theory, clinical skills and supporting sciences to miraculously happen at the end of a student's training but to create learning activities to ensure and compel it to happen. The belief should be that graduates will, at best, be novices, however they should also learn the skills that will help them transition quickly from novice to safe and effective practitioners and then to proficient experts.

On this topic, O'Brien *et al.* (2013) explain that having an expectation that represents a graduate as more than a novice in the field of study typically results in an unrealistic training programme or worse, a training programme that is inappropriate. It is only once skill proficiency is achieved after 'unsupervised' practice and anxiety levels diminish that novice recent graduates are able to incorporate the social and interpersonal aspects of the clinical situation, resulting in their transition from novices to experts. O'Brien *et al*. further mention that it is only after graduation and some time in actual practice that individuals, based on intuition gained from a deep understanding of their professional environment developed through experience and repeated exposure, start behaving in a manner the HEI had hoped to create on graduation – a hope that is unfortunately unrealistic.

Despite the unrealistic expectations placed on graduates, paramedic education has advanced significantly over the years, largely as a result of legislative policies that seek to ensure alignment to internationally benchmarked best practices. As with all change, there have been many obstacles however, the change has largely brought with it tremendous value for the paramedic profession. One criticism that has been voiced in recent years concerns the effectiveness of these relatively new, typically university-based programmes in achieving their intended aim of creating graduates who are actually ready to meet the prehospital healthcare demands of communities. There is a clear need for this criticism to be addressed; however, while no locatable studies can be found in SA, a common thread from a few international studies indicates that as programmes become more professionalised the theory–practice gap widens (O'Brien *et al.* 2014; Reid *et al.* 2019). It is this gap that is often to blame for the lack of work-unreadiness among graduates.

2.4 History of paramedic training in South Africa

In January 2012, all prehospital emergency care short courses in SA (i.e. Basic Ambulance Assistant (BAA), Critical Care Assistant (CCA) and Ambulance Emergency Assistant (AEA)) were legislatively approved to be phased out. This was a significant move for the country regarding paramedic training, as these short courses had served the country as the main entry points into the profession since the early 1980s, when the profession found its own personal identity (South Africa. Department of Health 2017b). The BHSc: EMC evolved from what was first known as a three-year National Diploma in Ambulance and Emergency Technology, which later changed to the National Diploma in Emergency Medical Care (Ndip: EMC), as shown in figure 1.1. The Ndip: EMC differed from its predecessors in that it included rescue training as part of the teaching and learning curriculum. This addition was largely due to the need for vehicle extrication and rope rescue skills, as there was a vast number of under-serviced rural areas in the country.

Building on the Ndip: EMC, the Bachelor of Technology in Emergency Care (BTech: EMC) emerged, which subsequently allowed Ndip: EMC graduates the opportunity to increase their scope of practice, particularly around drug-facilitated intubation and the prehospital treatment of acute coronary syndromes (ACS), but also to give these graduates a steppingstone to access further qualifications in the form of master's and doctoral degrees (Cermak 2016). In 2011, the BHSc: EMC was introduced, with plans

that the BTech: EMC would eventually be phased out and replaced (Sobuwa and Christopher 2019).

Paramedic training in SA currently consists of qualifications that are in line with the National Emergency Care Education and Training Policy and with the Higher Education Qualifications Sub-Framework of SA. Three primary qualifications currently exist, i.e., a 120-credit higher certificate, a 240-credit diploma and a four-year BHSc: EMC 480-credit degree (South Africa. Department of Health 2017a). All three qualifications, while characteristically recognised as having the same exit-level outcomes, and therefore recognised as being the same by potential employers, may in some cases differ significantly with regard to the content that is taught across the years of study, the way this content is delivered and the assessments that measure whether learning has in fact actually occurred. Since their inception, the effectiveness of all three qualifications, including the BHSc: EMC degree, across all four HEIs in South Africa in preparing graduates for independent practice has not yet been examined. Herein lies the need for this study; however, the focus of the study is on one HEI, which subsequently delimits its findings to just the degree offered at an HEI in KZN.

2.5 Contents and instructional designs of paramedic training in South Africa

Like elsewhere, the education of paramedics in SA forms just one component of the continuum of paramedic education and training during an individual's tenure as a registered prehospital care practitioner. The continuum typically starts with secondary school education and/or specific competencies and continues to a professional education and continuing professional development (CPD) (Health Professions Council of South Africa 2017). Important prerequisite skills that are required prior to enrolling in a paramedic training programme are basic English and Mathematics. These two foundational concepts are critical to the success of individuals within these programmes and serve as a base upon which further academic competencies can be built. Owing to the challenging nature of the paramedicine programme and profession, applicants are also required to have specific behavioural skills and traits such as confidence, courage, physical fitness, and communication and leadership skills. It also appears that regardless of whether paramedic study results in a certificate, diploma or degree, paramedic training and education in SA are built around the following core constructs: Foundations of Professional Practice (FPP), Basic Sciences, Anatomy and Physiology, Emergency Medical Care Theory and Practical and Clinical Practice (Health Professions Council of South Africa 2016; CPUT 2021a; UJ 2021a).

Foundations of Professional Practice is an entry-level subject with the aim of introducing and familiarising students with the structure and function of South African EMS. The subject also covers medical ethics, law, legislation and professionalism, providing students with knowledge about affective programme objectives that specify behaviours consistent with professional and employer expectations. Basic Sciences consists of physics and basic chemistry. The physics component covers topics such as energy, pressure, and the physical properties of matter. These topics, although introductory in nature, appear to serve as a foundation upon which future subjects like Medical Rescue and Emergency Medical Care (EMC) are taught. The same is true for the chemistry component, in which content like chemical bonding, basic calculations and acid-base buffer systems are covered, again creating the foundational knowledge upon which future subjects are to be taught.

Anatomy and Physiology is understandably an important subject, where mastery is not only an assumed expectation throughout training but is linked to the successful understanding of the clinical content concurrently taught in EMC, where students are actually taught how to perform purposeful assessments and provide contextually acuity-based care. Clinical Practice provides students with the opportunity to apply their theoretical knowledge in a frontline patient care setting, working in ambulances, primary healthcare clinics and hospitals.

While the continuum of education and training in the paramedic profession (see figure 2.1) may differ based on the country and community in which paramedics serve, the core components are largely similar. The variation lies in the packaging of the modules across the four years of the degree at the four accredited HEIs. As an example, the first year of the BHSc: EMC differs across the four HEIs in SA. The Cape Peninsula University of Technology (CPUT) is the only one of the four HEIs that includes an introduction to Medical Rescue, rescue systems and principles (Cape Peninsula University of Technology 2021). The other three HEIs – Durban University of Technology (DUT), University of Johannesburg (UJ) and Nelson Mandela University (NMU) – do not include Medical Rescue in the first year but rather use this year to focus only on the core components previously described (Durban University of Technology 2021; University of Johannesburg 2021; Nelson Mandela University 2021). All four HEIs include FPP as a first-year module, however NMU and UJ offer computer literacy, which is part of FPP at the other HEIs, separately. Another difference included in the first year of the BHSc: EMC at these two HEIs is the inclusion of Mental Health and Wellness which is not included

at the other two HEIs (University of Johannesburg 2021; Nelson Mandela University 2021). While the end goal of the degree remains the same, the packaging of the modules differs as, in SA and due to the lack of benchmarking of the BHSc: EMC, this is the prerogative of the offering HEI.

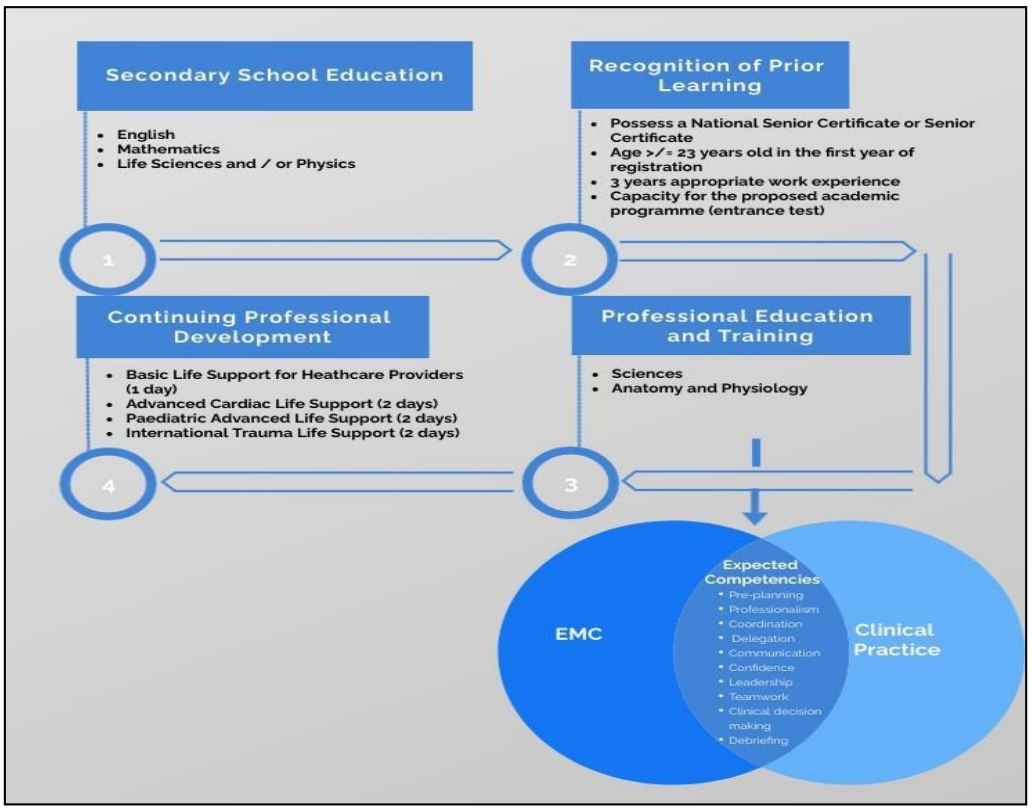

Figure 2.1: The Continuum of Lifelong Paramedic Education and Training

2.6 The need for training evaluation

While work readiness is a goal that all HEIs hope graduates will achieve upon completion of conferred academic programmes, the actual state of graduate work readiness is often assumed and not actually known. According to Rouse (2011), academic programmes require regular, systematic evaluation to allow for strength and weakness identification and for improvements to be made. It is through this process of evaluation that the true value of an academic programme can be ascertained. Kirkpatrick's (1994) training evaluation model is a well-established method for analysing and evaluating the effects of academic programmes and has been used for many years for both formal and informal training programmes. It has been the benchmark for other evaluation models such as Hamblin's model titled "The Five Level Approaches" and Kaufman's Five Levels of Evaluation model (Choudhury and Sharma 2019). The Kirkpatrick evaluation model

determines the effectiveness of training programmes based on four levels: reaction, learning, behaviour, and results. The first level assesses a participant's reactions to the training programme; the second level of evaluation determines the extent to which learning has occurred within the training programme; the third level looks at the extent to which new skills and knowledge are being applied on the job and the fourth level measures the direct results of the learning on targeted objectives or outcomes (Kirkpatrick 1994). In line with this previously adopted methodology, one way that appears to have the ability to accurately and reliably evaluate the effectiveness of training in preparing graduates for independent practice is an exploration of graduate perceptions of the level of influence the degree had on their employability and transition into operational practice.

Another way that allows for accurate and reliable evaluation of the effectiveness of training in preparing graduates for independent practice is to gauge graduate perceptions of work readiness. The state of graduate work readiness has been studied in both paramedicine (O'Brien *et al.* 2013) and nursing (El Haddad *et al.* 2017), and the most common finding in these types of study is an identified theory–practice gap. This term essentially refers to the difference between how a graduate should perform versus how graduates actually perform (El Haddad *et al.* 2017). Much of the reason for the gap appears to be due to the graduate's inability or decreased ability to integrate theoretical knowledge with its practical application. In most studies undertaken on nursing training programmes, the principal finding was that nursing university graduates were subjected to too much theory and not enough practice (El Haddad *et al.* 2017). With this being a common finding in the literature, it is especially important that these types of training programme undergo regular evaluation to not only identify and bridge a possible theory–practice gap but also to ensure that the training programme remains contextually relevant for the communities in which its graduates will serve. As nursing and paramedic education has followed similar evolutionary processes from vocational to university-based training, content and instructional designs, it is likely that a similar theory–practice gap exists within South African paramedic-based training; however, as this has never been examined, it is unknown.

While Devenish *et al.* (2015) and Moodley (2016) reported a theory–practice gap in undergraduate paramedic clinical placement in SA, a component of paramedic education, the existence of this gap in paramedic education as a whole in South Africa has not been researched. An undetected theory–practice gap in paramedic education,

as has been found in nursing education, has the ability to negatively affect graduate work readiness and, if not bridged, the employability of graduates (Saifan *et al.* 2021). This means that paramedic graduates will be continually ill equipped to deal with the demands of the South African prehospital environment. As it stands, the country is heavily reliant on its EMS system. SA cannot afford for its EMS system to function sub optimally due to a lack of graduate readiness for the prehospital environment as this will result in more patient deaths and further strain on hospitals (Gage, Geduld and Stassen 2020).

2.7 Workplace readiness and employability of graduates

Work readiness is the term used to describe the process of students being equipped with all the foundational skills, self-sufficiency, reliability and resources needed to be minimally qualified for a specific occupation as specified by a job description or occupational profile (Clark 2013). Employability, as defined by the Cambridge Dictionary (2021), defines employability as having the necessary skills and abilities that allow for employment. These two concepts are pertinent to graduate success in the workplace and therefore training programmes need to ensure that graduates possess these skills upon exit.

Despite a myriad of literature describing the work readiness of graduates across a variety of healthcare professions, there exists a clear paucity when it comes to paramedicine. Regarding other professions, the most common themes that emerge are around graduates feeling overwhelmed by industry expectations, the obvious theory–practice gap that was previously discussed, not fitting into the workforce due to personality clashes, and having a feeling of "being lost" due to macro-management (Sofianopoulos *et al*. 2011; Huot 2013; Kelly and McAllister 2013; Lazarsfeld-Jensen *et al*. 2011).

The feeling of "being lost" is usually a result of the challenging transition that typically takes place between when a student practises under mentorship (supervised practice) during their final years of study and now are suddenly expected to work independently without supervision (independent practice) upon graduation. The thought of not having someone to look over your shoulder, which inevitably provides a cloud of reassurance, which should you fail plan B, comes into place with the preceptor taking over, appears to be quite prevalent (Lazarsfeld-Jensen *et al*. 2011). The same could likely be said of paramedics; in fact, in SA, because paramedics are typically expected to "hit the ground" running and function without readily available help, even in the form of top-side telephonic consultation, this feeling of being lost may be more prevalent.

Perhaps one of the most relevant pieces of literature is the scoping review by Kennedy et al. (2015) who examined paramedics in the workplace, identifying five emergent themes associated with the transition into the workforce. The first theme was graduate uncertainty. This refers to the stress graduates feel prior to entering the workforce, a feeling similarly identified by Sofianopoulos *et al*. (2011); Huot (2013); Kelly and McAllister (2013) and Lazarsfeld-Jensen *et al*. (2011). This feeling, similar to "being lost", is explained by graduates as being thrown in the deep end without much support. It appears that the feelings are heightened in paramedicine, particularly because of the complex harsh nature of the prehospital environment, which invariably proves as challenging for the novice graduate who is still trying to find their feet in this world with millions of proverbial spectators. Kennedy et al. (2015) state this most aptly, indicating that the feeling of uncertainty is a result of the discrepancy between graduate expectation and workplace reality.

The discrepancy between graduate expectation and workplace reality is a result of graduates being challenged with the reality of practically applying their theoretical knowledge to the complexity of the prehospital environment (Kennedy *et al*. 2015). This expectation discrepancy contributes to the second emerging theme – graduates feeling unprepared for the workforce. The main contributor to this feeling, according to new graduates, is the inadequate undergraduate clinical experience prior to employment which, again, hints at the theory–practice gap (Lazarsfeld-Jensen *et al*. 2011, Michau *et al*. 2009; Wray and McCall 2009).

Although there is little evidence to support its effectiveness in reflecting the reality of the workplace (Michau *et al*. 2009; Wray and McCall 2009), Lazarsfeld-Jensen *et al.* (2011) describe clinical learning as being integral to bridging the theory–practice gap. Clinical learning, while greatly varied among different institutions, is the best way for undergraduate paramedics to be exposed to the realities of the prehospital environment as the classroom environment can in no way replicate the complexities of a real emergency environment (Lazarsfeld-Jensen *et al*. 2011; Michau *et al*. 2009). However, due to the unpredictable nature of the prehospital environment, clinical learning time can sometimes be wasted by "slow" days or even by ill-chosen clinical preceptors who are either unable or unwilling to provide quality educational experiences for graduates (Lazarsfeld-Jensen *et al*. 2011; Michau *et al*. 2009). Graduates in Lazarsfeld-Jensen *et al.*'s (2011) study echoed this unavoidable disadvantage of clinical learning when they reported that clinical placement time provides insufficient workforce preparation.

Once in the workforce, Phillips *et al.* (2013) report that an unsupportive workplace culture has a negative impact on new graduates and herein lies the third theme which emerged from the literature. Kelly and Ahern (2009) and Phillips *et al.* (2013) describe the graduate transitional experience as varied and complex, and found that this is largely dependent on the workplace environment. The authors explain that a supportive workplace environment assists the transition of a graduate into the workplace, whilst a negative work environment does the opposite. Apart from negatively affecting the graduate transition process, a negative work environment, which may involve poor management, lack of resources or a high workload, may also contribute to poor long-term physical and psychological outcomes in graduates (Kennedy *et al*. 2015).

Once graduates have settled in and feel accepted into the workplace culture, this is when they access valuable inside knowledge which propels their professional development in the field – the fourth theme. Contrary to the definition provided by Clark (2013); Kennedy *et al.* (2015) suggest that work readiness in the graduate is related more to acceptance into the workplace culture and not so much to a list of specific skills or knowledge. The authors explain that the process of fitting in is based on the graduate being exposed to and acquiring the attitudes and values of other paramedics within the organisation. It is in this way that newly qualified paramedics gain acceptance from seniors and open the door for further experience during the crucial transitional period. Phillips *et al*. (2013) support the notion of these newly qualified paramedics, as the same is found in nursing where nursing students have attributed gaining the respect of seniors to a smoother transition, reduced stress and improved confidence in clinical practice.

Social integration within the workforce is essential for new paramedics to feel a sense of belonging (Wray and McCall 2009). Newly qualified paramedics are often undermined and therefore feel the need to prove their place within the workforce. This is done by integrating into the established culture in a way that proves to their senior colleagues that they are capable paramedics who have the ability to function in high-stress situations (Filstad and McManus 201; Howe, Smajdor and Stöckl 2012). The transition of graduates from novice to expert is an on-the-job learnt process of unspoken knowledge, social participation and conformity to the role. In paramedicine in particular, this unspoken knowledge is developed through incident debriefing and social interactions with colleagues which involves the recounting of past case experiences and the use of “dark humour” (Filstad and McManus 2011).

As a paramedic, coming face to face with traumatic events is inevitable and, depending on the individual, may either catalyse personal growth or spark psychological decay – the fifth theme. Newly qualified paramedics often find learning to control their own emotions in the face of human suffering, injury and death challenging, as preparation for such highly emotional situations cannot be appropriately replicated in the classroom environment. Proving the ability to endure traumatic events makes newly qualified paramedics more socially accepted by their colleagues; however, an unprepared novice paramedic or the build-up of stress from frequent exposure to traumatic events over time may increase the risk of paramedic burnout and posttraumatic stress disorder (PTSD), which is already a common phenomenon in the field. To avoid this, employers need to offer newly qualified paramedics support to engage in a structured approach to processing traumatic experiences (Sofianopoulos *et al*. 2011; McAllister and McKinnon 2009; McCann *et al*. 2013).

2.8 Workplace measures to support graduate transition in healthcare

Cho *et al.* (2012) report that new nursing graduates experience intense stress due to transition challenges from school to their first work setting. These transition-to-practice challenges of new graduates are the main reasons for the high turnover rates of new nursing graduates. Kovner *et al*. (2010) reported that 18.1% of newly licensed nurses left their first employer within a year of starting a job, and 26.2% did so within two years. Brewer *et al.* (2012) reported similar statistics in a later nursing-graduate-based study, finding that 26% of newly licensed registered nurses had left their first job within two years of starting it and 43% had left within three years. These studies, like many others, indicate that graduates do not easily transition into the workforce.

Based on these statistics, healthcare organisations have created measures and support programmes to support the graduate transition more easily (Rush *et al.* 2015; Spector & Echternacht 2010). These programmes are typically in place to bridge the theory–practice gap and help graduates navigate the administrative, social and emotional challenges that come with new employment. To date, there is scant knowledge examining transition programmes for university educated paramedics. However, some literature exists on transition programmes in midwifery and nursing (Clements, Fenwick and Davis 2012; Rush *et al.* 2015; Spector & Echternacht 2010) that may be relevant to paramedicine.

Clements *et al.* (2012) analysed the transition of midwife graduates into the workforce in Australia. The authors looked at a variety of transition support programmes offered to

these graduates by their employers. It was found that while these support programmes varied in terms of length, structure and content, they shared common core elements such as clinical rotations, supernumerary time, study days and midwife-to-midwife support. Clinical rotations saw graduates rotating through a variety of maternity wards in order to widen their horizons and increase their clinical exposure to the various aspects of their profession. The authors highlighted that these rotations were most beneficial when they were pre-planned and communicated well in advance. This provided graduates with a sense of structure and control which increased their confidence. Clinical rotations offered new graduates an opportunity to consolidate their practice and lasted between eight to 16 weeks. The next core element was supernumerary time which allowed for newly qualified midwives to work alongside an experienced midwife or clinical educator. This time was considered to be extremely valuable as it provided an opportunity for graduates to be "eased" into the clinical area and afforded graduates the opportunity to ask questions and be fully orientated to their new role without the pressure of taking on a full clinical load. This supernumerary time, while valuable, was found to be quite minimal and varied largely between support programmes with some lasting one or two days andothers lasting two to four weeks. The scantiness of this time was due to the workloads inthe contemporary maternity care context, leaving experienced midwives too busy to assist new graduates. Another core element of transition support programmes is study days. These are days within the programme which are dedicated to attending workshopsto increase specific knowledge and skills. The number of included study days in these programmes ranged from one to seven days. The available workshops on these study days included skills such as the application of a foetal scalp electrode and how to perform artificial rupture of membranes. Study days provided opportunities not only for developing new skills and knowledge, but also for new graduates to share clinical experiences with their peers. The final core element in midwife transition support programmes is midwife-to-midwife support. This provided graduates with an opportunity to work within a supportive environment where midwife colleagues provided each other with guidance and advice. This fostered relationships between colleagues as well as a positive working culture that facilitated education and learning. Despite the varied forms of transitional support programmes offered to midwives, these programmes have been demonstrated to improve recruitment and retention, as well as competence in the new graduate.

Rush *et al.* (2015) conducted a study which examined the transition experiences of new nursing graduates and found that graduate transition was enhanced through participation

in a formal transition programme. Rush *et al.* (2015) found that nursing graduates who participated in a formal transition programme transitioned more smoothly into the workforce than graduates who did not participate. This finding suggests that transition programmes are not only beneficial to graduate transition, but they also expedite the process.

In nursing, transition programmes exist internationally and are becoming standard practice in certain countries such as the United States. These programmes are diverse in terms of duration, content and structure (Spector and Echternacht 2010), with some programmes simply extending the orientation phase of these graduates when they enter the workforce (Park and Jones 2010) and others being completely separate from the orientation phase (Spector and Echternacht 2010).

Despite the variability of these transition programmes, Rush *et al.* (2015) concluded that the length of the transition programmes made the most significant impact on graduate transition. It was found that transition programmes lasting at least four weeks or more translated to better graduate leadership and professional satisfaction. Moreover, a transition programme that lasted more than four weeks improved the graduate's ability to relate to both their patients and other healthcare professionals.

The value of preceptorship in these transition programmes was also studied and it was found that the quality of preceptorship rather than the volume of preceptorship hours had the most impact on graduates. Preceptor training was found to be associated with enhancements in graduate critical thinking abilities. Regardless of duration or structure, however, transition programmes have been shown to increase graduate competency, specifically in the areas of leadership, professional satisfaction and planning. Transition programmes allow graduates to immerse themselves in the practice culture and provide them with opportunities to explore their scope of practice with the support of the transition programme regulatory body (Rush *et al.* 2015).

In Innes and Calleja's (2018) review of the nursing transition support literature, preceptorship, socialisation, workplace culture, knowledge, and skills acquisition and orientation proved to be the most common and beneficial components of support programmes.

2.8.1 Preceptorship

Preceptorship provides nursing graduates with support, knowledge and guidance (Edwards *et al*. 2015; Haggerty, Holloway and Wilson 2013; Tastan, Unver and Hatipoglu

2013), as well as opportunities to ask questions. Preceptorship also helped prepare new graduates for the rigours of the workforce (Penprase 2012) and, in this way, assisted in bridging the theory–practice gap (St-Martin *et al*. 2015). The literature highlights the need for formal training of preceptors (Ortiz 2016; Tinio 2013; Rush *et al*. 2013). An issue of preceptor availability was raised when preceptors were unable to attend training due to workload and patient acuity issues. Preceptor training was reported to be anywhere from a few hours to more extensive ongoing development programmes. Poorly prepared preceptors provided little orientation to the clinical environment, proved untrusting of new graduates' clinical abilities and often tried to do the work themselves (Haggerty *et al.* 2013). Group mentorship, on the other hand, was found not only to be more cost-effective but also resulted in a positive transition experience for new graduates, likely due to the creation of social networks facilitating access to multiple resources and people (Tinio 2013).

2.8.2 Socialisation

Socialisation refers to the graduates interacting with fellow staff members. Preceptors were found to assist this socialisation through their already established relationships with fellow staff members and, through this, provided new graduates with advice on ways to approach fellow staff members and foster relationships (Haggerty *et al.* 2013). Socialisation was also found to assist new graduates with communicating with and leading a team in the clinical setting and to foster a positive workplace culture (McKillop *et al.* 2016).

2.8.3 Workplace culture

Haggerty *et al*. (2013) explain that the presence of a supportive workplace culture creates a nurturing environment for new graduates which has a positive impact on theirpractical confidence and competence. Although new graduates thrive in a nurturing andsupportive work environment, they still need to be provided with an opportunity to practise independently within the clinical setting. Finding a balance between nurturing and independence is important as this is what ultimately develops professional confidence. In this way, new graduates will also develop a deeper understanding of the key knowledge and skills associated with their scope of practice (Ortiz 2016).

2.8.4 Knowledge and skill acquisition

It was found in the literature that structured transition programmes which assigned specific support roles to new graduates promoted the attainment of skill and knowledge

and also resulted in increased graduate competence and confidence in the performing of clinical skills. New graduates also linked this to improved job satisfaction while senior nurses noticed a link between the support roles and patient outcomes (Haggerty *et al.* 2013; McKillop *et al.* 2016). Simulation-based training was included in these transition programmes as an adjunct to classroom and clinical learning to assist graduates with critical thinking and self-reflection skills. Simulation-based training is known to assist with bridging the theory–practice gap as it provides graduates with a safe environment to apply their theoretical knowledge practically while improving multiple skills such as teamwork, delegation, communication and stress management (Lewis-Pierre 2013;Della Ratta 2016). Also included in these support programmes is clinical exposure whererole consistency was found to be essential for new graduates. It is through these roles that repetition of various procedures occurs and graduate confidence and competence improve (Pupkiewicz, Kitson and Perry 2015).

2.8.5 Orientation

Another avenue that was found to improve graduate competence and confidence in the clinical setting was through orientation. In transition support programmes in New Zealand, graduate nurses must undergo six weeks of preceptored supernumerary time. Graduate nurses who have been allocated to specialised units require at least 12 weeks of supernumerary time to allow for more extensive training (Haggerty *et al*. 2013). A well-structured orientation of new graduates helped graduates better prepare for the clinical environment and was found to be closely linked to graduate satisfaction with their clinical performance (Penprase 2012).

2.9 Graduates who are skilled but not employable

Prior to considering workplace measures to support graduate transition in healthcare, however, it would make sense to first look at paramedic education programmes and measure their impact on graduate work readiness. The impact of a programme is best measured by testing the knowledge and/or skills gained, which can be done by asking graduates about their level of contentedness with the programme of interest. Another way to gauge the impact of a curriculum is by evaluating the employability or work readiness of the graduate. While there are currently no studies available that look into the impact of the university paramedicine curriculum, there are studies that look at the general impact of a curriculum on graduate employability. Misni, Mahmood and Jamil (2020) conducted a study to assess the impact of curriculum design on Malaysian graduate work readiness. Malaysia, like South Africa, is a developing country therefore

the extrapolation of these results to South African graduates is appropriate. As mentioned before, the authors found that graduate work readiness is directly related to curriculum design and should therefore be considered an underpinning objective of a university curriculum.

Apart from curriculum design, the mastery of clinical skills by students and new graduates is imperative in developing an individual who will positively contribute to the workforce. Students who do not receive adequate undergraduate clinical exposure and supervision may not appropriately develop competence in the key skills necessary for the workforce. The same is true for new graduates who are not supported during their transition from supervised to independent practice. A result of this is that these individuals may make persistent errors in practice that go uncorrected which may ultimately become embedded in their day-to-day practice, thereby creating a poorly skilled graduate who is not employable (Stayt and Merriman 2013). The entry of poorly skilled graduates into the workplace is dangerous and has the potential to lead to unsafe practice and poor patient care (Missen *et al.* 2016).

The performance of clinical skills is not merely a matter of executing a motor task correctly; to achieve competence performance of these skills must be coupled with underpinning knowledge. It is essential therefore that the underpinning knowledge associated with these key clinical skills be discussed with students and new graduates, as it is this knowledge that forms a key component of skill development. Without this discussion of associated knowledge, the individual's true understanding of key clinical skills cannot be ascertained. The resultant lack of associated knowledge may not only hinder the individual's competence development but may also compromise patient safety once the individual enters the workforce and begins practising unsupervised (Stayt and Merriman 2013; Missen *et al.* 2016).

2.10 Conclusion

The global trend in the training and education of paramedics appears to be shifting from technical vocational training to university-based education. As a result of this shift, traditional vocational paramedic training is slowly being phased out, with university-based education becoming the entry point into the profession for future candidates. The profession has progressed over the last decade, with HEIs now offering not only undergraduate qualifications but postgraduate paramedic qualifications up to doctorate level. This has advanced the paramedic profession and has led to the expansion of the paramedic scope of practice as well as contributing significantly to the professionalization

of the discipline. Despite this change in paramedic education, however, little is known about how well-prepared paramedic graduates actually are when they first enter the job market. With proof of a theory–practice gap being found in earlier studies on the work readiness of paramedic graduates and in other healthcare professions which have followed a similar change in education and training, such as nursing, it is imperative that the gold standard of paramedic education in SA – the BHSc: EMC – be evaluated. While work readiness is a goal that all HEIs hope graduates will achieve on completion of conferred academic programmes, the actual state of graduate work readiness is often assumed and is not actually known. In order to ensure the quality of academic programmes, regular systematic evaluation is required to allow for strengths and weaknesses to be identified and for improvements to be made. It is only through this process of evaluation that the true value of an academic programme can be ascertained. With the BHSc: EMC having never been evaluated, the probability of an undetected theory–practice gap is high and has the ability to negatively affect graduate work readiness and thus employability.

Literature that examined paramedics in the workplace identifies the transition challenges that are rife among these graduates. Transition support for these graduates is critical to assist in familiarising them with the workplace and bridging the theory–practice gap. Essential components which need to be included in support programmes are quality preceptorship and socialisation to ensure graduate competence and confidence in the workplace. Graduate work readiness can be assured by incorporating this as an underpinning objective of university curricula. Another way to create a work-ready graduate is by ensuring mastery of clinical skills. Transition support is once again necessary as unsupported individuals may make persistent errors in practice that, if uncorrected, may ultimately become embedded in their day-to-day practice, thereby creating a poorly skilled graduate who is not employable. The entry of poorly skilled graduates into the workplace is dangerous and has the potential to lead to unsafe practice and poor patient care. Thus, it is imperative to determine the value of the BHSc: EMC in terms of its appropriateness and effectiveness, to ensure that the degree is achieving its intended aim and is creating graduates who are not only work ready but also employable.

CHAPTER THREE
RESEARCH METHODOLOGY

This chapter provides a detailed outline of the research design and methodology used in the study. Particularly relevant is a description of the research paradigm, design and specific data collection methods utilised to address the purpose of the study; that is, to investigate the effectiveness of the BHSc: EMC qualification at an HEI in KZN in preparing paramedic graduates for independent practice. The chapter also pays particular attention to the study population, providing justification, and discusses the ethical considerations made in the study.

3.1 Research paradigm

In medical education, paradigms are considered as a set of beliefs and practices, shared by communities of researchers, which ultimately regulates inquiry in the discipline (Morgan 2007). Four major paradigms are currently used in the discipline, including positivism, post-positivism, interpretivism and critical theory. Each of the four are characterised by sets of assumptions that researchers who subscribe to a specific paradigm have regarding the nature of reality (referred to as ontology), the nature of knowledge (referred to as epistemology), the nature of the actual research (referred to as methodology), and the techniques used to collect data (referred to as methods of truth) (Brown and Dueñas 2020). According to Brown and Dueñas (2020), an interpretivist paradigm considers reality as being subjective and changing, with no one ultimate truth, but also no one way to determine this truth. The researcher believes that learners like herself, who also belong to the population under study, have multiple, diverse interpretations of their time and experience on the BHSc: EMC qualification at this HEI in KZN. In addition, because the focus of this study was on understanding, through inductive reasoning, the meanings that were constructed from researcher–participant interactions, the paradigm used in this study is also identified as one of interpretivism.

3.2 Research design

The research design is essentially the blueprint for the study and is the set of logical steps taken by the researcher to address the study purpose. The design that is ultimately chosen informs the methodology the researcher will follow in terms of data collection, analysis and interpretation (Brink, Van der Walt and Van Rensburg 2012). As a study of this nature has not been done before, it was technically uncharted territory. This

presented some challenges for the researcher as to where to actually start. To compound matters, the researcher was a part of the population under study and there was the prevailing concern of researcher bias playing a part in what and how the investigation was undertaken. Therefore, it was unanimously agreed that a starting point for the study would first be a document review of the curriculum to develop a foundation for the investigation and then once this foundation was established, through an exploratory sequential mixed method (ESMM) study, to investigate the remaining objectives of the study in a way that allowed for expansion, clarity and corroboration. As seen in figure 3.1, the intention of sequential design is to undertake this part of the study using a two-phased approach. Phase one consisted of interviews to explore graduate perceptions on a range of subjects related to the purpose of the study. Following analysis of the interview findings, phase two of the approach entailed in the creation of a questionnaire that was then sent out to all participants.

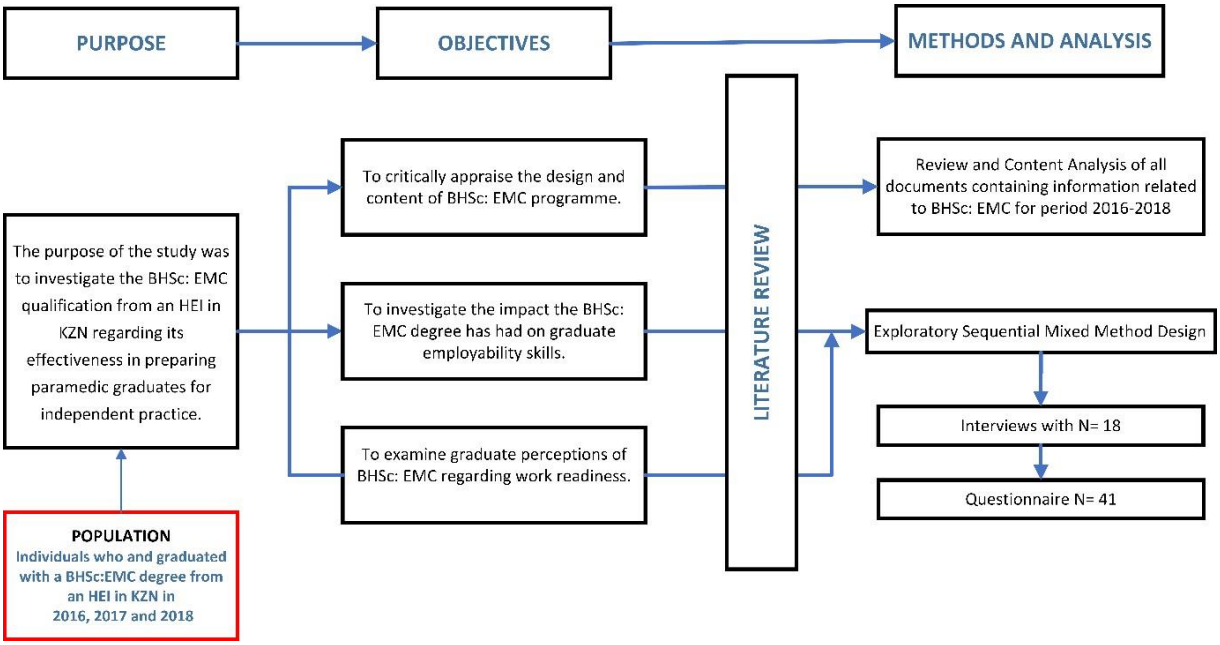

Figure 3.1 Study design

3.3. Addressing objective 1

This objective required a critical appraisal of the BHSc: EMC curriculum which was used by the selected HEI to teach study participants during a selected time frame. To ensure that the appraisal was both valid and could be replicated, a contextually appropriate curriculum review tool was sought. Following an extensive search over many weeks, no such tool was found to be locatable. As a result, the researcher, in consultation with the

study supervisors and stakeholders from the Centre for Excellence in Teaching and Learning (CELT) division at the HEI under study, and the Health Professions Council of South Africa, agreed that a suitable alternative curriculum review template could be used. The template chosen for the review, based on its suitability, was developed and used by the National Highway Traffic Safety Administration (NHTSA). The NHTSA, like the Professional Board for Emergency Care in SA, is the federal agency responsible for regulating emergency medical services in the United States of America (USA). Included in this regulatory responsibility is the regular review of emergency care training programmes against the NHTSA curriculum review template. This curriculum review template has been used to review and revise the EMT-Paramedic: National Standard Curriculum. The National Standard Curriculum–Paramedic (NSC-P) was developed by the NHTSA and is the accepted curriculum for paramedic programmes across the USA (Paris and Roth 2014). The NSC-P represents the highest level of education in Emergency Medical Care training. According to the South African Qualifications Authority (2021b), the BHSc: EMC curriculum, during its developmental phase, was compared to that of the NSC-P. Thus, it can be said that the BHSc: EMC and the NSC-P are fundamentally similar in nature. These programmes should both, therefore, adhere to the NHTSA's intention for its academic programmes: for such programmes to be of the highest quality and be maintained in a current and up-to-date status in terms of technical content and instructional strategy.

As the BHSc: EMC curriculum was an adaptation of the American National Highway Traffic Safety Administration's EMT-Paramedic: National Standard Curriculum (EMT-P NSC), the review template compiled by Paris and Roth (2014) became the framework on which the review of the BHSc: EMC was planned to be based.

However, this approach was soon abandoned after consultation with the study supervisors, the Head of Department (HOD) of the programme offering the BHSc: EMC and key stakeholders, as the relevance and applicability of the EMT-P NSC review document came into contestation. It was argued that while the EMT-P NSC may have been the framework upon which the BHSc: EMC was first based, the degree had evolved so much over the preceding five years that in its current version it no longer resembled the EMT-P NSC; in fact it was a completely different training package.

Adding to this, it soon became clear that unlike the EMT-P: NSC, the BHSc: EMC degree lacked a formal, single, generally agreed document that explicitly and comprehensively described it in regard to the content that was formally required to be taught, the

instructional design needed to deliver the content, and the minimum competencies that graduates needed to show at the end of each year of the degree as a result of what they had learnt. This in no way means that these requirements did not exist at all; they just did not exist as a result of a consensus for all BHSc: EMC programmes in SA, in a single document, such as that which the EMT-P: NSC had (Durban University of Technology 2018).

When the search for a valid and reliable tool proved unsuccessful, the search was extended to locate an accepted methodology that could be scaffolded on to build a process to review the BHSc: EMC curriculum. While the search revealed that curriculum reviews are generally locality and discipline specific (Bhavard 2010) and as a result no standardised template should therefore exist, it also revealed that it was reasonable to use an audit tool that reflected the programme objectives, which are derived from a combination of the programme goal and the communities of interest and are specific to the competencies attained in the programme. These programme objectives are competencies which graduates are required to have on completion of the programme and ideally represent three separate but interconnected domains. As described by Hoque (2016), these include the following:

- Programme cognitive objective

The graduate will be able to demonstrate the ability to comprehend, apply and evaluate the clinical information relative to his role as an entry-level paramedic in his respective country of employment.

- Programme psychomotor objective

The graduate will be able to demonstrate technical proficiency in all skills necessary to fulfil the role of entry-level paramedic in his respective country of employment.

- Programme affective objective

The graduate will be able to demonstrate personal behaviours consistent with professional and employer expectations for the entry-level paramedic in his respective country of employment.

3.3.1. Establishing a methodological framework for a curriculum review

The term “curriculum” is defined as the courses offered within the academic learning hierarchy (The Glossary of Education Reform 2020). The Glossary of Education Reform (2020), a comprehensive up-to-date resource that describes widely used educational

terms, concepts and strategies for journalists, parents and community members, expands further on this term and provides a more detailed explanation of the term, stating that it refers to the specific learning outcomes, study units, assessments and materials used to organise and teach a particular course. Ebert, Ebert and Bentley (2013) define a curriculum as the means and materials with which students will interact for the purpose of achieving specific educational outcomes, while Prideaux (2013) maintains that a curriculum includes all the planned learning experiences of an educational institution and typically exists on three levels.

Level one of a curriculum, Prideaux (2013) contends, is that which is planned for the students, while level two describes that which is actually delivered to the students and level three outlines what students ultimately experience. Overall, although definitions of the term "curriculum" continue to be debated and appear inconsistent at times, they share a commonality and that is a description of what students should know and how they come to know it. This commonality becomes the premise for the definition of a curriculum in this study. Accordingly, in this study, the term "curriculum" refers to the knowledge and skills students enrolled for the BHSc: EMC degree were expected to learn, which included the learning standards or learning objectives they were expected to meet; the units and lessons that they were taught; the assignments and projects received; the books, materials, videos, presentations and readings used; and the tests, assessments and other methods used to evaluate their overall learning.

Bharvad (2010) explains that a curriculum review is an academic, staff-led critical examination of an educational course or programme for the purpose of optimising the learning outcomes of that programme. Davenport, Spath and Blauvelt (2009), in agreement with this explanation, highlight that it is important for a curriculum to undergo periodic review as this ensures and maintains programme quality and, in so doing, continually improves student learning experiences.

According to Bharvad (2010), the focus of a curriculum review may include curriculum design; the learning environment; instructional processes; and resources and materials used in the instructional processes. Another essential point is that the focus is dependent on the educational facility's definition of the term "curriculum". In the review of the University of Oklahoma's College of Pharmacy, Britton *et al.* (2008) state that a curricular review forms part of a quality improvement initiative for professional programmes and should include all the necessary stakeholders; namely, students, faculty members and practitioners in the field. The basis of the review process is to identify gaps or

redundancies in course content and it also increases communication among stakeholders.

From the referenced literature it appears that the process of reviewing a curriculum is discipline specific and currently no standardised template exists for this purpose. However, Ebert *et al*. (2013); Prideaux (2013); Bharvad (2010); Davenport *et al.* (2009) and Britton *et al*. (2008) agree that the general constructs of a curriculum and thus, a review thereof, include learning outcomes; learning content; learning and teaching strategies; assessments; alignment; philosophy and standardisation.

3.3.2. The review processes

Therefore, and in the absence of this review template as well as a list of minimum competencies, the review had to take place using a set of specific documents which reflected what needed to be taught, the instructional design needed to deliver the content, and the minimum competencies that graduates needed to show at the end of each year of the degree as a result of what they learnt. These documents altogether contributed to a representative overview of the BHSc: EMC curriculum and formed the basis of the curriculum review for the period 2016–2018, which was conducted on the following broad educational constructs: learning outcomes; content; learning and teaching strategies; assessments; alignment; philosophy and standardisation. These documents are presented in Table 3.1.

Table 3.1: Documents used to review the BHSc: EMC Curriculum.

Document name and date	Description
BHSC: Self-Evaluation Report 2018	The BHSc: EMC programme for the period 2015–2018 was reviewed by the academic staff involved against various criteria which the academic staff used to score the programme. The responses were noted by the executive dean of the Health Sciences Faculty to which the BHSc: EMC programme belongs.
BHSc: EMC handbooks 2016, 2017 and 2018	The BHSc: EMC handbooks outline the programme rules, learning programme structure, assessment and moderation methods and subject content, including prerequisites and co-requisites.

BHSc: **EMC curriculum map 2015**	The BHSc: EMC curriculum map provides an overview of the BHSc: EMC programme according to each year of study.
Module Descriptors 2016	The module descriptors outline the module content taught in each module across the four years within the BHSc: EMC curriculum.

3.4 Addressing objectives 2 and 3

The study utilised a ESMM undertaken in two phases. The overall aim of this specific design was to create a contextually relevant and appropriate questionnaire that could be used to investigate the impact the BHSc: EMC degree has had on graduate employability skills as well as identify the impact it has had on their work readiness. Phase one of data collection was conducted using semi-structured interviews while phase two was conducted using a Likert-style survey. To suit the data collection requirements and to appropriately address each objective, phase one of the sequential mixed method exploratory design ensued.

3.4.1. Phase one – Qualitative

Phase one of addressing objectives 2 and 3 consisted of interviewing a purposefully targeted group of representative individuals to help develop the type and range of questions that needed to go into the survey that was to be sent to the total population (N = 41). Purposive sampling, as described by Brink *et al.* (2012), is a type of non-probability sampling which is based on the researcher's judgement of participants who are considered to be representative of the phenomenon in question. Because the researcher formed part of the study population, they had insight into the phenomena being studied and was therefore able, through consultation with the study supervisors and key stakeholders, to select an appropriate sample to be interviewed. These individuals were considered accessible and information rich, were not known to have antagonistic feelings related to their time at the HEI under study, and were considered sufficiently articulate to be able to communicate the required information in a manner that would benefit the study. The interviews were based on a semi-structured interview guide (Appendix 3.1) which guided the process but also allowed graduates an opportunity to express their views in regard to the BHSc: EMC in their own words. The interview guide contained broad topical questions so as to not come across as leading, but to ensure that focused information that could be used to develop the questionnaires for phase 2 could be collected.

3.4.2. Recruitment of phase one participants

Participants selected for the interviews were sent electronic invitations on WhatsApp, a social messenger application, to participate in the study. Attached to the electronic invitation was a letter of information (Appendix 3.2) explaining all the details of the study, including the aim and objectives. Also attached was a consent letter (Appendix 3.3) for participants to sign on agreeing to participate. In this way, informed consent was requested from each participant.

Following the participants' agreement to participate in the study, the researcher scheduled individual virtual interviews via WhatsApp. Eighteen participants agreed to participate in this phase of the study. The interviews were held either electronically on WhatsApp using voice notes or physically at a place deemed convenient for both the researcher and the participant. To maintain anonymity, participants were not asked for their name, rather they were assigned a number from one to 18. The electronic interviews were recorded using the WhatsApp voice note recorder feature, while the physical interviews were recorded using a cell phone voice recorder. The researcher continuously interviewed participants until data saturation occurred. Data saturation, as explained by Brink *et al.* (2012), is the point at which no new data emerges from data collection which indicates that an appropriate sample size has been reached, as this sampling method does not explicitly pre-outline a required sample size. Once data saturation was achieved, the researcher proceeded to analyse the data, identifying key themes from which questions were created for the survey that was to be used in phase two.

3.4.3 Phase Two – Recruitment of participants

Etikan, Musa and Alkassim (2016) describe total population sampling as a technique which uses the entire population that meets the inclusion criteria for the study being conducted. This type of sampling is also used when the population being studied is small. Having said this, total population sampling was used for phase two due to the small study body of the BHSc: EMC who met all the inclusion criteria of the study and to increase the accuracy of the yielded results.

3.4.4 Phase two – Data collection

In phase two, a Likert-style questionnaire designed from the information obtained in phase one was distributed to the total population of participants which included the 18 participants who had participated in phase one. An information letter was included at the beginning of the survey for participants to read and accept if they wished to take part in the study.

3.4.5 Piloting the questionnaire

According to Brink *et al*. (2012), the practicality of a research study can be tested by conducting a pilot study using a representative of the sample or population planned to be used in the actual study. In this study, a pilot study was done on five BHSc: EMC graduates who belonged to the total population but who, as a result of their involvement in the pilot study, were not included in the actual study. The comments and suggestions of the graduates were considered, and the appropriate adjustments were made to the questionnaire prior to its final distribution. The questionnaire was distributed to the total population of participants through the electronic dissemination of the QuestionPro survey link.

3.5 Data analysis

As previously mentioned, the study consisted of two phases, with phase one entailing the collection of qualitative data from the transcribed interviews and phase two the collection of quantifiable data from the Likert-scale questionnaire.

3.5.1 Phase one – Qualitative data analysis

Qualitative research requires a rigorous and methodical approach to ensure the study yields useful results (Nowell *et al.* 2017). For this reason, for the qualitative phase, following the semi-structured interviews, participants' responses were recorded and transcribed, and entered into a Microsoft Excel spreadsheet where thematic analysis was used to analyse the data to develop a thematic framework to further analyse the data.

During the interviews, each participant was given a participant number from 1 to 18 to ensure anonymity and confidentiality. The responses from the interviews were transcribed using Microsoft Excel workbook. Each interview question was given its own worksheet within the workbook. The responses to each question were copied and pasted to the corresponding question and were then reviewed by the researcher who coded the responses. The identified codes were then grouped into key themes. Some themes shared common grounding and were collapsed into a larger over-arching theme to narrow them down and make the data more manageable. To prevent bias in this process, the researcher developed the codes and themes from the actual words of the respondents. In some cases, however, the researcher summarised the responses and provided a shortened code which still encompassed the essence of the response. As an added measure against bias, the study supervisors checked the codes and themes

against the transcribed data. Once key themes were identified and agreed to, a questionnaire was developed from the data for phase two of data collection.

3.5.2 Phase two – Quantitative data analysis

The quantitative questionnaire data was analysed using the latest version of Microsoft Excel and the QuestionPro Survey Report feature. The QuestionPro Survey Report feature provides statistical analysis of responses to each survey question. A chi-square test for independence, which compared two variables in a contingency table in order to see if they are related, was also conducted.

3.6 Population

A population, as described by Brink *et al*. (2012), is the group of people or objects that possess a common characteristic of interest to the researcher. The chosen population for this study was three cohorts of BHSc: EMC graduates from the year 2016 to the most recent batch of graduates in 2018. The population consisted of 47 graduates all of whom met the stipulated inclusion criteria for the study. The researcher was excluded from the population leaving a total of 46, and a further five were excluded for the pilot study, this left 41 eligible graduates who met the inclusion criteria of the study.

3.6.1 Population justification

The BHSc: EMC programme at an HEI in KZN for the period 2016–2018 was used for this study, as 2016 marked the first year that the professional degree course was run and 2018 marked the most recent graduate at the time when this study commenced. The BHSc: EMC programme at an HEI in KZN was selected as this was the programme that the researcher was exposed to and naturally had questions about its effectiveness in preparing graduates for independent practice.

3.7 Sampling method

The study was conducted in two phases. In phase one, purposive sampling was used as 18 participants from the 2016–2018 BHSc: EMC cohorts were selected and interviewed. In phase two, total population sampling was used, as all 41 graduates between 2016 and 2018 were invited to complete a Likert-style questionnaire which was designed from the data obtained in phase one. The questionnaire included closed-ended questions which were predicated on the key themes that emerged from the individual interviews.

Number of Graduating Participants		
2016	21 (-2 for pilot)	18

2017	17 (-2 for pilot)	14
2018	9 (-1 for pilot)	8
Total	47 – 5 – [1= researcher] =	**41**

3.8 Delimitations

Delimitations highlight the boundaries of the research study and are based on the researcher's inclusion and exclusion criteria. The purpose of delimitations is to narrow a study down in order to make it more manageable and increase its relevancy to the phenomenon being studied (Theofanidis and Fountouki 2018). For this reason, only BHSc: EMC graduates from an HEI in KZN who graduated between the years 2016 and 2018 were included in the study. A possible implication of this is that the study findings reflect only on the population under study and are not generalizable.

3.9 Limitations

Theofanidis and Fountouki (2018) explain a limitation as an "imposed" restriction that is out of the researcher's control. The authors explain that even though the limitation is out of the researcher's control it still has the ability to influence the study design, results and conclusions. For this reason, the limitations of a study should be acknowledged. A limitation of this study was the low population size, and the low response rate received in phase two.

3.10 Ethical considerations

The study received ethics approval from the Institutional Research Ethics Committee (IREC) (Appendix 3.3) at the Durban University of Technology in KZN (IREC 123/19).

3.10.1 Anonymity and confidentiality

Anonymity refers to keeping the identity of participants unknown, even to the researcher (Brink *et al*. 2012). The authors explain confidentiality as being the responsibility of the researcher to keep the identity of participants unknown to third parties. Anonymity in this study was assured by omitting identifiable data in interviews. Instead, a code was used during interviews and on questionnaires. The code used classified participants according to their order of participation in the study and no identifiable data was captured. In addition, the codes were used in the discussion of the data. Confidentiality was assured by storing all data hardcopies in a locked cupboard and the electronic files in a password protected folder. Only data that was deemed beneficial to the field was divulged in the results of the study. Even in this case, however, the anonymity and confidentiality of participants were protected.

3.10.2 Principle of beneficence – Freedom from harm and exploitation

The principle of beneficence is described by Varkey (2021) as being the obligation of those in healthcare to perform actions that are solely for the benefit of the patient. The gist of the principle is to protect and defend the rights of others and prevent harm. Purposive sampling was used in phase one and targeted information-rich individuals. This was used to help develop the type and range of questions that needed to go into a survey that was to be sent to the total population. Total population sampling was used for phase two due to the small study body of the BHSc: EMC and to increase the accuracy of the yielded results. Each participant received an information and consent letter at the start of the interview and prior to completing the questionnaire that explained the aim and objectives of the study so as to ensure that informed consent was obtained. The information letter further explained that participation in the study was voluntary and that participants could opt out of the data collection process at any time. The information letter included the researcher's and research supervisors' contact details for participants to use any time if they had a query.

To achieve freedom from harm, the researcher held the interviews at a mutually agreed venue and at a mutually agreed time. The researcher was dressed in civilian clothes so as to not create a conflict of interest and make respondents feel pressured to participate in any way. In addition, the names of the respondents were not recorded; instead, participants were assigned a participant number from 1 to 18. The participants were made aware that their responses would be recorded and that selected quotes from the interview might be included in the results of the study, but that identifiable data would be left out of the data collection process to ensure anonymity. Each interview recording and questionnaire was designated a unique code to protect the identity of the participants, who were assured that no personal identifiers would be divulged. Throughout the research process, respondents were assured that they would not, at any time, be subjected to direct and/or indirect harm.

3.10.3 Principle of beneficence – Risk/benefit ratio

Continuing with the principle of beneficence, during the data collection process all the captured data was stored on the researcher's personal computer which was password protected. The researcher had sole administrator rights over this computer, thus rendering remote access by a third party impossible. The electronic data was stored in an encrypted folder while the hardcopies were kept in a locked cupboard to ensure confidentiality. Confidentiality was maintained throughout the entire research process

and the research posed no immediate or long-term risks to the study participants. Only data that was beneficial to the research area was included in the results of the study and sensitive information was not divulged. In addition, only the researcher and the study supervisors had access to the raw data. Once the study had been completed, the data was stored in an encrypted file and will be kept for a period of five years after which the file will be destroyed. The aim of the study was to investigate the effectiveness of the BHSc: EMC qualification at an HEI in KZN in preparing paramedic graduates for independent practice. It was anticipated that this understanding would benefit further paramedic training, graduate performance and, ultimately, patient outcomes and survival rates in SA.

3.10.4 Principle of respect and human dignity – Right to self determination

"Human dignity captures the notion that every human being is uniquely valuable and therefore ought to be accorded the highest respect and care" (Andorno 2014). In keeping with this definition, Varkey (2021) explains that respecting the principle of autonomy or self-determination obliges the researcher to disclose all pertinent information necessary for self-determination and supports informed consent and confidentiality. Since the researcher is a BHSc: EMC graduate who formed part of the 2016–2018 cohort being studied, the researcher was able to reassure participants, urging them not to feel pressured into participating by reminding them that participation was completely voluntary and that they reserved the right to drop out of the study at any time. The participants were not persuaded or coerced in any way nor were they offered remuneration to participate in the study.

3.10.5 Principle of respect and human dignity – Right to full disclosure

Furthermore, and in relation to respect and human dignity outlined by Andorno (2014) and the principle of autonomy described by Varkey (2021), the researcher ensured that the letters of information which were sent out to all the participants fully explained the study in plain English. This was done to ensure that participants made an informed decision about their participation in the study. Adding to this, in the case of any queries, the contact details of both the researcher and the research supervisors were made available.

3.10.6 Principle of justice

Varkey (2021) describes the principle of justice as "fair, equitable, and appropriate treatment of persons". Throughout the research process, participants were treated fairly

and their privacy was considered to be of paramount importance. Participants who refused participation in the study or elected to drop out did not encounter any prejudice. The researcher ensured that all participants received and signed a consent letter which also gave participants an option to be personally notified once the study has been completed and the results made public. During the research process, no complaints were lodged against the researcher or the study.

3.11 Conclusion

This chapter contained an overview of study design and the methodology used to collect and analyse the data to address the three study objectives. The first phase included a document review while the second and third phases formed part of a ESMM design. The chapter also described the population, the setting and the curriculum that was investigated. Finally, it discussed the limitations and ethical considerations adhered to throughout the study.

CHAPTER FOUR
RESULTS

4.1. Introduction

This chapter presents the overall findings of the study and is segmented into three separate but interconnected sections. Section 1 is dedicated to addressing objective 1 of the study, which was to critically appraise the design and content of the BHSc: EMC programme. Section 2 addresses objective 2 of the study, which was to investigate the impact the BHSc: EMC degree has had on graduate employability skills. To ensure clarity, section 2 is divided into two parts, Part A and Part B, each part representing a phase of the exploratory sequential mixed method design adopted to address objectives 2 and 3. As a result, section 2: Part A presents the findings of purposeful and targeted interviews that were conducted to establish a contextually valid and relevant bespoke questionnaire that was then used to elicit quantifiable participant responses. Section 2 Part B presents these responses. The third and final section addresses the third and last objective of the study which was to examine graduate perceptions of BHSc: EMC regarding work readiness.

4.2. Section 1: Objective 1

This section exclusively addresses objective 1 and presents the findings of the review of the BHSc: EMC curriculum that was delivered to students during the period 2016–2018.

4.2.1 The goal of the BHSc: EMC curriculum

The promulgated goal of the BHSc: EMC, as per SAQA (2021) was to produce Advanced Life Support (ALS) professionals who are independent clinical practitioners and rescue specialists within the emergency medical care and rescue environments. The BHSc: EMC curriculum map describes the goal of the programme in more detail, indicating that the goal of the qualification was to develop a learner who is competent in the knowledge, attitude, insight and skills required for the prehospital Emergency Medical Care and Rescue (EMCR) profession (Durban University of Technology 2018c). It further describes the graduate as an individual who would be able to competently apply and integrate theoretical principles, proven techniques, practical experience, clinical procedures and appropriate skills in order to

- provide independent, specialised EMCR services to all community sectors

- apply management, education and research skills during independent practice and function in a supervisory, clinical governance and/or quality assurance capacity within EMS and healthcare environments
- become a reflective practitioner and lifelong learner within the EMCR profession.

As indicated in chapter 3, while the BHSc: EMC curriculum was predicated on a defined goal in respect to what graduates needed to exit with, there was no nationally espoused and agreed minimum standard that was locatable at the time when this review was conducted and on which the review could be based. Hence, this review, in accordance with Ebert *et al*. (2013); Prideaux (2013), Bharvad (2010) and Davenport *et al*. (2009), was conducted on the following broad generally agreed educational constructs: learning outcomes, content, learning and teaching strategies, assessments, alignment, philosophy and standardisation.

4.2.1.1 Learning outcomes

Learning outcomes are statements that describe the knowledge or skills students would have acquired at the end of a particular training period (Chatterjee and Corral 2017). The standard format of a learning outcome includes an action verb, content and context. Ideally, learning outcomes should be aligned to elements summarised by the SMART mnemonic. Accordingly, learning outcomes should be *Specific, Measurable, Achievable, Relevant and Time-bound.*

Table 4.1 describes the learning outcomes for three core modules that the population under study were registered for during the 2016–2018 period. The remaining learning outcomes for all other modules are described in Appendix 4.1. The outcomes are described in respect to the level of alignment of each to SMART considerations.

Table 4.1. Learning outcomes for BHSc: EMC core modules

Year	Learning outcomes					
1	**Subject: Emergency Medical Care IA**	**S**	**M**	**A**	**R**	**T**
	The learner will be able to:					
	Manage the prehospital emergency scene and patient, solve problems, and apply theoretical understanding of emergency medical care in the effective assessment and treatment of medical emergencies at an introductory level and with reference to the specific systems and disorders included in Emergency Medical Care I.		Y	Y	Y	
	Justify all interventions and omissions related to prehospital emergency patient and scene assessment and treatment based on the application of the theoretical principles of patient		Y	Y	Y	

	and scene assessment, disease processes and Emergency Medical Service systems as detailed in the module.					
	Subject: Emergency Medical Care IB	**S**	**M**	**A**	**R**	**T**
	The learner will be able to:					
	Demonstrate the use of basic emergency medical equipment.	Y	Y	Y	Y	
	Demonstrate the ideal approach to any patient in an emergency situation by referring to the primary and secondary surveys.	Y	Y	Y	Y	
	Demonstrate physical examination techniques used for assessment of specific body regions.	Y	Y	Y	Y	
1	Demonstrate basic airway management techniques for the trauma patient.	Y	Y	Y	Y	
	Demonstrate the administration of oxygen using the appropriate oxygen delivery device/s.	Y	Y	Y	Y	
	Demonstrate the management of a patient with musculoskeletal injuries.	Y	Y	Y	Y	
	Demonstrate the management of a patient with soft-tissue injuries.	Y	Y	Y	Y	
	Demonstrate the management of a patient with environmental emergencies.	Y	Y	Y	Y	
	Demonstrate the management of a pregnant patient during normal labour and delivery.	Y	Y	Y	Y	
	Demonstrate the appropriate information to be elicited during the obstetrical patient's history.	Y	Y	Y	Y	
	Subject: Clinical Practice I	**S**	**M**	**A**	**R**	**T**
	The learner will be able to:					
	Illustrate the ability to communicate effectively with the patient and the crew in the emergency care environment.	Y	Y	Y	Y	
	Demonstrate an ability to perform the required clinical skills and procedures relevant to the emergency care environment.		Y	Y	Y	
	Compose and appraise patient case studies and presentations.		Y	Y	Y	
	Demonstrate an ability to assess, diagnose and institute appropriate management strategies for critically ill and injured patients.		Y	Y	Y	
	Show how to utilise the emergency medical equipment available to emergency care practitioners up to an intermediate life support level.	Y	Y	Y	Y	
	Function within the daily operational environment of an emergency service which will include the checking of the emergency vehicle and emergency medical care equipment.	Y	Y	Y	Y	
	Produce accurate patient report form records which document the exact details relating to the incident including patient management.	Y	Y	Y	Y	

2	**Subject: Emergency Medical Care IIA**	**S**	**M**	**A**	**R**	**T**
	The learner will be able to:					
	Manage the prehospital emergency scene and patient, solve problems, and apply theoretical		Y	Y	Y	

	understanding of emergency medical care in the effective assessment and treatment of trauma and medical emergencies at an introductory level and with reference to the specific systems and disorders included in Emergency Medical Care I.					
	Identify the epidemiology, anatomy, physiology, pathophysiology, assessment findings and management of cardiovascular emergencies.		Y	Y	Y	
	Subject: Emergency Medical Care IIB	**S**	**M**	**A**	**R**	**T**
	The learner will be able to:					
	Demonstrate the advanced airway management techniques used to manage the airway.	Y	Y	Y	Y	
	Demonstrate appropriate reasoning and clinical decision-making.	Y	Y	Y	Y	
2	Demonstrate appropriate communication with the patient and others at the scene.	Y	Y	Y	Y	
	Demonstrate appropriate professional and ethical approaches to the patient and other healthcare professionals.	Y	Y	Y	Y	
	Demonstrate an adequate primary survey, rapid detection and treatment of hypoxaemia and inadequate perfusion.		Y	Y	Y	
	Demonstrate the prehospital management of the medical emergencies as outlined in the Emergency Medical Care Theory II A & B.	Y	Y	Y	Y	
	Subject: Clinical Practice II	**S**	**M**	**A**	**R**	**T**
	The learner will be able to:					
	Illustrate the ability to communicate effectively with the patient and the crew in the emergency care environment.	Y	Y	Y	Y	
	Demonstrate an ability to perform the required clinical skills and procedures relevant to the emergency care environment.		Y	Y	Y	
	Compose and appraise patient case studies and presentations.		Y	Y	Y	
	Demonstrate an ability to assess, diagnose and institute appropriate management strategies for critically ill and injured patients.		Y	Y	Y	
	Show how to utilise the emergency medical equipment available to emergency care practitioners up to an intermediate life support level.	Y	Y	Y	Y	
	Function within daily operational environment of an emergency service which will include the checking of the emergency vehicle and emergency medical care equipment.	Y	Y	Y	Y	
	Produce accurate patient report form records which document the exact details relating to the incident including patient management.	Y	Y	Y	Y	

3	**Subject: Emergency Medical Care IIIA**	**S**	**M**	**A**	**R**	**T**
	The learner will be able to:					

	Demonstrate a sound knowledge and meaningful understanding of theory relating to advanced prehospital airway management.	Y	Y	Y	Y	
	Manage the prehospital emergency scene and patient, solve problems and apply theoretical understanding of emergency medical care in the effective assessment and treatment of respiratory emergencies with reference to the specific systems and disorders included in Emergency Medical Care III A.		Y	Y	Y	
3	**Subject: Emergency Medical Care IIIB**	**S**	**M**	**A**	**R**	**T**
	The learner will be able to:					
	Demonstrate a sound knowledge and meaningful understanding of theory relating to the assessment and management of patients who have encountered a toxic substance and patients with endocrine and urological emergencies.		Y	Y	Y	

3	**Subject: Clinical Practice III**	**S**	**M**	**A**	**R**	**T**
	The learner will be able to:					
	Illustrate the ability to communicate effectively with the patient and the crew in the emergency care environment.	Y	Y	Y	Y	
	Demonstrate an ability to perform the required clinical skills and procedures relevant to the emergency care environment.		Y	Y	Y	
	Compose and appraise patient case studies and presentations.		Y	Y	Y	
	Demonstrate an ability to assess, diagnose and institute appropriate management strategies for critically ill and injured patients.		Y	Y	Y	
	Show how to utilise the emergency medical equipment available to emergency care practitioners up to an intermediate life support level.	Y	Y	Y	Y	
	Function within the daily operational environment of an emergency service which will include the checking of the emergency vehicle and emergency medical care equipment.	Y	Y	Y	Y	
	Produce accurate patient report form records which document the exact details relating to the incident including patient management.	Y	Y	Y	Y	
4	**Subject: Emergency Medical Care IVA**	**S**	**M**	**A**	**R**	**T**
	The learner will be able to:					
	Demonstrate a sound knowledge and meaningful understanding of theory relating to the assessment and management of neonatal and paediatric emergencies		Y	Y	Y	
	Outline the appropriate care given for the neonate and paediatric patient during transportation.	Y	Y	Y	Y	
	Subject: Emergency Medical Care IVB	**S**	**M**	**A**	**R**	**T**

	The learner will be able to:					
	Manage the prehospital emergency scene and patient, solve problems and apply a theoretical understanding of emergency medical care in the effective assessment and management of medical conditions with reference to the specific systems and disorders included in Emergency Medical Care IV B.		Y	Y	Y	
	Justify all interventions and omissions related to prehospital emergency patient and scene assessment and treatment based on the application of the theoretical principles of patient and scene assessment, disease processes and Emergency Medical Service systems, as detailed in the module.		Y	Y	Y	
	Subject: Clinical Practice IV	**S**	**M**	**A**	**R**	**T**
	The learner will be able to:					
	Illustrate the ability to communicate effectively with the patient and the crew in the emergency care environment.	Y	Y	Y	Y	
4	Demonstrate an ability to perform the required clinical skills and procedures relevant to the emergency care environment.		Y	Y	Y	
	Compose and appraise patient case studies and presentations.		Y	Y	Y	
	Demonstrate an ability to assess, diagnose and institute appropriate management strategies for critically ill and injured patients.		Y	Y	Y	
	Show how to utilise the emergency medical equipment available to emergency care practitioners up to an intermediate life support level.	Y	Y	Y	Y	
	Function within an emergency service's daily operational environment which will include the checking of the emergency vehicle and emergency medical care equipment.	Y	Y	Y	Y	
	Produce accurate patient report form records which document the exact details relating to the incident including patient management.	Y	Y	Y	Y	

As indicated earlier, learning outcomes are statement that describes the specific knowledge, skills, understanding and application a learner will achieve through each component of the programme. For learning outcomes to be of any value, they must include an action verb, content and context but also align to the SMART considerations. At the outset, it becomes clear that the majority of learning outcomes for the core modules, listed in Table 4.1 and Appendix 4.1, lacked the key SMART considerations that one would ideally find in the standard learning outcome format.

4.2.1.2 Curriculum structure and content

The BHSc: EMC was delivered over four years. The first-year EMC module placed significant emphasis on the introductory concepts of emergency medical care and the emergency medical service as a whole. The same was true for the service subjects such as Anatomy and Physiology I, which dealt with an introduction to anatomy and the body systems. The EMC module dealt with basic and intermediate life support for adults, obstetrics, paediatrics and neonates, while medical rescue covered basic medical rescue modules such as fire, search and rescue and vehicle extrication. The second year of the BHSc: EMC focused on specific system emergencies and trauma such as respiratory emergencies and soft tissue trauma. In line with this was the introduction of Pharmacology which introduced the basic concepts of drug therapy. As a step up from Medical Rescue I, Medical Rescue in second year covered more complex content such as navigation and survival techniques. The third year of the degree focused mainly on advanced airway management and mechanical ventilation, arrhythmias and arterial blood gas analysis, while the rescue aspect dealt with Advanced Medical Rescue (AMR) modules such as confined space and trench rescue. The fourth and final year of the BSc: EMC focused primarily on paediatric and neonatal clinical assessment and management. Service subjects included Management Practice I and Educational Techniques. The focus in this year was on creating a graduate with research, management and teaching capabilities.

4.2.1.2.1 Appraisal of first-year structure and content

Emergency Medical Care IA is listed as a co-requisite for EMC IB. The same is true for Medical Rescue IA and IB. However, Emergency Medical Care IA should be listed as a prerequisite for EMC IB instead of as a co-requisite. Without this change, students who are unsuccessful in EMC IA will still be allowed to complete EMC IB. This is not in the best interests of the student as EMC IA is a prerequisite for EMC IIA. This means that the student will not be allowed to register for EMC IIA until EMC IA has been completed. The student will then have to re-register for and complete EMC IA in the following year along with EMC IB, which may have already been completed. To prevent this, EMC IA should be listed as a prerequisite for EMC IB to prevent unsuccessful candidates from moving forward to the next module. The same should be done for Medical Rescue IA and IB.

Basic Sciences are covered in the first year in the form of physics and chemistry modules. The subject content for chemistry includes chemical bonding and basic

chemical calculations which students may find useful when dealing with acid–base balances in third year. Concepts such as Boyle's law should be added which will help students with understanding mechanical ventilation. Acid–base balance and mechanical ventilation are both covered in third year. It may be useful for chemistry to be done in third year to facilitate the understanding of these study units. The physics content includes basics of physics; mechanics; hydrostatics and heat. These concepts tie in with the background knowledge that may be required for fire and extrication in Medical Rescue IA. Therefore, the physics portion of basic sciences should remain in first year.

4.2.1.2.2 Appraisal of second-year structure and content

Emergency Medical Care IIB covers the kinematics of trauma; soft tissue injuries; burns; management of the entrapped patient; and polytrauma management. This is valuable information that ties in with fire and extrication which is done in MR IA – a first-year module. Ideally, this content should be done within the same year. Physiology II, a second-year module, covers pregnancy, which includes obstetrics, labour and delivery. This is deemed to be more suitable for EMC IB content. Being exposed to the EMC IB content without the foundational knowledge offered in Physiology II may be difficult for a learner at first-year level who is likely to be a school leaver without prior knowledge or experience relating to anatomy, physiology and the emergency medical care of a pregnant patient. This gap in knowledge may have a negative impact on the student's performance in the EMC IB module.

4.2.1.2.3 Appraisal of third-year structure and content

Medical Rescue IIIA covers confined space and hazard control, atmospheric monitoring and ventilation and disaster management. Hazmat should be included in this MR module to ensure that students have a thorough understanding of potential dangers and appropriate control methods in such environments.

4.2.1.2.4 Appraisal of fourth-year structure and content

Emergency Medical Care IVB covers the emergency management, clinical assessment and transportation of paediatrics and neonates as well as the transportation of the critically ill/injured by road or air. Clinical Practice IV includes mastery of emergency medical service operational systems; professional practice; emergency medical care at ALS level; and documentation and record keeping. Throughout the degree, the second semester of fourth year is the first time the students are exposed to the advanced clinical assessment and emergency management of paediatric and neonatal patients. Exposure

to these categories of patient so late in the degree may prove to be overwhelming for students. Hence, these patients should be introduced earlier in the programme to allow students to become comfortable with adjustments in drug dosages and medical management. Another study unit which is covered in EMC IVB is transportation of the critically ill/injured patient by road or by air. An aviation medicine module should accompany this to ensure students have a comprehensive understanding of aeromedical patient management and transport. In addition, the Clinical Practice IV module should dedicate a set number of hours to intensive care unit (ICU) ambulances which deal solely with the interfacility transfer of patients. This gives students better exposure than regular response vehicle shifts where the ALS practitioner may get one or two transfers for the whole 12-hour shift in comparison to a shift in an ICU ambulance that where the entire shift is devoted to interfacility transfers.

4.2.1.3 Learning and teaching strategies

According to Tanner (2013), learning and teaching strategies are methods of teaching that assist students with grasping the subject content. The learning and teaching strategies that are used within the BHSc: EMC can be found in Table 4.2.1 and have been selected to aid the achievement of the graduate attributes listed below. The major modes of delivery for core component modules (also known as subjects) such as EMC include large classroom-based activities such as lectures and case presentations which comprise 40% of total learning time. The remaining 60% of learning time is dedicated to structured independent study through traditional and e-learning formats: reading, writing, research activities, presentations, tutorials, assignments and assessments. Table 4.2.1 provides an overview of the teaching strategies that reflect the instructional design of the BHSc: EMC. The variety of learning and teaching strategies used is appropriate and caters for the different learning styles of students.

Blended learning and teaching strategies encourage students to develop critical thinking and reflective practice, as well as foster independent and lifelong learning through the application of professional knowledge and research-related activities. From this, the graduate should be able to practise independently and continually improve their own practice through reflective and critical thinking.

Table 4.2.1: BHSc: EMC learning and teaching strategies

Core components	Learning and teaching strategies

Emergency Medical Care	• Large class activities such as lectures and case presentations. (40%) • Structured independent study through traditional and e-learning formats: reading, writing, research activities, presentations, tutorials, assignments, and assessments. (60%)
Clinical Practice	• This is a practical module which requires the students to be treating patients while working in hospitals, clinics or ambulances.
Medical Rescue	• Formal lectures • Practical demonstrations • Individual and group work practical exercises • Scenarios and problem-based learning

4.2.1.4 Assessments

Assessments are used to test whether or not the student has obtained the learning outcomes associated with the module taught (Le Grange and Reddy 1998). The BHSc: EMC makes use of formative or continuous assessment, which Le Grange and Reddy (1998) describe as including frequent, interactive assessments focused on student progress and understanding, which allows for the identification of the learning needs and appropriately informs the adjustment of teaching. The use of formative assessment allows lecturers to be better prepared to meet the diverse needs of students through the variety of assessment methods used and the adaptation of teaching to increase understanding and the achievement of learner outcomes. The methods of assessment used in the BHSc: EMC are as follows:

- Portfolios
- Simulations
- Written assignments
- Written tests
- Case studies and case presentations
- Peer group projects and assignments
- OCSE
- Scenario based assessments

- Online assessments

Simulated patient scenarios in particular, are an invaluable innovative teaching and learning method that promotes a high standard of patient care. However, if assessed incorrectly, this form of assessment can become subjective and unreliable. For this reason, the HEI makes use of the Simulation Assessment Tool Limiting Assessment Bias (SATLAB) tool. This tool, which offers a form of standardisation for assessments, is used in the BHSc: EMC and is also often used at the other HEIs that offer the programme. The student is assessed by three examiners and a moderator, and the entire simulation is video recorded. After the simulation assessment, students are required to undergo a viva voce assessment. During this assessment, students are given the opportunity to either defend or correct decisions made during the simulation. This then allows examiners to give a more reliable and valid assessment mark. This variety of assessment methods allows for the development of the various graduate attributes required for the profession of Emergency Medical Care to be assessed and developed.

4.2.1.5 Alignment

In order to ensure that an academic programme achieves its intended aim, it is essential that it is aligned to a set of minimum standards. These minimum standards serve as a benchmark for academic programmes and ensure academic quality (Webb 1997). The alignment of the BHSc: EMC curriculum cannot be ascertained owing to a lack of PBEC minimum standards as stated by the HEI 2018 Self Evaluation Report (SER). There is also no document that describes the BHSc: EMC in detail or the NSC-P framework it was derived from. For this reason, the curriculum review relied on the HEI 2018 SER; the 2016, 2017 and 2018 BHSc: EMC handbooks; the 2015 BHSc: EMC curriculum map;and the 2016 module descriptors (MD) for each module offered. These documents in combination were used to create a representative overview of the BHSc: EMC for the period 2016–2018.

4.2.1.6 Philosophy

According to the University of Minnesota (2021), a teaching philosophy is a personal reflective statement which encompasses an individual's or institution's beliefs about teaching and learning in the context of a specific discipline. In this research study, the HEI in question believes that all students are individuals and that everyone learns in their own unique way. Hence, the BHSc: EMC makes use of multiple methods of teaching to reach students in a variety of ways. Learning and teaching methods include theory

lectures, groupwork and discussions, simulations, role-play, assignments, case studies, reflective practice portfolios, research proposals and reports and OSCEs. The variety of learning and teaching strategies cater for the different learning styles of students. These strategies assist in developing the various attributes required of the graduates so they are able to function as useful, meaningful professionals in the emergency medical field.

4.2.1.7 Standardisation

Bates *et al.* (2019) describe standardisation as the sharing of standards within a discipline, which allows for increased efficiency, accountability and productivity. The authors further state that, as the presence of standards on their own cannot lead to standardisation, it is imperative for the standards to be first communicated, disseminated and adopted within the respective discipline. According to the SER (Durban University of Technology 2018a), the HEI has tried to achieve standardisation of the BHSc: EMC by using benchmarking activities such as assessment marking with other HEIs in SA thatoffer the BHSc: EMC. Such activities may ensure the standardisation of the BHSc: EMC curriculum content across HEIs in SA. Another way in which the HEIs in SA attempt to achieve standardisation of the BHSc: EMC is through the minimum requirements for enrolment in the programme.

4.2.1.7.1 Minimum admission requirements

The Department of Education (2005) describes minimum admission requirements as the criteria for enrolment in a bachelor's degree programme, with the offering HEI being entitled to specify the appropriate subjects and level of achievement required for entry into the respective programme. The minimum admission requirements that an applicant must have in order to register for the BHSc: EMC are consistent across the four accredited HEIs that offer the programme in SA and, for the HEI in KZN, remained unchanged for the 2016–2018 period (Durban University of Technology 2016; 2017; 2018b). To register, the applicant must have a minimum of 30 subject points, not including Life Orientation, and have passed specific compulsory subjects at the appropriate level (Tables 4.2.2 and 4.2.3).

Table 4.2.2: Subjects required for the National Senior Certificate (NSC) with a bachelor's degree endorsement

Compulsory Subjects	NSC Rating
English	4
Mathematics	4
Life Science and/or Physical Science	4

Table 4.2.3: Subjects required for the Senior Certificate (SC) with matriculation exemption

Compulsory Subjects	HG	SG
English	D	B
Mathematics	D	B
Biology and/or Physical Sciences	D	B

Thereafter, the applicant will be required to complete a medical fitness, physical fitness and environmental evaluation. The BHSc: EMC handbooks do not provide much detail on these assessments, but anecdotal evidence suggests that for the medical fitness evaluation, the applicant is required to have a general medical assessment done at a general practitioner. The general practitioner then completes and signs an Emergency Medical Care and Rescue departmental form as proof of this assessment, which is then stored in the applicant's file. Once the applicant has proven medical fitness, they are invited to undertake the departmental physical fitness evaluation.

The physical fitness assessment was changed in 2016 from an age/gender-based assessment to a standardised assessment regardless of age and gender criteria. The age/gender-based assessment which was conducted until 2016 was used as both the entry physical assessment as well as the programme physical assessment to track physical fitness of enrolled students. The assessment required applicants to complete a physical assessment which comprised of three separate components tailored to the applicant's gender and age. The three components included strength, speed and endurance which were evaluated through push ups, sit ups, shuttle runs and a long-distance run. The number of push ups and sit ups to be completed as well as the distance that had to be run was dependent on the applicant's age and gender. The push ups and sit ups to be completed within one minute ranged from 30–45 depending on the applicant's age and gender. The distance for the long-distance run ranged from 1.2–2.4 km, again depending on age and gender. This meant that an older applicant would have a lower target to reach in these assessments than a younger applicant and the same would be true for a female versus a male applicant.

The 2013 and 2014 PBEC review of the BHSc: EMC highlighted concerns about the structure of the physical fitness assessment, with specific reference to the actual

assessments used and the gender/age-based criteria. As a result, in 2016, the HEI commenced with a new physical assessment which assessed cardiovascular and muscular endurance and now included swimming proficiency as well (Durban University of Technology 2018a). The specific components of the new physical assessment were now a five-kilometre run in 32 and half minutes, a 30-second flexed arm hang test and a 200-metre swim in six minutes (Durban University of Technology 2016b). This change in physical assessment was only incorporated into the BHSc: EMC programme to track the physical fitness of enrolled students; it did not replace the entry physical assessment that applicants had to undertake to enrol in the programme.

It is not clear from the BHSc: EMC handbooks exactly how the environmental evaluation is conducted; all that is mentioned is that the applicant will be subjected to assessments that test for claustrophobia and agoraphobia. On successful completion of these evaluations, applicants have to complete a placement test which assesses basic Mathematics and English (Durban University of Technology 2016a, 2017 and 2018b). The applicant's abilities in these two subject areas are assessed as they give an indication of the applicant's potential for success in the programme. It is upon these foundational English and Mathematics skills that the programme content will be built as the individual moves through the four years of the degree.

4.3. Conclusion for Section 1

The BHSc: EMC represents the professionalization of paramedicine and allows emergency care personnel to access postgraduate qualifications in EMC. The curriculum review discussed here found that the learning outcomes of the various modules in the programme appear not to adhere to the standard format of learning outcomes and the SMART principles. In addition, there appears to be a mismatch in the modules that currently form part of the BHSc: EMC. It was also found that the BHSc: EMC curriculum lacks minimum standards. Without these minimum standards, the alignment of the BHSc: EMC curriculum content cannot be measured.

SECTION TWO: OBJECTIVE 2

PART A

Section 2, Part A provides the results, in particular the key themes that emerged from the interviews of the 18 purposively chosen participants. The interview guide contained 24 questions in total.

4.4 Objective 2 – Interview results

4.4.1 Demographics of interviewees

While the anonymity of informants was assured, the demographics of the interviewees provide the context from which the responses emerged. Insignificant results at $p > 0.05$ are not reported. The responses ultimately informed the development of the study questionnaire used in the next phase.

4.4.1.1 Distribution of participants across graduating cohorts

In response to the question: “When did you complete your BHSc: EMC?”, all participants indicated that they had completed their BHSc: EMC degrees between the years 2016 and 2018, with the majority completing in 2017 (56%) (see Table 4.3).

Table 4.3: Participants’ year of completion of the BHSc: EMC

	Q1 interview	**2016**	**2017**	**2018**	***p***
1	When did you complete your BHSc: EMC?	**6 (33%)**	**10 (56%)**	**2 (11%)**	**0.02**

4.4.1.2 Relevant experience of participants prior to enrolment

Graduates were asked whether they had a prior EMS qualification or relevant experience prior to enrolling in the BHSc: EMC. The majority of the participants (56%) had enrolled for the BHSc: EMC without any prior EMS experience or qualification. Eight participants (44%) had prior EMS experience or qualification, with all of them (100%) admitting to having at least a Basic Ambulance Assistant (BAA) qualification. Three participants (30%) of the ten participants without prior EMS experience had enrolled straight from school (see Table 4.4).

Table 4.4: Prior EMS experience or qualification

	Q2 interview	Yes	No	*p*
2	Did you have prior EMS qualification or relevant experience prior to enrolling into the BHSc: EMC	**8 (44%)**	**10 (56%)**	**-**

4.4.1.3 Participant employment dispersion within South Africa

Graduates were asked in which area they were employed. Thirteen graduates (72%) has successfully found employment within KZN while six graduates (33%) sought employment outside of KZN. Of the 13 graduates employed in KZN, six (46%) were employed in an urban area, six (46%) in a small town and one in a rural area (refer to Table 4.5 below).

Table 4.5: Area of graduate employment

	Q3 interview						
3	In which area are you currently employed?		urban area	small town	rural area	*p*	*p*
	In KZN	**13 (72%)**	**6 (46%)**	**6 (46%)**	**1 (7%)**	**-**	**0.02**
	Outside KZN	**6 (33%)**					

4.4.1.4 Participant employment dispersion in EMS

Graduates were asked what type of unit they worked on within their organisation. The majority of graduates were working operationally on the road, either in a response vehicle (50%) or an ALS ambulance (28%) or both (11%). Two graduates (11%) were not working road operations. One graduate worked on a remote site whiled the other graduate worked in aviation (see Table 4.6).

Table 4.6: Type of EMS units graduates worked on

4	Q4 interview	Road operations			Other		*p*
		16 (89%)			2 (11%)		0.00
		Response vehicle	ALS ambulance	Both	Aviation	Remote site	
	What unit are you working on?	**9 (50%)**	**5 (28%)**	**2 (11%)**	**1 (5.5%)**	**1 (5.5%)**	**0.04**

4.4.1.5 Employer sourcing of rescue services

Graduates were asked if their employer had a designated rescue department or unit. It was accordingly found that half of the graduates worked for an organisation with a designated rescue team while the other half worked for organisations that outsourced their rescue when the need arose (refer to Table 4.7).

Table 4.7: Presence of an organisational rescue department or unit

	Q5 interview	**Designated team**	**Outsource**	***p***
5	Does your employer have a rescue department/unit?	**9 (50%)**	**9 (50%)**	**-**

4.4.1.6 Participant search for employment post-graduation

Graduates were asked how long it took them to find employment after graduation. Twelve graduates (67%) had found employment in less than a month post completion of the BHSc: EMC. Of these graduates, six (50%) were already employed when they graduated and on completion of the degree were converted to an ECP post, while six graduates (50%) had found employment within a month of completing the BHSc: EMC. Six (33%) of the total number of respondents reported finding employment more than a month after graduation (see Table 4.8).

Table 4.8: Time taken to find employment after graduation

6	**Q6 interview**	**Less than a month**		**More than a month**	***p***
		12 (67%)		**6 (33%)**	**0.04**
		Already employed	**Within a month**		**-**
	How long did it take you to find employment after graduation?	**6 (50%)**	**6 (50) %**		

4.4.2 Key themes emerging from the interviews and specific to employability

Under this subheading are the interview responses related to employability obtained from the semi-structured interviews. Participants were asked about whether they had done any extra courses postgraduation; their patient age preferences; medical and trauma-related case preferences; perceptions of rescue competency and confidence; competency and confidence related to specific skills; and their personal strengths and weaknesses as an ECP. The key themes which emerged from the interviews were used to inform the development of the Likert-style questionnaire used in phase two.

4.4.2.1 Additional training requirements post-graduation

Graduates were asked if they had completed any short courses after completing the BHSc: EMC and what their opinion was regarding their experiences of these additional training. The majority of graduates had not yet done any extra courses although some graduates had done at least a Basic Life Support for Healthcare Providers (BLS HCP) which appears to be an entry requirement for some jobs and for available short courses, as the same respondents had also completed the Advanced Cardiac Life Support (ACLS) course. It became clear that while some of the respondents undertook additional training, it did not appear to be an industry requirement for graduates to have any additional training post-graduation. It also appeared as if those graduates who had enrolled in these courses did so for their own benefit to acquire some new knowledge pertaining to skills not included in the BHSc: EMC. They also appeared to have increased their understanding of, and have revised, certain topics covered in the BHSc: EMC. Some notable and supporting statements included the following:

"I found the courses to be helpful because they came as a revision to me and there are some other aspects of the ALS life that I got to understand further and yes they really advanced my knowledge because some of the things I tend to understand better now compared to when I was in the BHSc: EMC." ***P1Q7***

"Some of it was new information while some of it was a recap from what I already studied from the BHSc: EMC but I found it really useful …" ***P3Q7***

"It was useful information also a refresher of the things I already knew." ***P12Q7***

"With Advanced Cardiac Life Support (ACLS) and International Trauma Life Support (ITLS) it was re-packaging of information we had already done." ***P11Q7***

4.4.2.2 Exposure increases confidence

Graduates seemed to associate areas of increased undergraduate theoretical andclinical exposure with confidence. In relation to the assessment and management of different patient populations, the majority of graduates highlighted increased confidencein treating the adult patient due to adequate undergraduate exposure. On the other hand,graduates felt least confident treating paediatric and neonatal populations due to a lack of undergraduate theoretical and clinical exposure.

The relationship between confidence and exposure was further supported when looking at the medical and trauma-related cases that graduates preferred treating. The majority of participants felt least confident with cardiac-related emergencies due to a lack of

clinical exposure during the BHSc: EMC, added to the fact that these emergencies are challenging to diagnose. In the case of trauma emergencies, some graduates felt comfortable with all types of trauma, mostly due to having had EMS experience prior to enrolment in the BHSc: EMC programme.

A similar finding was highlighted in relation to medical rescue. The graduates were asked to compare how they felt about participating in a rescue attempt prior to graduation versus post-graduation. Most graduates felt confident immediately post-graduation as the skills were still fresh in their minds. However, a large majority felt less confident some time post-graduation owing to a lack of postgraduate rescue exposure and skill degradation. When asked about specific rescue areas, participants felt they required more practice or supervision post-graduation, with most graduates specifying aquatic rescue and structural collapse, again due to a perceived lack of undergraduate exposure. In relation to key clinical skills, participants were asked about their competency and confidence levels surrounding performing rapid sequence intubation (RSI) and undertaking an inter-facility transfer (IFT) immediately post-graduation versus now**.** Participants explained that they were not initially confident due to a lack of undergraduate clinical exposure to the skills. In an assessment of personal strengths and weaknesses, graduates again attributed their strengths to areas of increased exposure and weaknesses to areas of less exposure. Below are some of the supporting statements made by participants:

"*I was confident to treat adults as opposed to neonates paediatrics or geriatrics because there are very few considerations to look out for adult patients. Everything is just basic, dosages are the same, you don't have to adjust anything. I needed more practice with neonates. I was really uncomfortable to deal with neonates at the time as opposed to now. I think I've gained experience and knowledge through the short courses that I took. I can say I am a little more comfortable now to tackle neonatal cases than I was post-graduation. More time could have been spent on neonates in the BHSc: EMC maybe a whole module rather than a subsection or a chapter because it's not as easy as the textbook makes it to be.*" ***P3Q12***

"The emergencies I didn't feel confident in was cardiac. Cardiac cases were rare during clinical practice so when it came to tachy and brady arrhythmias, they were quite challenging. Up until now I haven't seen one so I feel I needed more practice and exposure." ***P7Q14***

"This is difficult for me to answer because with my experience I have been exposed to such a broad range of trauma that I didn't really battle with any of the trauma management." ***P10Q15***

"Well post-graduation I was very confident because I had just practised all the things and I was familiar with all types of rescue but now I haven't been practising it much and now I'm starting to forget some of the stuff like knots because I don't have the equipment to practise with." ***P16Q17***

"I think we should have spent more time on structural collapse and navigation. I still don't know how to save a patient from drowning. I think we should have spent more time with aquatic rescue as well." ***P9Q19***

"Post-graduation I felt that I was very competent in RSI. I don't think that we got enough practical application during our training in hospitals and on the road. Now I am very comfortable with RSI, doing it relatively often. I feel that it is a skill that is necessary and that the lecturers and the syllabus are well geared toward educating us on the RSI process." ***P2Q10***

"First RSI I was a stress ball. It was really nerve wrecking. I was very sure in my skills and abilities theoretically but practically it was really different. It is not textbook and no two cases are the same. I had a successful first time but I was really nervous and unsure even though I knew what to do but just in the moment it was really nerve wrecking compared to now. Now I'm really comfortable. I think experience makes you more proficient in your skills and abilities and gives you confidence because if you had two or three successful intubations or RSIs you kind of really know what to look for and all those things so now I'm really confident even though I can't say with difficult intubation I've got all that much. I'm just more confident now." ***P3Q10***

"The first time I performed RSI I can't say that I was confident in doing it because it was the first time. Obviously, you will be scared to perform a skill for the time in a real patient. In saying that, the confidence was not there so I needed someone there to hold my hand at that point. I felt like I wished I had someone who had done it before there with me while I was performing it." ***P5Q10***

"The first time I RSI'd on my own I was absolutely freaked out. I had only a Basic Ambulance Assistant (BAA) with me, no one to call for assistance because my consulting ECP was out of the country. The hardest decision for me to make was to RSI or not. Since then it has become a lot easier. The decision making as well. I go

through my steps a lot more rapidly, I'm a lot quicker overall. The first time it took me about 20 minutes to set up. My confidence has grown. I still wouldn't do it on my own, I would rather wait for assistance. The first time I had one person with me and I absolutely hated it. It makes it easier to have more hands around." ***P10Q10***

"Post-graduation I was completely unprepared. I didn't know what to expect, what to do, where to start. Now I'm absolutely comfortable, I've done so many I think I can do it in my sleep." ***P9Q11***

"Nervous. Shaking because I was thrown in the deep end. Second day of employment, I was thrown into the deep end. I had to do a transfer of a newborn. The reason for my nervousness was because I didn't do any orientation within my organisation with an experienced person. After that I had to go back and read, do a SWAT analysis. Now I'm confident, not scared." ***P6Q11***

"I was absolutely fine with ICU transfers because we do many of them from Port Shepstone to Durban. So, I was pretty happy to do one with five infusion pumps and a ventilator without having my consulting ECP with me. When I started working with him, even though he was in the vehicle, I was left completely to manage that patient and he would just supervise so I could gain that experience. I had been doing them for many years prior to that. My first one on my own, I was happy to do." ***P10Q11***

"My weakness when I came out was management even though they gave us business management, managing people and doing administration is one of the big jobs, especially where I work, is like doing paperwork, clinical governance on paperwork, teaching, things like that. So, I believe management is a very important role. Maybe business management is good for what they taught us but maybe bringing a more practical aspect of management in because they come out onto the road and they don't realise well especially me I knew there was admin but now you've got crews like fighting each other and upset and you now have to sort it out because there's no management on in the evenings for example." ***P13Q24***

"My weaknesses when I started, I felt I wasn't really equipped for doing patient report forms and the necessary paperwork especially now thinking about the admin side of things and how to document patient care because we were not really taught how to at the university but I have since found my feet and learned." ***P3Q24***

"My weaknesses would be paediatric management in primary calls and IFTs. I feel EMC contributed to my ability to make decisions rapidly but more time could have been

spent on paediatrics because we don't see them often and when we do, they are critically ill." ***P2Q24***

"I feel it has made me better because of the knowledge I have received from the BHSc: EMC on how to be an ECP but I look at certain things that I lack as an ECP due to things that were not included. It added to my strengths of general patient care, RSI drug calculations, which a lot of emphasis is placed on but we miss so much like geriatrics and paediatrics. We did not learn enough about them so when we have patients like that, we feel like we can't recall the information so I think that's a weakness." ***P14Q24***

"My weaknesses when I started, I felt I wasn't really equipped for doing patient report forms and the necessary paperwork especially now thinking about the admin side of things and how to document patient care because we were not really taught how to at the university but I have since found my feet and learned." ***P3Q24***

"My weakness as an ECP is I sometimes get overwhelmed with the patients I get, especially when you feel like you couldn't save a life. They didn't emphasise at university that you will be psychologically affected. The psychological part of the profession is not emphasised within the BHSc: EMC. People need to be psychologically prepared to deal with losing a patient." ***P5Q24***

4.4.2.3 Lack of postgraduate exposure results in skill degradation

In the case of medical rescue, graduates felt that a lack of postgraduate exposure to aspects of AMR resulted in skill degradation. Because of this, graduates highlighted rescue as a weakness and expressed a need for postgraduate rescue refreshers.

"My weakness is rescue." ***P1Q24***

"One of my weaknesses as an ECP is rescue at the moment because it's lacking seriously. I haven't been practising it and I haven't done any updates. If I have to do a rescue it's going to be dangerous because of that lack of practice. In terms of strengths, I feel trauma is my strength. I feel the BHSc: EMC has contributed to my lack in rescue because it's BHSc: EMC not BHSc: EMCR [Bachelor of Health Sciences in Emergency Medical Care and Rescue]." ***P18Q24***

"[Rescue is] beneficial to understanding the prehospital environment but some postgrad refresher is needed for rescue to stay current." ***P18Q22***

"The university also needs to offer an opportunity for graduates to refresh their rescue skills postgrad. We are expected to have a certain number of CPD points each year to assist us in remaining current. Something of that sort needs to be done for rescue because a lot of skills are lost along the way because these are not skills that we practise every day." ***P17Q23***

"The rope rescue was fun to do but it's not something that we do all the time." ***P10Q19***

"I've done one trench rescue I think in the whole time I've been on the road and in confined space I haven't done and then structural collapse I haven't done either. So, the three that I haven't done, I can do them but I don't really feel confident on the road." ***P13Q19***

4.4.3 Key themes emerging from interviews and specific to work readiness

Under this subheading are the interview responses from the semi-structured interviews which related to work readiness. Participants were asked about their perceptions of their preparation for independent practice; the Clinical practice module; the module structure of the BHSc: EMC; exposure to both medical and rescue training and suggested BHSc: EMC curricula inclusions and/or exclusions. As in section 4.4.2, the key themes which emerged from the interviews were used to inform the development of the questionnaire used in phase two.

4.4.3.1 Prior experience aided preparation for independent practice

Prior experience seems to have been advantageous for preparation for independent practice. Graduates were asked whether they felt sufficiently trained as an ECP up to the level of independent practice straight after graduation. Most graduates felt sufficiently trained for independent practice, however it is worth noting that half of these graduates owed their readiness to prior EMS experience. Supporting responses were recorded as follows:

"Because of the previous years I spent in EMS engaging with different ALS practitioners over the years, me studying and me not studying at the time before I even engaged with the BHSc: EMC course, I would say when I graduated because I had that experience before, I will say that when it comes to other aspects example airway management and overall patient management as an ALS practitioner, yes, I will say yes, I was sufficiently trained because the onus was on me as a student to perfect my skills when I was in university. So, I will say because of the experience and the time I spent in EMS with other ALS practitioners, I will say yes. Without a shadow of a doubt it

would have been very difficult, I would not have been well equipped without prior experience." ***P1Q8***

"Yes, I did feel like I am sufficiently trained to be an ECP. I didn't feel like I needed a mentor due to the fact that I had prior experience in EMS. So, I think that's the reason why I felt I was able to work as an ECP without a mentor." ***P5Q8***

4.4.3.2 Misalignment of the BHSc: EMC with industry needs

Graduates were asked about their perceptions of the Clinical Practice module in terms of skills, hours and shift department allocation. The majority of participants felt that the skills requirements were too onerous and that skills were hard to find due to the unpredictable nature of EMS and no guarantee that a specific skill would be found on a specific shift. Participants also felt that some skills were unnecessary and that the focus should have been on achieving basic skills first and then advanced skills later to ease the load. The majority of graduates felt that not enough hours were allocated to road shifts where the probability of exposure to relevant cases would have been greater. Adding to this, participants felt that fewer hours should have been allocated to neonatal intensive care units (NICU) and maternity departments due to the tedious nature of the functions in these departments.

When asked about having undergraduate exposure to medical rescue training in combination with EMC training, some graduates mentioned that while medical rescue training assisted with their understanding of rescue scenarios, they had not been offered the opportunity to practise these skills due to organisations having designated rescue teams and being reserved for non-rescue related critical cases or interfacility transfers. Graduates were asked what they thought should be either included, excluded or restructured within the BHSc: EMC curriculum to prepare future graduates for independent practice. In response, most graduates felt that diagnostics, mental health awareness and the basic practicalities of EMS should be included. Some supporting responses from participants are included below.

"I feel like we did get a lot of experience. There were sufficient hours to learn said skills. However certain departments really didn't help us much. Antenatal department, NICU. The many hours we spent in NICU, we could have spent those hours in theatre or on the road. There were a lot of hours that I felt were wasted because we didn't learn much." ***P17Q21***

"Skills wise, I feel that a lot of the skills were necessary, a lot of them were unnecessary e.g. asking a fourth-year student to do 50 blood pressures. I feel that due to the unpredictable nature of EMS, the advanced skills that are rare and difficult to find should be available as soon as they are taught and the student is deemed competent. I feel the more basic skills should be required to be completed within first or second year to free up pressure on the student in their third and fourth years when they are hunting more advanced skills e.g. RSI and intubation" ***P2Q21***

"I don't feel there was enough clinical time especially for those of us who weren't employed during the degree or had previous EMS experience. I also feel as if towards the end it was too controlled especially for fourth years and that was to a detriment. Toward third and fourth year there was a lot of emphasis being placed on skills that could have been done and dusted in first and second year and that would have freed up more time to focus on intricate skills like RSIs and interpretation of 12 leads. I also feel the number of RSIs that were required were too high compared to the number of clinical shifts we were working because we were just working government shifts and there were lots of students working on the same days which meant the competition was a lot higher. So, some individuals weren't able to get RSIs. It would have been a lot better if they allowed students to work at a variety of bases government and private just so everyone is spread out and had a greater chance of exposure to skills. I would have preferred if more time was given to prehospital, emergency department and possibly theatre shifts. It should be taken into account that the exposure rate isn't as high in departments such as CCU and NICU so the skills will be limited there as what we can do is limited there so maybe we didn't have to spend 12-hour shifts in each of these places. Maybe shorter shifts in CCU, NICU, ICU, theatre and full shifts in ED and prehospital" ***P11Q21***

"I feel the EMC programme was sufficient and very well taught and assisted with my work readiness. Rescue was educational and helped me understand and better treat and care for my patients when they were involved in situations that required rescue to be called out and to be used. However, I did not partake in those rescues…" ***P2Q22***

"Rescue training, although I was well trained and equipped with the knowledge, unfortunately in our district, rescue is undertaken by the fire department as well as metro search and rescue so we do not partake much in the rescue. We mainly deal with EMC. Having done both contributed positively to my work readiness." ***P8Q22***

"I lack more confidence now than I did when I came out. Even though prior to all of this I did a lot of rescues and that's because my husband is in the rescue field. Being an ILS, it was actually very easy for me to go out and perform rescues. Now because I'm an ECP, when a rescue comes through, I stay back and cover the area as the operational ECP even on my off days so I can get left behind. So now I lack my rescue skills so I have been attending some of the university's rescue practicals just to maintain my skills because at this time those skills are gone because we don't use them often. Even though our company does do them, I cannot go along. If I had to run a rescue scenario now, I probably wouldn't be able to tie two ropes together." ***P10Q17***

"I think diagnostics should definitely be included. I feel it's a big part of my work that could help me become a better paramedic. A lot of the time when you have a diagnosis for a patient it streamlines your management plan and it helps you conduct your patient care better so this inclusion would be beneficial." ***P9Q23***

"They need to add diagnostics if they haven't started already to assist with the understanding of pathologies and guide patient management." ***P16Q23***

"I think diagnostics needs to be included maybe a little bit of counselling or a psychology-based course to ready us to be able to tell people that their parents have died or their baby is badly burned. I think we need to be able to deal with that as medical practitioners because we encounter a lot of it ..." ***P14Q23***

"They could really go into mental health awareness in paramedics and managing PTSD and learning how to cope and when to say no and downtime …" ***P10Q23***

"Specifically included I think should be completing accurate patient-report forms, dealing with medical aids because about 50% of your working time as an ECP is dealing with these things. Keeping drug registers should also be included because as an ECP you are entrusted with scheduled medications. The management module was more focused on business management. Crew management should also be included, how to deal with and interact with your crew and how to deal with disputes among staff members. Vehicle care as well, how to properly stock it and maintain the stock and condition of your vehicle. You are entrusted with expensive equipment and you need to keep a log book. Reporting vehicle damages. These are the realities of EMS. Interviewing as well. Medical wise I feel that all bases were covered well." ***P2Q23***

4.4.3.3 The need for mentorship

Graduates alluded to the need for undergraduate and postgraduate mentorship. The need for undergraduate mentorship was expressed by graduates in relation to the Clinical Practice module. Participants felt that they could have benefitted from a postgraduate mentorship programme. The need for postgraduate mentorship was highlighted when graduates were asked about their performance of key competencies post-graduation. Participants explained that they lacked confidence to perform these key competencies and would have benefitted from assistance from a senior. Supporting quotes have been captured as follows:

"The clinical practice module, we were rostered in certain places that none of us got any experience especially coming from working on the road before. I just believe that they could have more hours that are needed for clinical practice. And then you need to also try and get like a mentor programme because working with one ALS does everything one way and you might like another ALS way. So not to confuse the students. I really enjoyed where we were rostered. They rostered us in the correct place to try and get us a correct clinical understanding of the treatment of those patients but as I said I do believe we need more time ..." ***P13Q21***

"The first time I performed RSI I can't say that I was confident in doing it because it was the first time. Obviously, you will be scared to perform a skill for the time in a real patient. In saying that, the confidence was not there so I needed someone there to hold my hand at that point. I felt like I wished I had someone who had done it before there with me while I was performing it" ***P7Q10***

"The first time I RSI'd on my own I was absolutely freaked out. I had only a BAA with me, no one to call for assistance because my consulting ECP was out of the country. The hardest decision for me to make was to RSI or not. Since then it has become a lot easier. The decision making as well. I go through my steps a lot more rapidly, I'm a lot quicker overall. The first time it took me about 20 minutes to set up. My confidence has grown. I still wouldn't do it on my own, I would rather wait for assistance. The first time I had one person with me and I absolutely hated it. It makes it easier to have more hands around" ***P12Q10***

"Nervous. Shaking because I was thrown in the deep end. Second day of employment, I was thrown into the deep end. I had to do a transfer of a newborn. The reason for my nervousness was because I didn't do any orientation within my organisation with an

experienced person. After that I had to go back and read, do a SWAT analysis. Now I'm confident, not scared." ***P6Q11***

4.4.3.4 Revise rescue aspect of BHSc: EMC

Graduates seemed to call for the revision of Medical Rescue within the BHSc: EMC. Participants suggested that the focus of the BHSc: EMC should primarily be on EMC with a focus on rescue only after the completion of EMC modules. Graduates highlightedthat EMC is the core construct of the BHSc: EMC and should therefore be given more focus than rescue. They suggested focusing on basic medical rescue principles such as extrication, as this is often encountered in the prehospital environment in SA. Most graduates felt the BHSc: EMC should be restructured, with the graduates suggesting that more time should be spent on Emergency Medical Care (EMC) and that rescue should be made an elective course for those who are interested in learning rescue. Graduates felt that the physical assessment parameters, pass criteria and associated Medical Rescue modules should be revised as they are unfair due to a previous disadvantage of a lack of swimming proficiency and the lack of alignment with industry needs. Graduates stated the following in this regard:

"Beneficial to understanding the prehospital environment and making me well-rounded as an ECP but EMC and rescue needs to be separated because sometimes doing both is a bit much and some post-grad refresher is needed for rescue to stay current." ***P18Q22***

"At first post-graduation I felt that it was not right because like I said, there were lots of loopholes when it came to rescue per se. So, I wasn't confident with rescue and still today I am not confident with it. But now I see that the programme was designed to make us flexible and to adapt in the world out there. The core of our study is EMC so if the university starts with that and makes sure that the student understands and then the rescue part comes at the end of the year, that's my suggestion" ***P1Q22***

"The EMC side of it, I was ready. On the rescue side of it I wasn't ready. The university did their part in making me ready to work. The only problem I had was with the organisation that I work for. It depends on which organisation you work for, whether they are ready or equipped to make you work with someone who is experienced. In my case, there wasn't anybody who was there to work with me because of limited resources, that's the EMC side. On the rescue side I was not ready because I was

more focused on the EMC part of my studies. It would have been great if we were just taught the basics of rescue not that we shouldn't do rescue at all. For example, like the swimming part of it, you're taught how to swim and then you're not using that skill. Like when you're called for a drowning patient, by the time you arrive that patient is already dead. Even if the person is dead and you're required to go and search for that person, if you don't do that skill often, then it isn't of any help to you as an ECP. So rather teach the basics like extrication but focus more on the EMC rather than the rescue." ***P6Q22***

"I feel like some rescue modules prepared me for the road more than others such as extrication. I do believe that having had exposure to both EMC and rescue training has contributed to making me a more well-rounded paramedic." ***P17Q22***

"We needed to work more with motor vehicles and cut outs. I work a lot, as most of us do, doing MVAs [Motor Vehicle Accidents]. Majority of the time I am expected to assist with passing equipment through or I'm getting into a vehicle, and I am expected to feel around where the patient is trapped and advise where to put the spreader or the ram etc. So, I think doing that in the first year may not have been the best. It was something we should have done more toward the end because it's what we do the most. The rope rescue was fun to do but it's not something that we do all the time. The other one is they have taken fire away from us, yet I am often going out to them and expected to assist." ***P10Q19***

"I think they should restructure it. More specifically rescue should be optional to the students. Since it is a Bachelor of Health Sciences in EMC. They should have the students qualify in EMC without the rescue and let the rescue be optional because a lot of students I see are failing with rescue and they are unable to qualify due to their downfall in rescue. So, it should be optional and dependent on the individual if they are interested." ***P8Q23***

"Remove some of the rescue stuff and take that time that's used for rescue and focus it more on EMC. So, first year EMC with rescue. The same with second and third year and then fourth year, I would just make a practical year. Preparing the undergraduates for the workplace. Do all the simulations in third year and then after passing, dedicate fourth year to practicals." ***P6Q23***

"In terms of rescue, it should be an elective course. Let's say if you want to follow aquatic rescue, you can do just that with EMC instead of doing all of rescue. They

should allow students to specialise in certain areas of rescue. Because I feel that we do it but it isn't beneficial at the end of the day." ***P5Q23***

"I had a bad personal experience with aquatic rescue, I was once involved in a near drowning situation in the past and then when I came to study, I got exposed to it again. I'm not a good swimmer." **P6Q20**

"With aquatic rescue I was not that confident. Before arriving at university, I was not a strong swimmer. I learned to swim at university. Even after swimming for the six minutes, I was not that strong. I was battling with some skills with swimming. I could only do freestyle. When it came to practicals for aquatic rescue, we were not as exposed as we were to rope rescue so I was not confident to do aquatic rescue as an independent practitioner." ***P7Q19***

"I know that the structure has changed since when I was there. Back then you did one module and after that it was done. Now there is this thing of students not being able to do one module because it clashes with another module. At the end of the year, only a few graduate. That means we are producing less ECPs per year which deprives the EMS field of personnel. I also feel that the swimming part of it is not a necessity. Not everyone likes that and we wouldn't be exposed to such emergencies whereby we are required to go in the water and swim. Rather get those qualified personnel to deal with the rescue and you deal with the patient. Because now students have been deprived of qualifying in time just because of the swimming part of it. I think they should reconsider making it a requirement or a necessity in the BHSc: EMC." **P15Q23**

"Restructuring of the physical needs to be looked at because we are creating fit paramedics who can run 5 km but not necessarily smart paramedics who can treat patients correctly. So, while I understand that being physically fit is important as a paramedic, that needs to be looked at." **P17Q23**

4.4.3.5 Revision of the Physical Preparedness requirements

When graduates were asked about what they thought should be either included, excluded or restructured in the BHSc: EMC, Physical Preparedness was highlighted. Graduates felt that the assessment is not aligned with industry needs and acts as a barrier to student progression through the degree. When asked about which Medical Rescue modules graduates were least confident in, graduates highlighted aquatic rescue. Accompanying this response was the fact that some graduates were poor swimmers or could not swim at all, and the programme was not sufficiently equipped to

get them to the level of proficiency before the time when proficiency was required. Supporting responses are included below.

"I know that the structure has changed since when I was there. Back then you did one module and after that it was done. Now there is this thing of students not being able to do one module because it clashes with another module. At the end of the year, only few graduate. That means we are producing less ECPs per year which deprives the EMS field of personnel. I also feel that the swimming part of it is not a necessity. Not everyone likes that and we wouldn't be exposed to such emergencies whereby we are required to go in the water and swim. Rather get those qualified personnel to deal with the rescue and you deal with the patient. Because now students have been deprived of qualifying in time just because of the swimming part of it. I think they should reconsider making it a requirement or a necessity in the BHEMC" ***P15Q23***

"Restructuring of the physical needs to be looked at because we are creating fit paramedics who can run 5 km but necessarily smart paramedics who can treat patients correctly. So, while I understand that being physically fit is important as a paramedic, that needs to be looked at. I feel like the chemistry and physics in first year doesn't really need to be included. A couple of the side modules are less important and a waste of time such as management. There is no use for them and you could be using that time to study something that is actually related to what we do which is treating patients. Lecturers need to show students how to implement their training and what they have been taught on an actual patient. It was very difficult to try and simulate that in a non-emergency setting where you're sitting in a classroom. In future they need to get university response vehicle on the road and actually do that training hands on with real patients. The university also needs to offer an opportunity for graduates to refresh their rescue skills post-grad. We are expected to have a certain number of CPD points each year to assist us in remaining current. Something of that sort needs to be done for rescue because a lot of skills are lost along the way because these are not skills that we practise every day" ***P17Q23***

"I'm least confident in aquatic rescue. That was one of the nightmares. Also, not confident in rope rescue. I loved the navigation part of it. I had a bad personal experience with aquatic rescue, I was once involved in a near drowning situation in the past and then when I came to study, I got exposed to it again. I'm not a good swimmer. Rope rescue is tiring for me. Just imagine you have to go down the cliff, you're sweaty and tired and you have to rescue this person who isn't even injured, he's just sitting

there waiting for you. I don't have a passion for that. Even if they were injured, I still don't like. Imagine doing rescue for the whole day and then arriving to fetch the patient and then the patient is dead by the time you get there" ***P6Q19***

"With aquatic rescue I was not that confident. Before arriving at university, I was not a strong swimmer. I learned to swim at university. Even after swimming for the six minutes, I was not that strong. I was battling with some skills with swimming. I could only do freestyle. When it came to practicals for aquatic rescue, we were not as exposed as we were to rope rescue so I was not confident to do aquatic rescue as an independent practitioner" ***P7Q19***

SECTION TWO: OBJECTIVE TWO

PART B

Part B of section two investigates the impact the BHSc: EMC degree has had on graduate employability skills as established by survey responses. For the Likert-style questionnaire, a total of 26 participants (63%) from an available sample of 41 graduates responded to the survey. The survey had a 63% completion rate and comprised of 21 questions in total. The results below represent the responses to the questions that pertained specifically to objective 2.

4.5 Objective 2 Likert-style survey results

4.5.1 Participant places of employment

Most graduates reported working for a road ambulance service (see Table 4.9).

Table 4.9: First places graduates worked on completion of the BHSc: EMC

	Q2		***p***
1.	Road ambulance service	**20 (76.92%)**	**0.00**
2.	Aviation ambulance service	**2 (7.69%)**	
3.	Clinical/hospital setting	**0 (0.00%)**	
4.	Medical rep	**0 (0.00%)**	
5.	Remote site	**3 (11.54%)**	
6.	I did not work and don't intend to	**0 (0.00%)**	
7.	I did not work but intend to at a later stage	**0 (0.00%)**	
8.	Other, please specify	**1 (3.85%)**	

4.5.2 Participants' entry into the workforce

Most graduates were required to work alone at the level of an operational ALS paramedic (see Table 4.10).

Table 4.10: Graduate experiences on their first day of their first job post-graduation

	Q3		*p*
1.	I was required to work alone and at the level of an operational Advanced Life Support paramedic	**20 (76.92%)**	**0.00**
2.	I was required to work with someone else who was also at the level of an operational Advanced Life Support paramedic	**4 (15.38%)**	
3.	I was required to work in a job or at a level other than that of an operational ALS paramedic for a period < 6 months	**0 (0.00%)**	
4.	I was required to work in a job or at a level other than that of an operational ALS paramedic for a period > 6 months	**0 (0.00%)**	
5.	Other, please specify	**2 (7.69%)**	
	[Other, please specify] I was required to work as an ALS paramedic on an ambulance along with a BLS crew.		
	[Other, please specify] I was required to work in an ambulance with a BAA crew		

4.5.3 Hierarchy of specific abilities required for first employment

Participants recognised the importance of being able to assess and treat patients across all age groups. They appeared to regard nonclinical aspects like research, management and teaching as having lesser importance (see Table 4.11).

Table 4.11: Ranked importance of specific abilities in participants' first job post-graduation

	Q5	Extremely important	Very important	Important	Not so important	Not at all important	*p*
1	The ability to undertake a targeted and purposeful clinical assessment on an adult patient	**19 (73.08%)**	**7 (26.92%)**	**0 (0%)**	**0 (0%)**	**0 (0%)**	**0.00**
2	The ability to provide safe and effective medical care to an adult patient	**21 (80.77%)**	**5 (19.23%)**	**0 (0%)**	**0 (0%)**	**0 (0%)**	**0.00**
3	The ability to undertake a targeted and purposeful clinical assessment on a paediatric patient	**20 (76.92%)**	**5 (19.23%)**	**1 (3.85%)**	**0 (0%)**	**0 (0%)**	**0.00**
4	The ability to provide safe and effective medical care on a paediatric patient	**21 (80.77%)**	**5 (19.23%)**	**0 (0%)**	**0 (0%)**	**0 (0%)**	**0.00**
5	The ability to undertake a targeted and purposeful clinical assessment on a newborn or an infant patient	**18 (69.23%)**	**7 (26.92%)**	**1 (3.85%)**	**0 (0%)**	**0 (0%)**	**0.00**
6	The ability to provide safe and effective medical care on a newborn or an infant patient	**19 (73.08%)**	**6 (23.08%)**	**1 (3.85%)**	**0 (0%)**	**0 (0%)**	**0.00**
7	The ability to undertake a research project to the point of publication in a medical journal	**6 (23.08%)**	**6 (23.08%)**	**5 (19.23%)**	**6 (23.08%)**	**3 (11.54%)**	**-**
8	The ability to manage an organisation as an entry level manager	**8 (30.77%)**	**8 (30.77%)**	**6 (23.08%)**	**4 (15.38%)**	**0 (0%)**	**-**
9	The ability to teach prehospital emergency care skills to students who want to practise at the level of an ALS paramedic	**12 (46.15%)**	**6 (23.08%)**	**3 (11.54%)**	**5 (19.23%)**	**0 (0%)**	**0.02**
10	The ability to perform medical rescue skills	**4 (15.38%)**	**9 (34.62%)**	**7 (26.92%)**	**3 (11.54%)**	**3 (11.54%)**	**-**
11	The ability to manage a medical-rescue incident	**6 (23.08%)**	**7 (26.92%)**	**8 (30.77%)**	**4 (15.38%)**	**1 (3.85%)**	**-**

12	The ability to perform safe and effective advanced airway management inclusive of mechanical ventilation	**19 (73.08%)**	**5 (19.23%)**	**2 (7.69%)**	**0 (0%)**	**0 (0%)**	**0.00**
13	The ability to undertake an interfacility transfer of a critically ill/injured patient	**17 (65.38%)**	**7 (26.92%)**	**2 (7.69%)**	**0 (0%)**	**0 (0%)**	**0.00**

4.5.4 Participant readiness in relation to key competencies

Graduates felt most prepared to perform advanced airway management and interfacility transfers. They also felt ready to assess and treat adult patients, while feeling least prepared to assess and treat paediatrics, infants and neonates. Additionally, they appeared to feel unprepared in terms of medical rescue and non-clinical aspects such as management, research and teaching (refer to Table 4.12).

Table 4.12: Graduate readiness to undertake various skills post-graduation

		READY			**On-the-Fence**	**Not Ready**		***p***
	Q8	**Extremely ready**	**Very ready**	**Ready**	**Somewhat ready**	**Not so ready**	**Not at all ready**	
1.	To undertake a targeted and purposeful assessment on a critical injured or ill adult patient	**6 (23.08%)**	**11 (42.31%)**	**6 (23.08%)**	**1 (3.85%)**	**2 (7.69%)**	**0 (0%)**	**0.00**
2.	To provide safe and effective management to a critical injured or ill adult patient	**7 (26.92%)**	**11 (42.31%)**	**5 (19.23%)**	**1 (3.85%)**	**2 (7.69%)**	**0 (0%)**	**0.00**
3.	To undertake a targeted and purposeful assessment on a critical injury or ill paediatric patient	**4 (15.38%)**	**9 (34.62%)**	**8 (30.77%)**	**3 (11.54%)**	**2 (7.69%)**	**0 (0%)**	**-**
4.	To provide safe and effective management to a critical injury or ill paediatric patient	**3 (11.54%)**	**10 (38.46%)**	**8 (30.77%)**	**3 (11.54%)**	**2 (7.69%)**	**0 (0%)**	**0.02**
5.	To undertake a targeted and purposeful assessment on a critically injured or ill newborn and/or an infant patient	**4 (15.38%)**	**6 (23.08%)**	**9 (34.62%)**	**4 (15.38%)**	**2 (7.69%)**	**1 (3.85%)**	**0.04**
6.	To provide safe and effective management to a critically injured or ill newborn and/or an infant Patient	**4 (15.38%)**	**5 (19.23%)**	**10 (38.46%)**	**4 (15.38%)**	**1 (3.85%)**	**2 (7.69%)**	**0.02**
7.	To collect and analyse data to the level of undertaking a research project to the point of publication of an article	**2 (7.69%)**	**3 (11.54%)**	**7 (26.92%)**	**8 (30.77%)**	**5 (19.23%)**	**1 (3.85%)**	-
8.	To manage an organisation as an	**4 15.38%)**	**4 (15.38%)**	**6 (23.08%)**	**6 (23.08%)**	**6 (23.08%)**	**0 (0.00%)**	**-**

	operations/shift or base manager							
9.	The ability to teach prehospital emergency care skills to the level of an ALS paramedic	**6 (23.08%)**	**7 (26.92%)**	**4 (15.38%)**	**7 (26.92%)**	**1 (3.85%)**	**1 (3.85%)**	-
10.	The ability to perform rescue skills unsupervised	**4 (15.38%)**	**6 (23.08%)**	**6 (23.08%)**	**6 (23.08%)**	**3 (11.54%)**	**1 (3.85%)**	-
11.	The ability to manage a medical-rescue incident as a scene commander	**2 (7.69%)**	**5 (19.23%)**	**7 (26.92%)**	**7 (26.92%)**	**4 (15.38%)**	**1 (3.85%)**	-
12.	The ability to perform safe and effective advanced airway management inclusive of mechanical ventilation	**9 (34.62%)**	**7 (26.92%)**	**7 (26.92%)**	**2 (7.69%)**	**1 (3.85%)**	**0.00%**	**0.02**
13.	The ability to undertake an interfacility transfer of a critically ill/injured Patient	**7 (26.92%)**	**7 (26.92%)**	**8 (30.77%)**	**2 (7.69%)**	**2 (7.69%)**	**0.00%**	**-**

4.5.5 Use of Rescue Skills post-graduation

Most graduates use their rescue skills once every six months or less in a year (see Table 4.13).

Table 4.13: Frequency of rescue skill usage postgraduation

	Q14		*p*
1.	Every shift	**0 (0.00%)**	-
2.	At least once in a weekly shift cycle	**5 (19.23%)**	
3.	At least once in a monthly shift cycle	**3 (11.54%)**	
4.	At least once every six months	**7 (26.92%)**	
5.	At least once a year	**6 (23.08%)**	
6.	Never	**5 (19.23%)**	

4.5.6 Responses to statement 1:

"My time at DUT has effectively prepared me for Independent Operational Practice as an Advanced Life Support paramedic in South Africa."

The majority of graduates agreed with this statement (see Table 4.14).

Table 4.14: Perceptions of preparation for independent practice within SA

Q19	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	*p*
	10 (38.46%)	**12 (46.15%)**	**4 (15.38%)**	**0.00%**	**0.00%**	**0.04**

4.5.7 Responses to the statement 2:

"My time at DUT has effectively prepared me for Independent Operational Practice as an Advanced Life Support paramedic outside South Africa" (Note this question is different from the previous one).

The majority of graduates agreed with this statement, although a number of others felt neutral about it and a small percentage disagreed (see Table 4.15).

Table 4.15: Perceptions of preparation for independent practice outside SA

Q20	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	*p*
	4 (15.38%)	**10 (38.46%)**	**10 (38.46%)**	**2 (7.69%)**	**0.00%**	**0.02**

4.5.8 Graduate transition experiences

Most graduates classified the transition process as being on an easy level, although a few highlighted the process as not so easy and not at all easy (see Table 4.16).

Table 4.16: The transition process from supervised practice to independent practice

Q6	Extremely easy	Very easy	Somewhat easy	Not so easy	Not at all easy
	6.90%	24.14%	24.14%	34.48%	10.34%

4.6 Conclusion for Section 2

In Part A, key themes emerged from the interviews which were used as a foundation for developing the survey questions for phase two. These key themes were specific to employability and work readiness. Themes related to employability included additional training requirements; exposure increases confidence; and a lack of postgraduaterescue exposure results in the degradation of rescue skills. The themes which emergedrelating to work readiness included prior experience aided preparation for independent practice; misalignment of BHSc: EMC with industry needs; the need for postgraduate mentorship; and revision of Medical Rescue and Physical Preparedness requirements. In Part B, survey responses specific to employability were included, with the responses addressing topics such as graduate readiness to undertake key competencies; graduateperceptions of preparation for independent practice; and graduate transition experiences.

SECTION THREE: OBJECTIVE THREE

This part includes the quantitative findings from the Likert-style questionnaire pertaining to objective 3, which sought to examine graduate perceptions of BHSc: EMC regarding work readiness. The findings are as follows:

4.7 Objective three Likert-style survey results

4.7.1 Responses to statement 3:

"*Upon completion of the BHSc: EMC qualification graduates should undertake a period of mentorship similar to that of an internship that medical doctors do, to help them refine their skills and transition better from supervised practice (working with another ALS paramedic as a student during experiential learning) to independent practice (where you had to work unsupervised and alone.*"

Most graduates agreed with this statement (refer to Table 4.17).

Table 4.17 Graduate perceptions of a postgraduate mentorship programme

Q7	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	*p*
	15 (57.69%)	7 (26.92%)	0 (0.00%)	3 (11.54%)	1 (3.85%)	0.00

4.7.2 Rated level of contribution that each of the following had in graduate development as an ALS paramedic ready for operational independent practice in South Africa

Graduates felt that lectures, OSCEs, simulations and classroom discussions all contributed similarly to their development as ALS paramedics ready for operational independent practice in SA. In terms of clinical learning, graduates highlighted working on an ALS vehicle in both the public and private sectors as contributing to their development. The majority of graduates felt that working on a non-ALS vehicle in EMS and in a non-emergency department setting in hospitals and clinics contributed moderately to their development. The majority of graduates felt that Rescue modules made a strong contribution to their development. Past knowledge and experience obtained prior to enrolling into the BHSc: EMC was viewed by the majority as making a major contribution to graduate development (refer to Table 4.18).

Table 4.18 Rated level of contribution of various teaching and learning strategies

	Q9	Major contribution	Strong contribution	Moderate contribution	Small contribution	No contribution	*p*
1	Lectures	**15 (57.69%)**	**8 (30.77%)**	**2 (7.69%)**	**1 (3.85%)**	**0 (0.00%)**	**0.00**
2	OSCEs	**13 (50.00%)**	**7 (26.92%)**	**6 (23.08%)**	**0 (0.00%)**	**0 (0.00%)**	**0.08**
3	Simulations and classroom discussions	**14 (53.85%)**	**9 (34.62%)**	**3 (11.54%)**	**0 (0.00%)**	**0 (0.00%)**	**0.01**
4	Clinical learning – working on an ALS vehicle – public EMS	**18 (69.23%)**	**6 (23.08%)**	**2 (7.69%)**	**0 (0.00%)**	**0 (0.00%)**	**0.00**
5	Clinical learning – working on an ALS vehicle – private EMS	**12 (50.00%)**	**9 (37.50%)**	**3 (12.50%)**	**0 (0.00%)**	**0 (0.00%)**	**0.02**
6	Clinical learning – working on a non-ALS vehicle – public EMS	**9 (34.62%)**	**6 (23.08%)**	**9 (34.62%)**	**1 (3.85%)**	**1 (3.85%)**	**0.00**
7	Clinical learning – working on a non-ALS vehicle – private EMS	**7 (29.17%)**	**6 (25.00%)**	**10 (41.67%)**	**1 (4.17%)**	**0 (0.00%)**	**0.03**
8	Clinical learning – working on a non-emergency department setting i.e. wards – public hospital/PHC	**5 (19.23%)**	**10 (38.46%)**	**9 (34.62%)**	**2 (7.69%)**	**0 (0.00%)**	**0.04**
9	Clinical learning – working on a non-emergency department setting i.e. wards – private hospital/PHC	**6 (30.00%)**	**4 (20.00%)**	**9 (45.00%)**	**1 (5.00%)**	**0 (0.00%)**	**0.04**
10	Rescue modules – lectures and skill-based training	**6 (23.08%)**	**13 (50.00%)**	**4 (15.38%)**	**2 (7.69%)**	**1 (3.85%)**	**0.00**
11	Rescue Modules – real-life or simulated scenarios, e.g. trip to Drakensberg	**8 (30.77%)**	**9 (34.62%)**	**4 (15.38%)**	**4 (15.38%)**	**1 (3.85%)**	**0.00**
12	Past knowledge and experience that I had before enrolling at DUT	**10 (50.00%)**	**4 (20.00%)**	**3 (15.00%)**	**2 (10.00%)**	**1 (5.00%)**	**0.01**

4.7.3 Benefits of clinical learning placements in graduate development as an ALS paramedic ready for operational independent practice in South Africa

The majority of graduates felt clinical placement in the ED, ICU, NICU, theatre and maternity units to be extremely beneficial. Regarding clinical time in the CCU and Communications Centre, graduates felt this was very beneficial and somewhat beneficial respectively (refer to Table 4.19).

Table 4.19 Ranked important of various clinical learning departments

	Q10	Extremely beneficial	Very beneficial	Somewhat beneficial	Not so beneficial	Not at all beneficial	Was not placed	*p*

1.	Emergency department	**22 (84.62%)**	**4 (15.38%)**	**0 (0.00%)**	**0 (0.00%)**	**0 (0.00%)**	**0 (0.00%)**	**0.00**
2.	Intensive care unit	**15 (57.69%)**	**4 (15.38%)**	**6 (23.08%)**	**1 (3.85%)**	**0 (0.00%)**	**0 (0.00%)**	**0.00**
3.	Coronary care unit	**7 (26.92%)**	**11 (42.31%)**	**8 (30.77%)**	**0 (0.00%)**	**0 (0.00%)**	**0 (0.00%)**	**0.47**
4.	Neonatal intensive care unit	**12 (46.15%)**	**10 (38.46%)**	**3 (11.54%)**	**0 (0.00%)**	**1 (3.85%)**	**0 (0.00%)**	**0.00**
5.	Theatre	**14 (53.85%)**	**8 (30.77%)**	**3 (11.54%)**	**1 (3.85%)**	**0 (0.00%)**	**0 (0.00%)**	**0.00**
6.	Maternity	**10 (38.46%)**	**6 (23.08%)**	**8 (30.77%)**	**2 (7.69%)**	**0 (0.00%)**	**0 (0.00%)**	**0.07**
7.	Communications Centre	**3 (11.54%)**	**3 (11.54%)**	**10 (38.46%)**	**7 (26.92%)**	**1 (3.85%)**	**2 (7.69%)**	**0.01**

4.7.4 Responses to statement 4

"There were not enough clinical learning shifts for us to obtain the prescribed number of skills."

Graduate responses were split with the larger majority agreeing with this statement (see Table 4.20).

Table 4.20: Graduate perceptions on the sufficiency of clinical shifts to obtain skills

Q11	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	*p*
	5 (19.23%)	**9 (34.62%)**	**2 (7.69%)**	**6 (23.08%)**	**4 (15.38%)**	**0.17**

4.7.5 Responses to statement 5

"There were not enough clinical learning shifts in the right clinical sites for us to obtain the relevant skills to get sufficient practice."

Most respondents agreed with this statement although a small percentage disagreed (see Table 4.21).

Table 4.21: Graduate perceptions of relevancy of clinical placement sites to obtain skills

Q12	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree	*p*
	9 (34.62%)	**7 (26.92%)**	**4 (15.38%)**	**5 (19.23%)**	**1 (3.85%)**	**0.07**

4.7.6 Rescue module contribution to graduate development as an ALS paramedic ready for operational independent practice in South Africa

Some respondents highlighted not having received training in Industrial and Agricultural, Aviation and Hazardous Materials rescue. Respondents also seemed to think that Confined Space and Aquatic Rescue had made the least contribution, while the Basic Medical Rescue modules such as Fire Search and Rescue, Vehicle Extrication and Rope Rescue were most beneficial for their development (see Table 4.22).

Table 4.22: Graduate perceptions of the benefit of various rescue modules

	Q13	Extremely beneficial	Very beneficial	Somewhat beneficial	Not so beneficial	Not at all beneficial	Did not receive training	*p*
1.	High Angle 1 Rope Rescue	**2 (7.69%)**	**6 (23.08%)**	**7 (26.92%)**	**6 (23.08%)**	**5 (19.23%)**	**0.00%**	**0.47**
2.	Fire Search and Rescue	**2 (7.69%)**	**3 (11.54%)**	**9 (34.62%)**	**7 (26.92%)**	**5 (19.23%)**	**0.00%**	**0.10**
3.	Industrial and Agricultural Rescue	**1 (3.85%)**	**2 (7.69%)**	**7 (26.92%)**	**3 (11.54%)**	**7 (26.92%)**	**6 (23.08%)**	**-**
4.	Vehicle Extrication	**7 (26.92%)**	**10 (38.46%)**	**8 (30.77%)**	**1 (3.85%)**	**0.00%**	**0.00%**	**0.03**
5.	High Angle 2 Rope Rescue	**2 (7.69%)**	**6 (23.08%)**	**10 (38.46%)**	**2 (7.69%)**	**6 (23.08%)**	**0.00%**	**0.03**
6.	Aviation Rescue	**2 (7.69%)**	**7 (26.92%)**	**4 (15.38%)**	**2 (7.69%)**	**3 (11.54%)**	**8 (30.77%)**	**-**
7.	Wilderness Search & Rescue	**2 (7.69%)**	**6 (23.08%)**	**7 (26.92%)**	**8 (30.77%)**	**3 (11.54%)**	**0.00%**	**0.17**
8.	Aquatic Rescue	**5 (19.23%)**	**3 (11.54%)**	**4 (15.38%)**	**8 (30.77%)**	**6 (23.08%)**	**0.00%**	**0.47**
9.	Confined Space Rescue	**3 (11.54%)**	**7 (26.92%)**	**6 (23.08%)**	**8 (30.77%)**	**2 (7.69%)**	**0.00%**	**0.17**
10.	Trench Rescue	**2 (7.69%)**	**5 (19.23%)**	**9 (34.62%)**	**4 (15.38%)**	**6 (23.08%)**	**0.00%**	**0.17**
11.	Structural Collapse	**3 (11.54%)**	**6 (23.08%)**	**10 (38.46%)**	**6 (23.08%)**	**1 (3.85%)**	**0.00%**	**0.02**
12.	Hazardous Materials	**2 (7.69%)**	**7 (26.92%)**	**5 (19.23%)**	**5 (19.23%)**	**1 (3.85%)**	**6 (23.08%)**	**-**

4.7.7 Effectiveness of the BHSc: EMC in preparing graduates to become ALS paramedic ready for operational independent practice in South Africa

Most graduates felt the BHSc: EMC was effective in preparing them to become ALS paramedic ready for operational independent practice in SA, although a small percentage felt that the BHSc: EMC was only somewhat effective in preparing them in this way (refer to Table 4.23).

Table 4.23: Graduate perceptions of the effectiveness of the BHSc: EMC degree

Q15	Extremely effective	Effective	Somewhat appropriate	Not so appropriate	Not at all appropriate	*p*
	9 (34.62%)	**13 (50.00%)**	**4 (15.38%)**	**0.00%**	**0.00%**	**0.03**

4.7.8 Which of the following do you feel would have likely contributed more towards your development as an ALS paramedic ready for operational independent practice in South Africa? (Select as many options as you like)

Graduates indicated that the addition of more response vehicle shifts would have positively contributed their development. On the other hand, the ability to perform rescue skills was perceived to be of less importance for graduate development (refer to Table 4.24).

Table 4.24: Graduate ranked importance of teaching and learning strategies

	Q16		*p*
1.	More lectures	**8 (4.85%)**	**0.01**
2.	More time to practise OSCES	**4 (2.42%)**	**0.00**
3.	More time to practise patient simulations	**6 (3.64%)**	**0.00**
4.	More realistic patient simulations	**15 (9.09%)**	**-**
5.	More theory lectures on ne-born and/or paediatric patients	**15 (9.09%)**	**-**
6.	More practical focus on management of ne-born and/or paediatric patients	**16 (9.70%)**	**-**
7.	More in-depth Research Methodology lectures	**11 (6.67%)**	**-**
8.	More response vehicle shifts	**19 (11.52%)**	**0.00**
9.	More intensive care unit ambulance shifts	**14 (8.48%)**	**-**
10.	The ability to perform rescue skills	**3 (1.82%)**	**0.00**
11.	Postgraduate mentorship programme to assist with the transition from supervised to independent practice	**14 (8.48%)**	**-**
12.	Inclusion of a separate Diagnostics module	**14 (8.48%)**	**-**
13.	Inclusion of a separate Trauma Counselling module	**13 (7.88%)**	**-**
14.	Response driver training	**12 (7.27%)**	**-**
15.	Other, please specify: [Other, please specify] More response vehicle shifts, and casualty/trauma unit shifts within the private sector	**1 (0.61%)**	**0.00**

4.7.9 Rated level of contribution that BHSc: EMC modules made to graduate development as an ALS paramedic ready for operational independent practice in South Africa

Graduates highlighted Anatomy and Physiology, General Pathology, EMC, Clinical Practice and Diagnostics as modules that made a major contribution to their development, while Rescue, Physical Preparedness and allied modules were perceived as making a lesser contribution (see Table 4.25).

Table 4.25 Perceived importance of various BHSc: EMC modules

	Q17	Major contribution	Strong contribution	Moderate contribution	Small contribution	No contribution	*p*

1.	Physical Preparedness	**9 (34.62%)**	**10 (38.46%)**	**5 (19.23%)**	**1 (3.85%)**	**1 (3.85%)**	**0.00**
2.	Basic Medical Rescue	**7 (26.92%)**	**9 (34.62%)**	**7 (26.92%)**	**2 (7.69%)**	**1 (3.85%)**	**0.02**
3.	Advanced Medical Rescue	**6 (23.08%)**	**7 (26.92%)**	**9 (34.62%)**	**4 (15.38%)**	**0.00%**	**0.45**
4.	Educational Techniques	**6 (23.08%)**	**8 (30.77%)**	**6 (23.08%)**	**2 (7.69%)**	**4 (15.38%)**	**0.29**
5.	Management Practice	**6 (23.08%)**	**6 (23.08%)**	**10 (38.46%)**	**0 (0.00%)**	**4 (15.38%)**	**0.27**
6.	Anatomy and Physiology	**15 (57.69%)**	**11 (42.31%)**	**0.00%**	**0 (0.00%)**	**0 (0.00%)**	**0.27**
7.	General Pathology	**12 (46.15%)**	**10 (38.46%)**	**4 (15.38%)**	**0 (0.00%)**	**0 (0.00%)**	**0.05**
8.	Emergency Medical Care	**23 (88.46%)**	**3 (11.54%)**	**0 (0.00%)**	**0 (0.00%)**	**0 (0.00%)**	**0.00**
9.	Basic Sciences	**6 (23.08%)**	**6 (23.08%)**	**7 (26.92%)**	**5 (19.23%)**	**2 (7.69%)**	**0.47**
10.	Clinical Practice	**19 (73.08%)**	**7 (26.92%)**	**0 (0.00%)**	**0 (0.00%)**	**0 (0.00%)**	**0.00**
11.	Diagnostics	**7 (50.00%)**	**5 (35.71%)**	**2 (14.29%)**	**0 (0.00%)**	**0 (0.00%)**	**0.19**

4.7.10 Various abilities influenced by the BHSc: EMC

Participants noted that the BHSc: EMC had had a positive impact on their development in terms of being able to assess and treat patients across all age groups, as well as with airway management and the ability to undertake inter-facility transfers. They appeared to list rescue and non-clinical aspects like research, management and teaching as having a lesser impact on their development (see Table 4.26).

Table 4.26: Impact that the BHSc: EMC at the HEI had on the development of various graduate abilities

	Q4	**Major impact**	**Strong impact**	**Moderate impact**	**Small impact**	**No impact**	***p***
1.	The ability to undertake a targeted and purposeful clinical assessment of an adult patient	**12 (46.15%)**	**8 (30.773%)**	**6 (23.08%)**	**0.00%**	**0.00%**	**-**
2.	The ability to provide safe and effective medical care to an adult patient	**13 (50%)**	**10 (38.46%)**	**3 (11.54%)**	**0.00%**	**0.00%**	**0.01**
3.	The ability to undertake a targeted and purposeful clinical assessment of a paediatric Patient	**8 (30.77%)**	**10 (38.46%)**	**6 (23.08%)**	**2 (7.69%)**	**0.00%**	**-**
4.	The ability to provide safe and effective medical care to a paediatric patient	**8 (30.77%)**	**11 (42.31%)**	**5 (19.23%)**	**2 (7.69%)**	**0.00%**	**0.03**
5.	The ability to undertake a targeted and purposeful clinical assessment of a newborn or an infant patient	**6 (23.08%)**	**10 (38.46%)**	**7 (26.92%)**	**3 (11.54%)**	**0.00%**	**-**
6.	The ability to provide safe and effective medical care to a newborn or an infant patient	**6 (23.08%)**	**10 (34.46%)**	**7 (26.92%)**	**3 (11.54%)**	**0.00%**	**-**
7.	The ability to undertake a research project to the point of publication in a medical journal	**3 (11.54%)**	**6 (23.08%)**	**11 (42.31%)**	**6 (23.08%)**	**0.00%**	-
8.	The ability to manage an organisation as an entry-level Manager	**7 (26.92%)**	**5 (19.23%)**	**8 (30.77%)**	**4 (15.38%)**	**2 (7.69%)**	-

9.	The ability to teach prehospital emergency care skills to students who want to practise at the level of an ALS paramedic	**10 (38.46%)**	**7 (26.92%)**	**6 (23.08%)**	**2 (23.08%)**	**1 (3.85%)**	**0.01**
10.	The ability to perform medical rescue skills	**7 (26.92%)**	**7 (26.92%)**	**9 (34.62%)**	**3 (11.54%)**	**0.00%**	**-**
11.	The ability to manage a medical-rescue incident	**5 (19.23%)**	**12 (46.15%)**	**5 (19.23%)**	**4 (15.38%)**	**0.00%**	**0.04**
12.	The ability to perform safe and effective advanced airway management inclusive of mechanical ventilation	**14 (53.85%)**	**10 (38.46%)**	**1 (3.85%)**	**1 (3.85%)**	**0.00%**	**0.00**
13.	The ability to undertake an interfacility transfer of a critically ill/injured patient	**12 (46.15%)**	**9 (34.62%)**	**2 (7.69%)**	**1 (3.85%)**	**0.00%**	**0.00**

4.7.11 Responses to statement 6

"Blocked learning (e.g. learning only EMC for a selected period of time) is better for skills retention than learning EMC and Rescue at the same time (i.e. doing EMC on Monday and Rescue on Tuesday of the same week)."

Most graduates strongly agreed with this statement (see Table 4.27).

Table 4.27: Perceptions of blocked learning for skill retention

Q18	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	*p*
	14 (53.85%)	**5 (19.23%)**	**3 (11.54%)**	**3 (11.54%)**	**1 (3.85%)**	**0.00**

4.7.12 Participant level of satisfaction with the BHSc: EMC

Most graduates were satisfied with the BHSc: EMC (see Table 4.28).

Table 4.28: Graduate satisfaction with the BHSc: EMC

Q21	Very Unsatisfied	Unsatisfied	Neutral	Satisfied	Very satisfied	*p*
	0.00%	**2 (7.69%)**	**2 (7.69%)**	**17 (65.38%)**	**5 (19.23%)**	**0.00**

4.8 Conclusion for Section 3

Section 3 included survey responses specific to work readiness. These responses addressed topics such as graduate perceptions of the need for a postgraduate mentorship programme; the relevancy of various clinical learning sites; Medical Rescue module contribution to graduate development for independent practice; and graduate perceptions of the effectiveness of and overall satisfaction with the BHSc: EMC.

CHAPTER FIVE

DISCUSSION AND CONCLUSIONS

5.1. Introduction

In this chapter, the results of the study are interpreted and discussed in regard to each of the three objectives. The discussion focuses on key issues relating to each objective in an attempt to investigate the effectiveness of the BHSc: EMC in preparing graduates for independent practice. The data from the curriculum review (Chapter 4, Section 1), the semi-structured interviews (Chapter 4, Section 2 Part A) and the survey questionnaire (Chapter 4, Section 2 Part B) is triangulated in an attempt to enhance overall understanding of the results. Furthermore, the results are discussed in association with the existing literature reviewed in chapter two to highlight possible similarities and conflicts, with the ultimate aim of addressing any research gaps that exist.

5.1.2 Recapitulation

Emergency Medical Services in SA has advanced significantly over the last four decades, with the most considerable advancement being the transition of its education and training from vocational training to university-based education. The latest product of this change is the four-year professional degree in EMC which is offered at four accredited HEIs in SA. It is this professional degree that the study focused on; specifically, the effectiveness of the degree offered at an HEI in KZN in preparing paramedic graduates for independent practice.

The researcher sought to start the investigation with a critical appraisal of the design and content of the BHSc: EMC programme and then proceed to investigate the emic experiences of graduates who completed the programme, particularly in regard to their employability skills and work readiness. Before beginning the interpretation and discussion of the results, it is essential to reiterate operational definitions for the terms “work readiness” and “employability” used in this study.

Work readiness is the term used to describe the process of students being equipped with all the foundational skills and resources needed to be minimally qualified for a specific occupation as specified by a job description or occupational profile (Clark 2013).

and

Employability is defined as having the necessary skills and abilities that allow for employment (Cambridge Dictionary 2021).

5.1.3 The critical appraisal of the BHSc: EMC programme

The aim of the BHSc: EMC, according to the South African Qualifications Authority (2021), is to produce professionals who will graduate as independent clinical practitioners and rescue specialists within the emergency medical care and rescue environments. Since its inception, however, there appears to have been no formal review that indicated whether this had in fact been achieved. A curriculum review, as explained by Britton *et al.* (2008), forms part of a quality improvement initiative of professional programmes and should take place regularly to ensure gaps in teaching and learning are identified early on and remedied. In the absence of a formal review tool, measuring the effectiveness of the BHSc: EMC in relation to its intended aim had to take place using a set of specific documents which together provided a representative description of the curriculum in regard to content taught, instructional designs used to deliver content, assessments, moderation processes, and the degree of alignment that existed with national qualification frameworks. Using these documents, this review commenced using the following broad, generally agreed, educational constructs: learning outcomes; content; learning and teaching strategies; assessments; alignment; philosophy; and standardisation (Ebert *et al*. 2013; Prideaux 2013; Bharvad 2010; Davenport *et al.* 2009). The discussion is presented against the backdrop of these constructs but focusing on the main issues that emerged as result of the review.

5.1.3.1 Learning outcomes

As described in chapter four, learning outcomes are statements that describe the knowledge or skills students should have acquired at the end of a particular training period (Chatterjee and Corral 2017). The standard format of a learning outcome includes an action verb, content, and context. Ideally, learning outcomes should be aligned to elements summarised by the SMART mnemonic. Accordingly, learning outcomes should be *Specific, Measurable, Achievable, Relevant, and Time-bound* (New Zealand Qualifications Authority 2020). For learning outcomes to be of any value, they must adhere to this standard format.

After review of the BHEMC1 learning outcomes for each of its modules, it became clear that the majority of learning outcomes for the core modules (listed in Table 4.1) and the non-core modules (listed in Appendix 4), did not comply with the SMART considerations

that one would ideally find in the format of a standard learning outcome. In most instances, the learning outcomes were not specific enough, contained more than one action verb and were not time-bound. Learning outcomes, if written correctly, serve three main functions: they guide the learners in terms of having a clear idea of what they can expect to learn and what will be expected of them by the end of the module; they provide lecturers with a set of goals to achieve in presenting the content of a module; and they form the basis for evaluating the lecturer, student and module effectiveness (New Zealand Qualifications Authority 2020).

Since the learning outcomes for the modules included in the BHSc: EMC did not adhere to the standard learner outcome format, it is likely that they did not serve their above-mentioned functions and as a result promoted some level of uncertainty in learners, particularly in modules where there are a variety of different lecturers with different views and takes on what students should ideally know (Hanusch, Obijiofor and Volcic 2009).

This possible lack of cogency may be one of the reasons behind a growing theory–practice gap that is now known to exist with evolving educational programmes and especially as programmes now attract many more first-time recruits who are younger in age. Younger graduates not only find independent self-directed learning harder, but they are also the cohort where the theory–practice gap is most notable (Henderson 2012; Hickson *et al*. 2015 and O'Brien e*t al.* 2014). This gap is described as the reduced ability to effectively translate knowledge to actual hands-on skills. According to Alshammari and Jennings (2018) and Willis *et al.* (2010), younger graduates often lack, through no fault of their own, the levels of maturity needed to immediately transition from post- graduation to independent practice, with the same skill competency and maturity to dealwith the day-to-day challenges of the prehospital environment as their older counterparts. Compounding this and as discussed by O'Brien *et al.* (2014) and Reid *et al.* (2019), as programmes become more professionalised, often at the expense of "hands on technicaltraining", the theory–practice gap widens, and it is this gap that is often blamed for the work-unreadiness of graduates. For this reason and also to hold lecturers accountable for what needs to be consistently taught, learning outcomes need to be clear in order to appropriately guide individuals through the academic programme. This not only promotes a smaller theory–practice gap but also a greater likelihood of a smoother transition for graduates into the workforce.

5.1.3.2 Lack of generally agreed minimum teaching and learning standards

The PBEC is the professional board within the HPCSA that regulates the EMS professionin SA. Ideally, part of regulation should include an established national curriculum, inclusive of minimum standards that direct what every EMS graduate of a degree in EMClearns in SA. This has many benefits as it not only ensures consistencies in exit outcomes and graduate attributes but could allow for students to alternate between HEIsshould they want to travel across SA (Sobuwa and Christopher 2019). It was found thatthe PBEC did not, at the time of this review, mandate a formal list of minimum training competencies with which the BHSc: EMC had to comply. This not only meant that the BHSc: EMC at one HEI could very well include subjects, modules and content that differfrom those at another, but also that there was no industry espoused regulatory body thatensured that the content taught across the first three formative years of the BHSc: EMCwas in fact contextually relevant. The final year of the BHSc: EMC is moderated by the PBEC; however, this process appears to be person dependent and does not follow a regimented, one-size-fits-all, consistent process. In other words, it appears that in place of a minimum competency list of skills and knowledge that graduates should have, these competencies were inconsistent and fluid, resulting in them changing over the years.

Minimum standards act as a guideline for instructional programmes to ensure that the aim of the programme is achieved. This means that in the absence of minimum standards, it is likely that the intended aim of the BHSc: EMC may have not been achieved, as discussed by Davenport *et al.* (2009). The lack of minimum standards means that the HEIs in SA which offer the professional degree had no standards to align the BHSc: EMC curriculum to. This further means that HEIs were, in many ways, able to decide for themselves what should be included in the BHSc: EMC curriculum, as well as how the programme should be structured. A risk of this autonomous developmental ideology is the possible omission of certain components normally required for effective teaching and learning. Although this concern was raised previously, particularly by the PBEC, which found that the EMC programme at the time was poorly structured with no evidence of benchmarking (Durban University of Technology 2018a), this appears to have gone on unfixed.

Another place where the lack of minimum standards and its consequences is evident is in the variation in the contents within the respective years of study in the degree at the four accredited HEIs in SA. An example of this is seen in BHSc: EMC offered in the Western Cape which includes an introductory Medical Rescue module while the other

three HEIs do not. The other three HEIs (Durban University of Technology 2021; University of Johannesburg 2021 and Nelson Mandela University 2021) appear to omit this introductory module to focus more on EMC and Anatomy and Physiology. While a first-year student at the Western Cape HEI may have a Medical Rescue advantage over the other students at the other HEIs, this student may also be at a disadvantage in comparison due to less time to focus solely on the other core constructs. On the other hand, early exposure to the Medical Rescue module may assist the student with deciding whether the degree is actually something they truly want to pursue. This, again, was likely a result of the lack of minimum standards which still did not yet exist for the 2016–2018 programme and a possible implication of this may very well be a graduate who is inadequately prepared for the workforce.

Rouse (2011) emphasises the need for regular, systematic evaluation of academic programmes in order to identify strengths and weaknesses and for improvements to be made. In America, the NHTSA plays the role of the PBEC and assumes responsibility for the development of paramedic training courses. it goes a step further than the PBECin this regard by undertaking a regular review of these programmes to ensure that they remain up to date and of good quality. The NHTSA does this by consulting with and including recommendations from national stakeholders such as the National Emergency Medical Services Education and Practice Blueprint, the EMT and Paramedic Practice Analysis, and the EMS Agenda for the Future to ensure that the goal of the EMT-P NSC is achieved (Paris and Roth 2014). The PBEC should consider undertaking regular reviews of their paramedic training programmes, namely the BHSc: EMC, to ensure that they remain up to date and of good quality and to ensure that the intended aim of these programmes is achieved, as it is only through this process of evaluation that the true value of an academic programme can be ascertained (Rouse 2011).

5.1.3.3 Inclusion of swimming midway through the degree

The physical assessment included in the BHSc: EMC ensures students maintain a certain level of physical fitness throughout the programme. In 2016, the physical assessment, which was a standalone aspect of the curriculum undertaken annually, was incorporated in the Medical Rescue module following recommendations from the PBEC which had undertaken a review of the BHSc: EMC programme, or rather an iterative version of it (Durban University of Technology 2018a). As a result of the change, students were required to complete a new standardised physical assessment which assessed cardiovascular endurance, muscular endurance and swimming proficiency, which was

not previously included in the old assessment format. This was considered a significant change from previous age/gender-based physical assessments in which swimming proficiency was not included (Durban University of Technology 2018a).

The study found that while graduates recognised the importance of maintaining physical fitness, they had highlighted the renewed level of fitness and swimming requirements were not aligned with industry needs and were therefore unnecessary, particularly as they came at the expense of spending more time learning EMC, which was considered the core of the profession. An example of this was the inclusion of swimming and the level of proficiency it required. It became clear that the 2017 and 2018 cohorts in particular struggled with this new and sudden inclusion, as these students had never been required to swim and then suddenly it became a requirement for students who had probably never swum in their lives. And because failure to prove swimming proficiency meant that students could not participate in the Aquatic Rescue module, they ultimately failed a year of the programme.

It was further established that those students who managed to learn to swim a timed sprint in a pool within six months were still not comfortable in the water and struggled with the Aquatic Rescue module, which inevitably required more technical, complex swimming skills and levels of confidence typically developed with years of swimming.

Graduates also highlighted the fact that swimming, as predicated, was not a skill which was ever required in the workforce and therefore should not hold such a heavy weight in the BHSc: EMC. In addition, while agreeing that swimming is an important life skill, the primary teaching across the programme holds that jumping in to physically rescue a patient in any body of water should be an absolute last resort, and because drowning rescues are often recovery missions where specialised sea rescue units are utilised, the time spent on swimming and Aquatic Rescue could be better invested to ensure already established graduate attributes are achieved. In its current position in the programme, it appears as a component not consistent with industry needs and mainly serves as a barrier to student progression through the degree.

5.1.3.4 Mismatch of modules across the BHSc: EMC

A mismatch of modules can be seen when certain modules with complementary content appear in different years of the BHSc: EMC and potentially disrupt the continuum of learning. Another finding, which possibly presented as a potential barrier to student progression through the degree, was the misalignment in content and its step-up

progression between the years. This misalignment most likely disrupted the learning continuum in a certain year of study or along progressive years. While there is no evidence of this, the lack of nationally agreed minimum competencies and standards may have contributed to this misalignment.

According to the BHEMC1 as outlined by the module descriptors, the following mismatches were found:

5.1.3.4.1. EMC IB and Physiology II of the BHSc: EMC curriculum

As part of the BHEMC1 curriculum, EMC IB and Physiology II are taught in different years yet contain complementary obstetric and foetal subject content. In EMC IB of the curriculum, students are taught uncomplicated normal delivery of a newborn. As this is a first-year module, this is the student's first exposure to maternal and foetal care and because EMC IB restricts its teaching to practical skills only, students at this stage have not acquired any anatomical and physiological underpinning knowledge to fully understand the skill of delivery. It is only in Physiology II, a second-year module, that maternal and foetal health is covered. To compound matters – the only other time maternal and foetal health is covered is at the end of year four. Owing to this misalignment, there really is no value in doing this component of Physiology II in year two, as any integration in the knowledge, understanding and skill that it is hoped to bring is unlikely to happen as modules are so far apart. A logical adjustment would be to have students learn about the anatomy of mum and baby first to allow for the step-up progression in learning and understanding. This may not necessarily be solved by nationally agreed minimum competencies and standards but having a peered-reviewed nationally benchmarked curriculum map that indicates when students learn what and when this occurs would be of benefit (Chakrabarti *et al.* 2021).

5.1.3.4.2. Timing of taught content in the BHSc: EMC curriculum

The timing of certain modules in the BHSc: EMC was found to be problematic. The fourth-year module, Emergency Medical Care IVB, covers the emergency management, clinical assessment and transportation of paediatrics and neonates and the transportation of the critically ill/injured by road or air. However, the fourth year Clinical Practice module is directed only at the mastery of: emergency medical service operational systems; professional practice; emergency medical care at ALS level; and documentation and record keeping. Accordingly, the second semester of fourth year is the first time the students are exposed to the advanced clinical assessment and emergency management of paediatric and neonatal patients. Exposure to these patient populations so late in the

degree may prove to be overwhelming for students. This is consistent with the findings of the scoping review undertaken by Fowler, Beovich and Williams (2018), who found that paramedics are generally uncomfortable with managing the paediatric patient population and desire more paediatric training and clinical exposure to children. To mitigate this, these patients should be introduced earlier in the programme to allow students to become comfortable with adjustments in drug dosages and the medical management specific to these patients.

Another study unit which is covered in EMC IVB is transportation of the critically ill/injured patient by road or by air. An aviation medicine module should accompany this to ensure students have a comprehensive understanding of aeromedical patient management and transport. In addition, and in accordance with the findings of O'Brien *et al.'*s (2013) study, clinical placements are valued by final-year paramedic graduates and as a result they desire more varied, relevant clinical placements. Having said that, the Clinical Practice IV module should dedicate a set number of hours to ICU ambulances which deal solely with the interfacility transfer of patients. This would provide students with better exposure than regular response vehicle shifts where the ALS practitioner may get one or two transfers for the whole 12-hour shift in comparison to a shift in an ICU ambulance that is specifically dedicated to the transfer of critically ill and/or injured patients.

As mentioned before, paediatric and neonatal populations are studied specifically for the first time in fourth year as part of EMC IVB. To bridge the potential theory–practice gap, learners should be exposed to the basics of paediatrics and neonates in perhaps the second semester of the first year. Taking this module earlier will allow for the early integration of anatomy, physiology and pharmacology into these patient populations. The different assessment and management dynamics of these patients should then be integrated in the content of each EMC module right through to the fourth year. Having this module so late in the BHSc: EMC may cause students to struggle with integrating earlier knowledge and skills into their treatment of these patients.

In the review of studies carried out on paramedic graduates, the presence of the theory–practice gap has been hinted at as graduates commonly report a feeling of being theoretically equipped but lacking practical confidence (Michau *et al.* 2009; Willis *et al.* 2010). This calls for an analysis and an adjustment of the paramedic curriculum in order to bridge the theory–practice gap and help graduates feel more confident in their practical abilities. Lazarsfeld-Jensen *et al.* (2011) suggest using clinical learning as a way to bridge the theory–practice gap. These authors explain that clinical learning, while greatly

varied among different institutions, is the best way for undergraduate paramedics to be exposed to the realities of the prehospital environment, as the classroom environment alone can in no way replicate the complexities of a real emergency environment (Lazarsfeld-Jensen *et al*. 2011; Michau *et al*. 2009). Bridging the theory–practice gap will also later translate to a graduate who is ready for the workforce and transitions smoothly from supervised to independent practice. This is consistent with the findings from the interviews and the questionnaire which are discussed in more detail below.

Based on the review, it was found that there is a lack of PBEC minimum standards to measure the BHSc: EMC against and there is also a mismatch of modules across the four years of the programme. These are pertinent issues which may have a negative impact on the imparting of knowledge and skills in the BHSc: EMC curriculum. As a result, this will likely contribute to the programme missing the intended aim espoused by SAQA (2021).

5.1.4 The impact the BHSc: EMC degree has had on graduate employability skills

Objective 2 specifically investigated the impact of the BHSc: EMC degree on graduate employability skills. The impact of a programme is best measured by testing gained knowledge and/or skills and comparing this to industry requirements, as well as by asking graduates about their emic lived experiences post-graduation and during the first weeks on the job.

5.1.4.1 Employability skills – Emergency medical care and rescue

As can be seen in the BHSc: EMC curriculum content, adult patients are a focus area of teaching for the first three years of the curriculum. A possible implication of this is a graduate who is confident in certain focus areas but lacks confidence in other areas which did not receive as much focus within the programme. This was seen in the data, as graduates revealed that they felt most confident treating adult patients post-graduation, mainly due to a perception of adequate theoretical and practical exposure. In contrast, graduates reported feeling least confident in dealing with paediatrics and neonates post-graduation due to a perceived lack of theoretical and practical exposure. This once again correlates with the curriculum content of the BHSc: EMC which reserves undergraduate exposure to these patient populations for the fourth and final year of study.

5.1.4.1.1 The advantage of prior experience to employability

Prior EMS experience appears to be advantageous for both the work readiness and the employability skills of paramedic graduates. In terms of employability, a clear division in graduates became apparent in relation to trauma emergencies. Most graduates felt most confident treating penetrating injuries, while most graduates felt least confident treating blunt trauma. A third group of graduates with prior EMS experience expressed confidence and competence in both penetrating and blunt trauma. This is an indication of the value of EMS exposure prior to enrolling in a programme such as the BHSc: EMC and the possible impact on graduate employability on completion of the programme. The NHTSA EMT-P NSC review document lists the EMT-Basic course, which is equivalent to the Basic Ambulance Assistant (BAA) course in SA, as a prerequisite for the EMT-P course. The NHTSA highlights that this inclusion was based on tradition rather than empirical data, as the value of this qualification and/or relevant experience as a prerequisite for paramedic education has not yet been studied (Paris and Roth 2014).

5.1.4.1.2 Rescue employability skills

Medical Rescue was not viewed as being majorly beneficial for graduate employability. The majority of graduates reported using their rescue skills about every one to six months or not at all. This may explain why graduates rated Medical Rescue skills and scene management as having lesser importance for their first job post-graduation. A skill that is not practised is at risk of being lost and this may explain why graduates reported a loss of rescue competency and confidence post-graduation.

The large majority (13; 72%) of graduates felt both competent and confident in their rescue abilities immediately post-graduation. However, due to a lack of postgraduate exposure and subsequent skill degradation, 78% (14) of graduates reported feeling neither confident nor competent sometime after graduation. This correlates with the results of the surveys which revealed that 0% of graduates are regularly involved in rescue once qualified. Fifty per cent (13) of graduates reported that their organisation outsources their rescue while the other 50% (13) of graduates reported that their organisation has a dedicated rescue team which is dispatched to rescue-related incidents. In Table 4.11, 23% (6) and 19% (5) of graduates felt that the ability to perform rescue skills and to manage a rescue incident respectively, were not important abilities in their first job post-graduation.

In contrast, graduates highlighted core constructs such as advanced airway management, the ability to undertake an inter-facility transfer (IFT) and the clinical

assessment and management of patients of great importance to their first job postgraduation (Table 4.11). This, coupled with the lack of postgraduate exposure, highlights Medical Rescue as a module with content which requires revision within the BHSc: EMC. From these results, it would appear that the module content is not aligned with industry needs. This is in line with the general consensus on what a paramedic actually is. According to various sources, the primary role of a paramedic is to provide emergency medical care to patients in the out-of-hospital setting (Engel 2020; Brennan 2021; Anon. 2021). Paramedics who require complex rescue knowledge and skills are firefighter paramedics who are dispatched to calls which require patient rescue and scene stabilisation (Anon 2021).

Apart from the above-mentioned curriculum discrepancies, the majority of graduates still felt that the BHSc: EMC adequately prepared them for independent operational practice both within and outside SA. Graduates seemed to think that the BHSc: EMC had prepared them better for the South African prehospital environment rather than for that outside SA, as their responses ranged from neutral to strongly agree (Table 4.14). In response to preparation for prehospital environments outside SA, graduate responses ranged from disagree to strongly agree (Table 4.15). It can therefore be said, from these responses, that graduates felt the BHSc: EMC was successful in achieving its intended aim; however, there is definitely room for improvement.

5.1.4.2 Graduate transition from supervised to independent practice

The majority of BHSc: EMC graduates reported that the transition from supervised to independent practice ranged from being “not so easy” to “not at all easy” (Table 4.16). Graduates who struggle to make this transition are suggestive of a theory–practice gap and may also be indicative of graduates who are not ready to enter the workforce. While there is no literature currently available to confirm transition challenges in paramedicine, graduate responses suggest that this may be a concern for paramedic graduates. As it stands, the literature reports that the transition from graduate to independent practice is a challenge for nursing graduates whose education system has followed the same path as that of paramedic education (Cho *et al.* 2012; Kovner *et al*. 2010; Brewer *et al.* 2012).

5.1.5 Work readiness – Graduate perceptions post-graduation

Curriculum design is directly related to and has a major impact on graduate work readiness (Misni *et al*. 2020; Iyer and Dave 2015; Pheko and Molefhe 2016). Work

readiness is a goal that all tertiary academic programmes hope graduates will achieve on completion of a specific academic programme. The actual state of graduate work readiness, however, is often assumed and not actually known.

5.1.5.1 Module structure within the BHSc: EMC

Over the years, the BHSc: EMC has undergone major transformation. Along with this transformation has been a change in the structure that the modules are presented in. As a result, different student cohorts were exposed to different module structures during the 2016–2018 period. Inappropriate module structuring has the potential to disrupt the learning continuum within the programme and stunt student progression. Appropriate module structuring, on the other hand, assists of learning continuum within the BHSc: EMC, which promotes student progression through the degree and ultimately results in graduate success.

In the analysis of which module structure was best suited for the programme, it was found that each module structure offered a unique set of advantages and disadvantages.The two module structures which have been used in the BHSc: EMC are “blocked” and “integrated” learning.

5.1.5.1.1 The blocked system

The blocked system saw the completion of a specific module, for example EMC, within a period of a few months. During these months, the theory and practical components of the module were completed simultaneously. Thereafter, the next block would begin, which was most often Medical Rescue. With the integrated system, different modules are offered at the same time on different days of the week, for example EMC on a Monday and Medical Rescue on a Tuesday. With both these systems, the allied modules within the BHSc: EMC, for example Pharmacology, would occupy one day in the week. Graduates found that the blocked system was more beneficial for practical learning due to the daily repetition of a skill for a long period which aided their learning of skills in both the EMC and Medical Rescue modules. Graduates also found that they were better able to cope with the BHSc: EMC workload within the blocked system and this also translated to better focus on module content. The disadvantages of this system, as mentioned by some graduates, include that the blocked system encouraged compartmentalisation of knowledge, making the integration of related principles in allied modules difficult. This disruption in integration of knowledge could possibly impact the continuum of learning, contribute to the theory–practice gap previously discussed and negatively affect graduate readiness.

5.1.5.1.2 The integrated system

On the other hand, the integrated system was found to be associated with better knowledge retention. The nature of this system exposed graduates to related principles in different modules, subsequently facilitating the integration of these principles. Graduates found that this system assisted with better knowledge retention of theoretical content. This is in line with the findings of a study conducted by Fraser *et al.* (2019), who compared these two learning systems. It can be argued that it is this system that creates the learning activities mentioned by Willis *et al.* (2010) that assist with graduate transition and help create a well-rounded paramedic. One major disadvantage of this system was that it made the BHSc: EMC feel congested. Graduates highlighted specific difficulty with coping with the workload in the integrated system. Graduates explained that the long Medical Rescue days, often beginning very early in the morning, for example 07:00 and ending in the late afternoon or evening, for example 17:00, were physically draining and took time away from focusing on EMC. Another issue highlighted by graduates was the grasping of rescue skills. The week-long interruption in practice of the specific skill made it difficult for graduates to retain it.

It is therefore suggested that the BHSc: EMC curriculum should combine these two systems to capitalise on the advantages of each. Perhaps the HEI could attach the two systems to each semester of the academic year. The first semester could make use of the integrated system to focus solely on theoretical principles, while the second semester could utilise the blocked system for the teaching and learning of the practical components of modules to assist with skill retention as it is known that increased practice in a skill facilitates mastery of the skill. This should help with the heavy workload graduates alluded to and also with focus on the key principles followed by the integration of linked principles. Ultimately, this semesterisation of systems may encourage the continuum of learning, mitigate the theory–practice gap and facilitate graduate success in the BHSc: EMC.

5.1.5.2 The advantage of prior experience for work readiness

Graduates seemed to associate their theoretical knowledge with competence and their practical exposure with confidence and readiness for independent practice. It was repeatedly found that graduates with prior experience were associated with increased levels of confidence. In the semi-structured interviews, graduates were asked if they had prior EMS experience/qualification, with eight graduates reporting having a prior BAA qualification and experience. In another question, graduates were asked if they felt

sufficiently trained as an ECP up to the level of independent practice straight after graduation. Eight graduates answered “yes”. Of these eight graduates, six (75%) had previously reported having prior EMS experience. A ninth graduate was unsure but mentioned having an added advantage over other graduates without prior experience.

This data hints at the value of a basic EMS qualification and/or experience prior to enrolment in a paramedic programme. This can only be of benefit to the graduate, as paramedics are required to be competent in all basic emergency medical care skills and knowledge. Paramedic programmes that do not list a basic qualification as a prerequisite for enrolment, like the BHSc: EMC, incorporate this information in the first year of the curriculum, therefore attaining such a qualification prior to enrolment is not a necessity. It is clear, however, that prior EMS experience is an advantage in terms of graduate readiness for those who enrolled in the BHSc: EMC. This was noted by graduates in Table 4.18 where past knowledge and experience obtained prior to enrolling in the BHSc: EMC was viewed by the majority as having made a major contribution to their development as an ALS paramedic ready for operational independent practice in SA.

5.1.5.3 Suggested BHSc: EMC changes and inclusions

Apart from the module structure of the BHSc: EMC, another way to improve the BHSc: EMC curriculum may be to revise the enrolment requirements, module structure and content.

5.1.5.3.1 BAA as a prerequisite

The BAA short course has now been phased out and is no longer offered in SA (Sobuwa and Christopher 2019). The data suggests, however, that there may still be a gap for this course, perhaps solely as a prerequisite for enrolment in the BHSc: EMC. This six-week course, or a revised course with similar outcomes to shorten the length of the course, may be included as a minimum requirement instead of the current Mathematics, Biology and Physical Sciences (Durban University of Technology 2018b). These above-mentioned high-school subjects as a minimum requirement could instead become the requirement for entry to the BAA course. The BAA final exam could then be used as the BHSc: EMC entrance exam to replace the current English and Mathematics entrance exam, as the BAA course content is more aligned with the BHSc: EMC than the content of the aforementioned high school subjects. These changes would result in a first-year student who is familiar with the basics of EMC and has proven competence to enrol for the BHSc: EMC. This would also encourage a continuum of learning from the point of enrolment and, with the appropriate practical exposure as described by Lazarsfeld-

Jensen *et al.* (2011), may translate to a graduate who is more ready for the emergency medical care and rescue environments.

5.1.5.3.2 Structuring of EMC and Medical Rescue modules

Medical Rescue was often highlighted as a recognised weakness among graduates due to an inherent disinterest in the module and a lack of postgraduate exposure. While graduates of the BHSc: EMC recognised the value of being exposed to both EMC and Medical Rescue training, they suggested a separation of these modules. Graduates felt that Medical Rescue training interferes with EMC focus and suggested that the BHSc: EMC should focus on EMC first, as this is a core construct of the degree. This is actually in line with the EMT-P NSC which does not include Medical Rescue as it is not recognised as a core construct. It is recognised, however, that additional training in this specific area may be required depending on the locality in which the graduate becomes employed (Paris and Roth 2014). As a result, graduates suggested focusing on EMC in the first three years of the degree and reserving Medical Rescue for the fourth year. Alternatively, some graduates suggested separating Medical Rescue completely from the BHSc: EMC and offering it instead as an elective module for those who are interested in becoming rescue technicians.

5.1.5.3.3 Medical Rescue contribution to work readiness

Medical Rescue was not viewed as being majorly beneficial to graduate work readiness. While graduates did recognise the importance of Medical Rescue training in making them well-rounded practitioners, they seemed to recognise only certain aspects of Medical Rescue as important to their development as ALS paramedics. When the focus fell on the various rescue modules, the basic Medical Rescue modules such as extrication and rope were recognised as contributing the most to graduate development as an ALS paramedic ready for operational independent practice in SA (Table 4.22). AMR modules such as Aquatic and Confined Space rescue contributed the least according to graduates, mostly due to no postgraduate exposure. This finding is supported by a study conducted by Szarpak and Kurowski (2014), who found that paramedics and other medical personnel did not have satisfactory knowledge relating to chemical rescue which was possibly a result of no operational exposure to chemical contamination. Graduates mentioned that motor vehicle accidents, an aspect of basic Medical Rescue, make up a large percentage of trauma calls and this is where fire and extrication knowledge proves useful even though the ECP is not often directly involved in the rescue but is rather preoccupied with patient care.

As mentioned before, the data revealed that EMS organisations either have a designated rescue team or outsource their rescue. Either way, according to operational graduates, the Emergency Care Practitioner (ECP) is hardly ever directly involved in the rescue attempt. Graduates explained that since ECPs are a scarce resource in SA, these personnel are often reserved for inter-facility transfers and other critical cases. This ties in with graduate perceptions of the level of contribution that BHSc: EMC modules made in their development as an ALS paramedic ready for operational independent practice in SA, where the ability to perform rescue was not recognised as an important contributor. Instead, graduates perceived the addition of more response vehicle shifts as having the potential to positively contribute to their development.

5.1.5.3.4 Clinical practice contribution to work readiness

Graduates highlighted the unpredictable nature of the prehospital environment and the occurrence of “slow” days particularly in the NICU and the Maternity departments. Graduates further reported that operations in these departments became tedious and because of this, fewer clinical hours should be allocated to these departments. Graduates suggested rather allocating these hours to more response vehicle shifts due to the established unpredictable nature of the prehospital environment and the fact that some ALS skills, such as RSI, are often difficult to find. This has the potential to greatly assist graduates in obtaining the relevant skills and experience to adequately prepare them for independent practice. Losing valuable time in tedious departments or in departments where patient walk-through is low may translate to less undergraduate clinical exposure. Clinical learning, according to the literature, is the best way for undergraduate paramedics to be exposed to the realities of the prehospital environment and the classroom environment can in no way replicate the complexities of a real emergency environment. Owing to the unpredictable nature of the prehospital environment, however, and in support of graduate responses, clinical learning time can sometimes be wasted by “slow” days or even by inappropriate clinical preceptors who are either unable or unwilling to provide quality educational experiences for graduates (Lazarsfeld-Jensen *et al*., 2011; Michau *et al*., 2009).

Graduates expressed a lack of confidence in RSI immediately post-graduation due to a lack of undergraduate practical exposure. RSI is viewed by graduates as being a key competency and extremely important to their job. Lacking confidence in this skill postgraduation could possibly indicate the presence of a theory–practice gap and a graduate who is not ready for independent practice. Lazarsfeld-Jensen *et al*. (2011) state

that clinical learning is integral to beginning to bridge the theory–practice gap; however, this gap is difficult to mitigate owing to the unpredictable nature of the prehospital environment. The only way to increase the potential opportunity of students to encounter the skill is to increase clinical hours in the department where this skill is most likely to be performed. This is why graduates highlighted the need for an increase in response vehicle shifts.

Despite the unpredictable nature of the prehospital environment and the resultant inevitability of “slow days”, graduates highlighted the Clinical Practice module as making a major contribution to their development as an Advanced Life Support (ALS) paramedic ready for operational independent practice in SA. This is contrary to the findings of Michau *et al*. (2009) and Wray and McCall (2009) who contend that there is little evidence to support the effectiveness of clinical learning in reflecting the reality of the workplace.

Graduates also highlighted that certain skills which need to be obtained in order to pass the Clinical Practice module are too many and some are unnecessary. For example, graduates referred to the need to obtain 50 blood pressures per year in the BHSc: EMC. Needing to obtain such a high number of such a basic skill dramatically increases the skill requirement for the specific year and leaves less time for the acquisition of more difficult or rare skills such as RSI. Graduates felt that basic skills requirements such as taking blood pressure should be reserved for the first and second years of study and that more complex and scarcer skills such as RSI should be left to the third and fourth year. The current skill requirements for the Clinical Practice module may support comments made by Lazarsfeld-Jensen *et al*. (2011) that clinical placement time does not provide sufficient workforce preparation.

5.1.5.3.5 Mental health in the BHSc: EMC

Graduates highlighted the need for the inclusion of a Mental Health module in the BHSc: EMC and expressed a lack of confidence in dealing with these types of case in terms of legal and emotional aspects. Graduates suggested that this module should also include content surrounding practitioner mental health as they often encountered cases that were emotionally overwhelming, mentioning that they were not equipped in the BHSc: EMC with the proper skills to deal with this. A consequence of this could be a graduate who does not know how to address or deal with patients in this category appropriately. Another consequence on the personal side may be a graduate who does not know how to deal with their own emotions. This, if not remedied, may plague the graduate, and negatively affect their mental well-being. This correlates with the findings of Filstad and

McManus (2011) who found that newly qualified paramedics expressed challenges in learning to control their own emotions in the face of human suffering, injury and death. An unprepared novice paramedic or the build-up of stress from frequent exposure to traumatic events over time, may increase the risk of paramedic burnout and PTSD, which is already a common phenomenon. Insufficient graduate preparation and support in this regard may contribute to poor graduate outcomes in terms of operational performance and job satisfaction (Sofianopoulos *et al*., 2011; McAllister and McKinnon, 2009; McCann *et al*., 2013).

5.1.5.4 BHSc: EMC preparation for independent practice

While the majority of BHSc: EMC graduates reported feeling sufficiently prepared for independent practice in SA (Table 4.14), it is important to note that 50% (9) of these graduates attributed their readiness to prior EMS experience. The remainder of graduates (5; 28%) reported feeling unprepared and 22% (4) felt unsure. Common themes which emerged for graduate perception of lack of preparation included a lack of practical exposure as well as challenges with transition from supervised to independent practice. A graduate who feels unprepared for the workforce may possibly struggle with the transition from supervised to independent practice. This finding is in line with the available literature on final-year paramedic students and paramedic graduates alike (O'Brien *et al.* 2013; Hickson *et al*. 2015).

5.1.5.4.1 Industry expectations

Graduates expressed their concern about industry expectations for them to make a seamless transition from supervised practice to independent practice and also about having received too much theory and not enough opportunities to apply this knowledge. This has the potential to contribute to the theory–practice gap and does not allow the graduate time after graduation to practise applying their knowledge and skills in the real clinical environment as a senior. The result may be a graduate who is not confident in the performance of their clinical skills and lacks the experience to fully integrate their knowledge and skills. El Haddad *et al.* (2017) discovered similar findings in their study on graduate nurses, where the authors identified a theory–practice gap among these graduates, also due to too much theory and not enough practice as described by BHSc: EMC graduates.

The expectation that new graduates will make a seamless transition into the workforce, as explained by O'Brien *et al.* (2013), is a dangerous one that may result in an unrealistic training programme or, worse, a training programme that is inappropriate. Alshammari

and Jennings (2018) and Willis *et al.* (2010) explain that graduate readiness for independent practice extends further than just skills competency. Graduates should also have the maturity to deal with day-to-day challenges within the prehospital environment on the first day of the job. With the change in paramedic education from vocational to university-based, however, the result has been a dramatic shift in the student profile the profession is attracting – young school leavers without a developed understanding of the social stressors and realities of the prehospital environment (Henderson 2012; Hickson *et al*. 2015; O'Brien *at al.* 2014). For this reason, now even more, the belief should be that graduates will at best be novices; however they should also learn the skills that will help them transition quickly from novice to safe and effective practitioners and then to proficient and expert. Willis *et al.* (2010) maintain that the way to do this and make a well-rounded paramedic is to create and include learning activities in the training programme that assist the integration of theory, clinical skills and supporting sciences. Filstad and McManus (2011), on the other hand, contend that the transition of graduates from novice to expert is an on-the-job, learnt process of unspoken knowledge, social participation and conformity to the role.

5.1.5.4.2 Graduate accountability

Some graduates recognised their role in preparing for independent practice. While the BHSc: EMC is designed to provide students with core EMC and Medical Rescue constructs, students in these programmes need to be accountable for their learning. This is imperative to avoid stagnation of practice especially in the medical field that is constantly evolving and advancing. The BHSc: EMC graduates recognise their role in being accountable for their learning which correlates with the findings of O'Brien *et al.*'s (2013) study in which paramedic graduates mentioned that on-the-job learning was still required despite having obtained a solid theoretical background from university-based paramedic education.

5.1.5.4.3 Graduate perceptions of their development in relation to key competencies

Regarding key competencies such as RSI, most graduates reported feeling competent due to the adequate curriculum focus in the BHSc: EMC. Graduate confidence was, however, lacking due to a lack of clinical exposure to the skill. Regarding the impact that the BHSc: EMC at the HEI had on graduate development in various abilities, graduates identified paediatric and neonatal assessment, research, management and rescue as abilities which were not well developed in the BHSc: EMC (Table 4.26). This is a possible

indication of the need for revision of these modules. It is possible that the module content or perhaps the teaching and learning methods are not appropriate and may therefore not have a positive impact on the development of graduates in these areas.

This data corresponds with the data presented in Table 4.12 of Chapter 4, which depicts graduate readiness to undertake various practical abilities post-graduation. Graduates felt most prepared to perform advanced airway management and interfacility transfers, while they appeared to feel unprepared for medical rescue and non-clinical aspects such as management, research and teaching. Of the different patient populations, the majority of graduates felt ready to assess and treat adult patients and least prepared to assess and treat paediatrics, infants and neonates. It is interesting to note, however, that only a small difference in readiness was noted between the adult and the paediatric populations despite the supposed heavy focus of the BHSc: EMC on adult patients from first year right through to fourth year, where graduate responses ranged from “not so ready” to “extremely ready”. For the infant and newborn populations, graduates reported feeling less ready, with responses ranging from “not at all ready” to “extremely ready”. This again hints at the presence of a theory–practice gap; while graduates may have received adequate theoretical exposure, their lack of practical exposure possibly contributes to their feelings of not being ready to practically apply their knowledge in a clinical setting. A graduate who does not feel ready to apply their knowledge to the clinical setting would possibly struggle with the transition from supervised to independent practice. These results correlate with the findings of a study conducted by Devenish (2014) in which paramedic graduates from Australia and the United Kingdom felt the paramedic course provided a solid theoretical foundation but felt underprepared in terms of practical exposure.

5.1.5.4.5 Transition support

The majority of graduates agreed that on completion of the BHSc: EMC, graduates should undertake a period of mentorship, similar to that of the internship that medical doctors undertake, to help them refine their skills and transition better from supervised practice to independent practice (Table 4.17). Without this, graduates may experience a feeling of being lost which Lazarsfeld-Jensen *et al*. (2011) found to be associated with the transition challenges previously discussed. With transition challenges being a known fact in nursing education, healthcare organisations have created measures and support programmes to support graduate transition more easily (Rush *et al.* 2015; Spector & Echternacht 2010). These programmes have been shown to be beneficial and are in

place to bridge the theory–practice gap and help graduates navigate the administrative, social and emotional challenges that come with new employment. Clements *et al*. (2012) analysed the transition of midwife graduates into the workforce in Australia and looked at a variety of transition support programmes offered to these graduates by their employers. It was found that while these programmes varied in terms of length, structure and content, they shared common core elements including clinical rotations, supernumerary time, study days and midwife-to-midwife support. These core elements in combination increased the clinical exposure, confidence and competence of midwife graduates and ultimately eased their transition into independent practice. Having said that, it may be beneficial to consider these same core elements in paramedic transition support or mentorship programmes.

Transition support in the form of a mentorship programme which includes preceptorship, socialisation and orientation may be equally beneficial to BHSc: EMC graduates. Healthcare organisations in Australia attempt to support the delicate transition of nursing graduates into the workforce through transition programmes that are put in place to bridge the theory–practice gap. Rush *et al.* (2015) found that graduate transition was enhanced through participation in a formal transition programme, suggesting that transitional programmes should run for a minimum of four weeks and should include good quality preceptorship.

5.1.5.3.6 Graduate satisfaction with the BHSc: EMC

Overall, the majority of graduates expressed satisfaction with the BHSc: EMC, although some were not satisfied and a few others expressed neutrality in this regard. This spread of responses indicates that while the BHSc: EMC is mostly effective in preparing graduates for the workforce, there may be room for improvement. It is believed that, with the suggested changes and inclusions mentioned in this chapter, the BHSc: EMC may be better aligned with industry demands and may subsequently produce a graduate who is better prepared for the workforce.

Graduate employability or work readiness should be considered an underpinning objective of a university curriculum. A university curriculum can be better designed by looking into the intended employment field to identify and better understand the skills required of graduates of a particular programme. Focusing curriculum design on bridging the theory–practice gap, as mentioned earlier, may also have a positive impact on graduate readiness and employability. Ensuring a demand-driven curriculum that is in

touch with current workforce needs will streamline the curriculum with the potential to produce a graduate who is work ready (Misni *et al*. 2020).

5.2 Summary conclusions with respect to the study objectives

5.2.1 Critical appraisal of the design and content of BHSc: EMC programme

The first objective of the study was to critically appraise the design and content of BHSc: EMC programme. A review of the curriculum found a potential misalignment of learning outcomes with SMART principles, a lack of PBEC minimum standards, a misaligned physical assessment, as well as a mismatch of modules across the four years of the degree. As stated by Davenport *et al.* (2009), minimum standards act as a guideline for instructional programmes to ensure the aim of the programme is achieved. Furthermore, minimum guidelines are an imperative part of a curriculum and must be adhered to ensure the success of the educational programme. The absence of minimum standards may indicate that the intended aim of the BHSc: EMC was not achieved.

5.2.2 The impact the BHSc: EMC degree has had on graduate employability skills

The second objective of the study was to investigate the impact the BHSc: EMC degree has had on graduate employability skills. The majority of graduates attributed their employability skills to prior experience. In relation to Medical Rescue employability skills, graduates reported an initial adequacy in Medical Rescue confidence and competence which was soon lost after graduation due to a lack of practical exposure. This may explain why graduates highlighted rescue as not being an important ability for their job post-graduation, as compared to advanced airway, interfacility transfers or clinical assessment and management. The presence of a theory–practice gap was hinted at, as graduates experienced challenges transitioning from supervised to independent practice. This, together with the curriculum discrepancies, has the potential to negatively affect graduate employability. However, apart from the above-mentioned curriculum discrepancies, the majority of graduates still felt that the BHSc: EMC had adequately prepared them for independent operational practice and appeared to feel that the degree had better prepared them for practice within SA rather than outside SA.

5.2.3 The impact of the BHSc: EMC on work readiness

The third objective of the study was to examine graduate perceptions of the BHSc: EMC regarding work readiness. Graduates felt that their paediatric and neonatal assessment and management abilities, as well as their management and rescue abilities were not appropriately developed by the BHSc: EMC. Subsequently, graduates reported feeling

unprepared in terms of these abilities and experienced challenges transitioning from supervised to independent practice. Furthermore, graduates mentioned that the BHSc: EMC is limited in its ability to prepare graduates for independent practice, as on-the-job learning is a major aspect of paramedicine. This means that both undergraduates and graduates need to accept accountability for their learning to prevent stagnation.

Regarding the contribution made by the modules in the BHSc: EMC, the data suggests that Advanced Medical Rescue (AMR) made a small contribution to graduate development as ALS paramedics. This is possibly due to a misalignment of module content with industry needs, as was highlighted by graduates in the case of Management Practice, which focused more on business management than on EMS organisation management.

Graduates highlighted EMC as being a core construct of the BHSc: EMC, which required increased focus. Suggested methods to increase EMC focus included focusing on EMC for the first three years of the degree then leaving the fourth year solely for practical application of the theoretical content and medical rescue. Alternatively, graduates suggested including only basic medical rescue (BMR) in the BHSc: EMC as a core construct and, instead, offering AMR separately as an elective course for those who express interest in furthering their rescue knowledge. Rescue seemed to be often highlighted as a graduate weakness due to an inherent lack of interest in the module and also due to a lack of postgraduate exposure. This is a possible indication that the rescue module is not appropriately aligned with industry needs and therefore needs to be revised in order to ensure alignment.

Graduates recognised the value of clinical practice in preparing them for independent practice; however, they suggested reducing clinical hour requirements in certain departments such as NICU and maternity, as skills and practical exposure in these departments are limited due to the tedious nature of these departments. Graduates suggested that, instead, more clinical hours should be allocated to response vehicle shifts. It is during these shifts that complex and rare skills such as RSI are required. Increasing the number of hours allocated to these shifts would probably increase the probability of encountering these skills, thereby creating an opportunity to increase practical exposure and confidence. Graduates also suggested reducing the number of basic clinical skills required to be learnt or alternatively reserving these basic skills for the first and second years of the BHSc: EMC. This may allow for more time to be spent on acquiring the more complex skills which are paramount to independent practice.

Apart from the modules and module content, the module structure of the degree also had an impact on graduate readiness. The BHSc: EMC made use of two module structure systems, the blocked system and the integrated system. Each system had its advantages and disadvantages, with the blocked system appearing to be more appropriate for the learning of practical skills and the integrated system more useful for theoretical aspects of the curriculum.

Curriculum design is directly related to graduate work readiness and has a great impact on it. Accordingly, graduate employability or work readiness should be considered an underpinning objective of a university curriculum. Consequently, curriculum design may be improved by examining the intended employment field to identify industry needs and better understand the skills required of a particular programme's graduates. Focusing curriculum design on bridging the theory–practice gap, as mentioned earlier, may also contribute to a positive impact on graduate employability. Ensuring a demand-driven curriculum that is in touch with current industry needs may assist in streamlining the curriculum and producing a graduate who is work ready.

The majority of graduates did feel sufficiently prepared for independent practice; however, half of these graduates attributed their readiness to prior experience. Those who reported feeling unprepared or were not sure of their preparation, highlighted that this was due to a perceived lack of practical opportunities to apply theoretical knowledge. Overall, the majority of graduates expressed satisfaction with the BHSc: EMC; however, as seen in the discussion of employability skills in 5.1.4.1, graduates seemed to feel that the degree better prepared them for practice within SA than outside SA. It can thus be said that the BHSc: EMC was probably successful in achieving its intended aim, although there does seem to be room for improvement. With the suggested curriculum changes, the theory–practice gap has the potential to be bridged and alignment with industry demands may be improved. The degree may then, in this way, better prepare graduates for the workforce both inside and outside SA and achieve its intended aim, as espoused by SAQA, "to produce professionals who are independent clinical practitioners and rescue specialists within the emergency medical care and rescue environments."

CHAPTER SIX
RECOMMENDATIONS, LIMITATIONS, REFERENCES, APPENDICES

6.1 Recommendations

This chapter includes the study recommendations for specific changes and inclusions in the BHSc: EMC programme. These recommendations are aimed at promoting improvements to the programme, bridging the prevailing theory–practice gap and better preparing graduates for independent practice. Recommendations for further research are also included in this chapter to ensure that the BHSc: EMC degree at this particular HEI and at all accredited HEIs in SA ultimately move towards offering a quality programme in line with nationally regulated espoused minimum standards.

6.1.1 Conducting of regular replicable reviews of the BHSc: EMC

In August of 2020, the PBEC introduced minimum standards for the BHSc: EMC in an effort to minimise variations and standardise the programme across the four HEIs (Health Professions Council of South Africa 2020). While this is a step in the right direction,the focus now needs to be on regular review of the BHSc: EMC and more specifically on whether or not the BHSc: EMC in SA is properly aligned with these newly developed minimum standards.

While the PBEC currently undertakes periodic reviews of the BHSc: EMC programmes at the various HEIs, it now needs to invest in the development of a standardised BHSc: EMC curriculum review template like that of the NHTSA EMT-P NSC review document. To ensure the validity of the template, it should be developed using the knowledge, attitudes and skills of field professionals and experts who wish to be involved in the review process. Ultimately, the review should be conducted by a comprehensive team of major stakeholders. The stakeholders should ideally be recruited from the HEIs that offer the BHSc: EMC, public and private EMS organisations, public and private healthcare facilities and the BHSc: EMC student body and alumni.

The review should take place every two years to ensure that the BHSc: EMC curriculum remains current with the ever-changing prehospital field. Field professionals and experts from the various organisations should be sent the most current version of the BHSc: EMC. Thereafter, these individuals should be given an opportunity to submit their comments to the PBEC for consideration. With regard to the student body’s inclusion, it is suggested that a curriculum satisfaction survey be distributed to exit-level students on completion of the degree. The BHSc: EMC alumni could receive a similar satisfaction

survey six months to a year after graduation. The inclusion of alumni would be especially important in this review process as these individuals would be able to provide the best view on the practicality of the BHSc: EMC curriculum content and skills in the context of the environment for which the degree was designed. This method of review would provide a platform for developing consensus opinions on controversial issues and ensure that the BHSc: EMC is aligned with field expectations and meets industry needs. This will assist in not only ensuring the quality of the BHSc: EMC curriculum but also in bridging the theory–practice gap that seems to currently exist within the degree. Ultimately, this review process will support the development of a graduate who is not only work ready but employable as well.

6.1.2 Inclusion of a postgraduate mentorship programme

The data in this study has indicated the need for a postgraduate mentorship programme while the reviewed literature has shown the value of such a programme. Currently, a theory–practice gap seems to exist in the BHSc: EMC, leaving graduates feeling unconfident in certain aspects of their clinical assessment and management abilities and, as a result, to some extent unprepared for the workforce.

The inclusion of a four-week postgraduate mentorship programme may assist in bridging the theory–practice gap and allow graduates to get a feel for independent practice before being thrown into the workforce. Locating appropriate preceptorship in SA may prove difficult, however, due to the lack of available ECPs within the country. Added to this is the newness of the qualification which means that the available ECPs are newlyqualified, with the most experienced ECPs only having been in practice since 2012. To ease the process of identifying potential preceptors, the mentorship programme should be the responsibility of the offering HEI. Accordingly, the HEIs should each develop a listof eligible preceptors to facilitate this programme, preferably graduates who previously completed the degree at that specific university. In this way, preceptors will be familiar with the curriculum content, teaching, learning and assessment modalities to which the graduate was exposed. This will assist in aligning the preceptor expectations of the graduate and will allow preceptors to identify where issues exist, if any, and how to remedy them. Using past graduates as preceptors will also mitigate the issue of a lack of available ECPs in SA for preceptorship. In cases where a preceptor has less than two years' operational experience, joint preceptorship may occur by teaming the preceptor up with perhaps an emergency physician or nurse to ensure the graduate receives quality preceptorship. Alternatively, HEIs could team up with surrounding healthcare

facilities which would allow graduates to work four weeks in the Emergency Department. In this way, graduates would afford an opportunity to practise their skills in a similar but controlled environment and with the support of field professionals.

6.1.3 Focus only on basic medical rescue (BMR) in the BHSc: EMC

The study highlighted that graduates do not receive adequate postgraduate rescue exposure and that, as a result, their rescue confidence and competency is lost. It was pointed out that paramedics are often dispatched to motor vehicle accidents where they encounter entrapments and extrication. For a paramedic working in SA, these skills are essential. The skills associated with AMR are not often used unless the graduate elects to work as a rescue technician post-graduation. One reason for this is because organisations either have a designated rescue team or outsource their rescue services. Another is the lack of ECPs in SA; as a result of this lack, ECPs are not sent out to these types of case but are rather reserved for interfacility transfers or other critical cases not involving rescue. The large majority of graduates enrol in the BHSc: EMC in the hopes of practising EMC, hence the rescue modules are often viewed only as a means to an end in order to graduate. It was also mentioned quite often that the rescue module takes focus away from EMC and some graduates had no interest in the module at all. Based on these findings, it may be more appropriate to focus only on BMR in the BHSc: EMC to ensure graduates are well rounded and prepared in line with the intended aim of the degree as espoused by SAQA. AMR could then be offered as an elective course in the BHSc: EMC for those who express interest in this aspect of EMS. Graduates who complete this course could then be issued with an AMR certification which would allow them to practise either as an ECP or as a rescue technician.

Alternatively, the HEI could offer postgraduate rescue refresher courses to operate in the same way as continuous professional development courses. This would allow graduates the opportunity to remain current in their rescue knowledge and skills post-graduation. This could possibly reduce the rate at which skill degradation and loss of rescue competence and confidence occurs; however, this would be unlikely to resolve the issue as a lack of postgraduate rescue exposure would still exist due to organisations having designated rescue teams, outsourcing their rescue assistance and ECPs being reserved for non-rescue-related critical cases and transfers.

6.1.4 Align entry and main programme physical assessments

Currently, the physical assessment undertaken on entry and the physical assessments required during the programme differ. It is important for these assessments to be

identical or at least very similar in order to prevent poor student progression through the course and to ensure successful graduation to increase the number of ECPs who are eligible for registration with the HPCSA.

It is imperative that both assessments include the same assessment parameters that the student will be subjected to when enrolled for the BHSc: EMC. As a suggestion, the entry physical assessment should include a swimming proficiency test. The time and distance parameters of the assessment could be revised by either increasing the time or decreasing the distance required to be completed for the entry assessment. This would ensure that all applicants enrol in the programme with at least a basic level of swimming proficiency which can be steadily improved throughout the degree with the appropriate training and assistance. This will better prepare students for the physical assessments and also for the third-year Aquatic Rescue module. The same should be considered for the long-distance run. Applicants should be required to complete a five-kilometre run in an extended time frame of perhaps 40-45 minutes. This would be a good indicator that the applicant has an appropriate level of fitness which can be improved upon with the weekly physical training sessions which are incorporated into the programme timetable.

Alternatively, the programme physical assessment needs to be completely revised and aligned with industry physical assessment needs. Thereafter, this assessment must be appropriately aligned with the entry physical assessment. Ultimately, this will prevent the poor progression of students through the BHSc: EMC as a result of poor physical preparedness and Medical Rescue performance and improve graduate success rates.

6.1.5 Standardisation of the BHSc: EMC

Standardisation of the BHSc: EMC can be achieved by mandating minimum competency standards, and institutional consensus on curriculum content delivery, assessment, and moderation or, alternatively, the introduction of a final-year board exam. The 2020 inclusion of minimum competency standards mandated by the regulatory body previously mentioned will ensure that all graduates have achieved the outlined minimum competencies prior to being released into the workforce. This will in turn ensure that all graduates are equipped with the same minimum competencies and are equally work ready and employable regardless of the HEI they attended. This will also ensure the consistent production of high-quality graduates that will meet industry and community needs. In addition, to ensure the standardisation of the BHSc: EMC, institutional consensus on curriculum content delivery, assessment and moderation is also required. If consensus is not possible, then it is suggested that a national board set and mark a

final-year assessment. The PBEC, in this case, would be the board which has the ultimate responsibility to ensure that the assessment meets the appropriate standards and is aligned with the board mandated minimum competencies. Ultimately, the purpose of this assessment would be to assess final year BHSc: EMC students' abilities to practise competently.

6.1.6 Recommendations for further research

6.1.6.1 Review most current BHSc: EMC at the HEI

To confirm alignment, it is imperative that the most current version of the BHSc: EMC at the HEI be reviewed in light of the newly developed PBEC minimum standards. This study looked at the 2016–2018 BHSc: EMC curriculum which lacked minimum PBEC standards and contained a mismatch of modules across the four years of the degree, which possibly affected the readiness of these student cohorts for independent practice. Since then and prior to the release of the new PBEC minimum standards in 2020, many more changes have been made to the curriculum. The resultant readiness of these graduates is not known, however the data from this study could be extrapolated to the 2019 and 2020 cohorts. It can thus be said that these graduates probably suffered similar challenges with the theory–practice gap and preparation for independent practice. Owing to the lack of the PBEC minimum standards, graduates were able to register as ECPs with the HPCSA without producing evidence of having met national minimum standards. This means that ECPs who registered with the HPCSA prior to 2020 likely lack some of the knowledge or skills which are now mandatory for registration as an ECP. If a review of the current curriculum against the PBEC minimum standards is not undertaken, graduates run the risk of being denied registration with the HPCSA as an ECP.

6.1.6.2 Review BHSc: EMC at all accredited HEIs in SA

The PBEC issued minimum standards for the BHSc: EMC professional degree in August of 2020. The HEIs that offer this programme now need to comply with these minimum standards in order for their graduates to successfully register with the HPCSA as ECPs. The PBEC should accordingly review the BHSc: EMC curriculum which is being offered at these HEIs in SA to confirm alignment with newly promulgated minimum standards and to ensure standardisation of this offering across SA.

6.1.6.3 Inclusion of BAA as a prerequisite

The results of the study highlighted the value of prior EMS experience in facilitating the work readiness and employability of graduates. While BAA concepts are included in the

first year of the BHSc: EMC, it may be better for these concepts to be learnt prior to entry to the degree. Students who wish to enrol in the BHSc: EMC could then be assessed in accordance with these concepts to prove potential competency to undertake a degree of this nature. It is believed that this pre-exposure to basic EMS concepts may facilitate the continuum of learning throughout the degree, as students will already have foundational knowledge which would allow the HEI to focus purely on building on this knowledge. This assumption is based purely on anecdotal evidence as there is no research to support or refute this. Research needs to be done on the success rates of graduates who enrolled in the degree as school leavers versus those who enrolled with prior EMS experience. No research currently exists on this topic, therefore the inclusion of BAA as a prerequisite can only be suggested.

6.2 Delimitations and limitations

The focus of this study was to investigate the BHSc: EMC qualification at an HEI in KZN regarding its effectiveness in preparing paramedic graduates for independent practice. This prevents the study and its subsequent findings from being generalised to other degrees offered at other HEIs in SA, or to versions of the BHSc: EMC qualification delivered before 2016 and after 2018. There have also been numerous influences that placed restrictions on methodology used in the study and therefore its conclusions, further limiting its generalisability. These include the use of purposive sampling in phase one of the study, which by its very nature of being based on the researcher's judgement limited who was identified to provide input in the study, and thus is prone to bias. However, this selection process was carefully considered and conceived through expert consultation and is discussed in this thesis, leaving it up to the reader to decide on the level of influence it may have had to the study. The lower-than-expected response rate in phase two of the study is also inevitably a study limitation, and while beyond the control of the researcher, the response rate was lower than that which was required for responses to be truly and consistently reflective of the population. Lastly, the 2018 BHSc: EMC curriculum represented the most current version of the curriculum at the time of the study; however, the curriculum has since changed and continues to change. This study began in 2018, and PBEC minimum standards that have since been published were not included in this study. Nevertheless, this does not diminish its value as a literary source of information that can be used to drive improvements in paramedic education in SA.

6.3 References

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6.4 Appendices

6.4.1 Appendix 3.1

Interview Guide

1. When did you complete your BHSc: EMC?

2. Prior EMS experience/qualification?

3. In which area are you currently employed?

4. What unit are you working on? (Response, rescue, ICU, ALS ambulance)

5. Does your employer have a rescue department/unit?

6. How long did it take you to find employment after graduation?

7. Did you need to or have you done any extra courses since completion of BHSc: EMC? (What courses? Helpful – new info or repetition?)

8. Did you feel sufficiently trained as an ECP up to the level of independent practice straight after graduation? (If no, when did you feel sufficiently equipped?)

9. Which types of emergency did you feel more equipped to deal with medical, trauma or rescue? Why?

10. How did you feel about performing RSI? Now versus then. Competency and confidence.

11. How did you feel about undertaking an IFT? Now versus then. Competency and confidence.

12. Which category of patient did you feel most and least confident about treating? Why? (Adult, paediatric, neonate, geriatric)

Medical Emergencies

13. Which areas did you feel confident about practising independently post grad? (Cardiac, endocrine, neurological, respiratory, anaphylaxis etc.)

14. Which areas did you feel you required more practice or supervision post-graduation?

Trauma

15. Which areas did you feel confident about practising independently? MVA, PVA, falls, gunshot, stab, assault (blunt force, penetrating trauma)

16. Which areas did you feel you required more practice or supervision post-graduation?

Rescue

17. How do you feel about partaking in a rescue attempt? Now versus then. Competency and confidence.

18. Which areas did you feel confident about practising independently? (Rope, extrication, confined space etc.)

19. Which areas did you feel you required more practice or supervision post-graduation?

BHSc: EMC curriculum design

20. What was the module structure of the BHSc: EMC during your years of study? (From 1st – 4th) Integrated or blocks? Beneficial or not to learning/work readiness? Suggestions?

21. How do you feel the Clinical practice module contributed to your work readiness post-grad? Sufficient hours, choice of departments, skill requirements.

22. How do you feel exposure to both EMC and Medical rescue training contributed to your work readiness post grad? Suggestions?

23. What do you think needs to be included/excluded or restructured within the BHSc: EMC curriculum to prepare future graduates?

24. What do you feel are your strengths or weaknesses as an ECP? Do you feel the BHSc: EMC curriculum contributed toward this? How?

6.4.2 Appendix 3.2

LETTER OF INFORMATION

Good day to you and thank you for your participation in my study. Below you will find a brief outline of the study as well as general information regarding questions you may have. If you have any further questions please feel free to ask.

Title of the Research Study: Curriculum design of the Bachelor's Degree in Emergency Medical Care and its work-ready preparedness of Emergency Care Practitioners from a Higher Education Institution in KwaZulu-Natal, South Africa

Principal Investigator/s/researcher: Shaylee Bauer BHSc: EMC.

Co-Investigator/s/supervisor/s: Dr Kevin Govender Phd: EMC and Mr Sagien Naguran MTech: EMC.

Brief Introduction and Purpose of the Study: Emergency care education and training in South Africa has undergone several changes over the last few decades from short course training to formal higher education qualifications. The four-year Emergency Medical Care degree (BHEMC) is the latest and a relatively new undergraduate offering for prospective Advanced Life Support (ALS) paramedics in South Africa. The programme is offered at Higher Education Institutions in KwaZulu-Natal and was designed to produce professionals who would be able to practice independently at the level of ALS within the emergency medical care environment both nationally and internationally. The aim of this study is to determine the value of a degree in Emergency Medical Care from an HEI in KZN. The study will include the total population of 47 graduates whom had completed their BHEMC degree from an HEI in KZN between 2016 and 2018.

Outline of the Procedures: Participation in this study is completely voluntary and can be opted out of at any point during the process. It is your responsibility to answer all questions fully and honestly. You will be interviewed either personally or electronically for an average of 60 minutes and will be asked questions guided by an interview schedule. In phase two of data collection, you will be contacted to complete a follow-up questionnaire to gain further clarity on data collected from the interviews.

Risks or Discomforts to the Participant: There are no foreseeable risks posed to you and/or possible discomfort that may be experienced.

Benefits: The results of the study may result in the revision of and additions to the BHEMC curriculum. These changes will directly benefit the future graduates in terms of producing professionals who would be able to practice independently at the level of Advanced Life Support (ALS) within the emergency medical care environment both nationally and internationally. Direct benefits for you, as a graduate, may come from you finding that the challenges they face in the EMS industry are experienced across the board amongst your colleagues. Since there is currently a paucity of literature on this specific topic, publication of the research will allow for further studies to be done on similar topics using the data collected in this study.

Reason/s why the Participant May Be Withdrawn from the Study: Since participation in this study is purely voluntary, you may withdraw at any time without fear of repercussions. The decision to withdraw information given is solely up to you and the researcher will not oppose the decision to discontinue participation.
Remuneration: There will be no compensation of any kind as payment for your participation in this study.

Costs of the Study: Participation in this study will bear no cost on you.
Confidentiality: Any information given or shared for the purpose of this study will remain anonymous, confidential and strictly for learning purposes. No personal information will be captured and you will each be assigned a participant number.

Research-related Injury: Should there be any accident, injury or illness incurred during the course of the study, the researcher will not accept responsibility and as a result, no compensation will be allocated.

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher Ms. S. Bauer (0762558859), my supervisor Dr. K. Govender (0313735611) or co-supervisor Mr. S. Naguran (0313735764) or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the DVC: Research, Innovation and Engagement Prof S Moyo on 031 373 2577 or moyos@dut.ac.

6.4.3 Appendix 3.3

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, _____ (Shaylee Bauer), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____.
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**

I, Shaylee Bauer herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

6.4.4 Appendix 4.1

Year	Learning outcomes					
1	**Subject: Foundations of Professional Practice I**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					
1	**Subject: Medical Rescue IA**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					
1	**Subject: Medical Rescue IB**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					
1	**Subject: Basic Sciences I**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					

Year	Learning outcomes					
1	**Subject: Anatomy and Physiology I**	**S**	**M**	**A**	**R**	**T**
	The student will:					
	Have a basic understanding of the organisation of the human body			Y	Y	
	Have foundational knowledge of physiology and demonstrated this theoretically in terms of the following sections:		Y	Y	Y	
	• Introduction to physiological concepts.					
	• The cell and general physiological principles.					
	• The different tissues that make up the organs of the human body					
	• The gastro-intestinal tract					
	• The musculoskeletal system.					
	• The nervous system – basic organization, motor and integrative neurophysiology.					
	• The endocrine organs and the hormones that are secreted					
	• The cardiovascular system and blood					
	• The respiratory system					
	• The reproductive systems					
	Describe basic functions within the context of their systems and body functions.	Y	Y	Y	Y	

Year	Learning outcomes					
2	**Subject: Medical Rescue IIA**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					
2	**Subject: Medical Rescue IIB**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					
2	**Subject: Pharmacology II**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					

Year	Learning outcomes					
2	**Subject: Physiology IIA**	**S**	**M**	**A**	**R**	**T**
	The control systems can be discussed as follows: • Nervous system • Endocrine system • Special senses.		Y	Y	Y	
	The cardio-respiratory system is discussed as follows: • Cardiovascular function and control • Respiration and gaseous exchange.		Y	Y	Y	
	The physiological functions of the main organs/systems are explained.		Y	Y	Y	
	The physiological functions of the various systems practically demonstrated and/or investigated with reference to the sections mentioned above.		Y	Y	Y	

Year	Learning outcomes					
2	**Subject: Physiology IIB**	**S**	**M**	**A**	**R**	**T**
	Genital and urinary systems can be discussed as follows: • Regulation of the body fluids by the urinary system. • Male and female reproductive systems • Endocrine regulation of the male and female reproductive systems		Y	Y	Y	
	The physiological functions of the organs / systems are explained.		Y	Y	Y	
	The physiological functions of the various systems are practically demonstrated and/or investigated with reference to the sections mentioned above.	Y	Y	Y	Y	

Year	Learning outcomes					
3	**Subject: Medical Rescue IIIA**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					
3	**Subject: Medical Rescue IIIB**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					
3	**Subject: General Pathology II**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					
3	**Subject: Research Methodology I**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					

Year	Learning outcomes					
4	**Subject: Research Project IV**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					
4	**Subject: Management Practice I**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					
4	**Subject: Educational Techniques I**	**S**	**M**	**A**	**R**	**T**
	Module descriptor not locatable.					