INTEGRATED CLINICAL SIMULATION ASSESSMENT CRITERIA FOR EMERGENCY CARE EDUCATION PROGRAMMES IN SOUTH AFRICA

by

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DEDICATION

To my awesome Dad who reminds me continuously that I am not alone as an orphan and gives me glimpses of a future that is bright and hope-filled, and most of all despite his status condescends and is comfortable just hanging out with me.

To my Mom, Luella, who, in her 70's is young at heart, still writes books, has successfully navigated into the computer age and has instilled in me a love for truth and knowledge.

To my wife, Hanli, for her endearing support during this process and her unwavering belief in what is possible.

To my amazing children: Lizhan, Jon-Erinn, Jedd and Kentleigh. The wonderful privilege of being a father and learning such humbling lessons from you.

To the team of healthcare professionals around the world dedicated to educating paramedics and sending them out into very stressful and chaotic situations to rescue those who can't help themselves.

If we wish to design an authentic test, we must first decide, what are the actual performances that we want students to be good at. We must design those performances first and worry about a fair and thorough method of grading them later (Wiggins 1989:705).

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LIST OF ACRONYMS AND ABBREVIATIONS

ALS	**Advanced life support**
ATC	**Ambulance training college (synonymous with College of Emergency Care)**
BD:EMC	**Bachelor Degree: Emergency Medical Care (ALS paramedic)**
B.Tech:EMC	**Bachelor of Technology: Emergency Medical Care (ALS paramedic)**
CCA	**Critical care assistant (ALS paramedic)**
CHE	**Council on Higher Education**
COPD	**Chronic obstructive pulmonary disease**
CPR	**Cardiopulmonary resuscitation**
CUT	**Central University of Technology**
ECG	**Electrocardiograph**
ECT	**Emergency Care Technician (ALS paramedic)**
EMC	**Emergency Medical Care**
EMS	**Emergency Medical Services**
ETT	**Endotracheal tube**
ETQA	**Education and Training Quality Assurance Body**
HEQC	**Higher Education Quality Committee**
HPCSA	**Health Professions Council of South Africa**
HFS	**High fidelity simulation / simulator**
HPS	**Human patient simulator**
IV	**Intravenous**
N.Dip: EMC	**National Diploma: Emergency Medical Care**
NQF	**National Qualifications Framework**
NRF	**National Research Fund**

NSB	**National Standards Body**
OBET	**Outcomes-based education and training**
OSCE	**Objective structured clinical evaluation**
PBEC	**Professional Board for Emergency Care**
SAQA	**South African Qualifications Authority**
SGB	**Standards Generating Body**
SPs	**Standardised patients**
VF	**Ventricular fibrillation**

SELECTED DEFINITIONS AND TERMS

Assessment instrument: “[T]he nature of the assessment task given to the learner to do” (SAQA 2001:29).

Assessment method: “[T]he activities that an assessor engages in as he or she assesses a learner and the learner’s work” (SAQA 2001:27).

Case type: For the purpose of this study a clinical context requiring emergency care presenting in the out-of-hospital context or hospital emergency unit, the nature of which determines the urgency and manner of medical intervention. Synonyms include scenario or simulation event.

Clinical simulation or clinical scenario: “[T]he imitation of human processes and interactions by a model system” (Rosen, McBride & Drake 2009:842) and *“The plan of an expected and potential course of events for a simulated clinical experience.”* (INASCL 2011:S4).

Emergency care: “[T]the rescue, evaluation, treatment and care of an ill or injured person in an emergency-care situation and the continuation of treatment and care during the transportation of such person to or between health establishment(s)” (DoH 2002).

Emergency medicine: The International Federation for Emergency Medicine, as cited by the College of Emergency Medicine, UK (2013 online) defines emergency medicine in 1991 as “a field of practice based on the knowledge and skills required for the prevention, diagnosis and management of acute and urgent aspects of illness and injury affecting patients of all age groups with a full spectrum of undifferentiated physical and behavioural disorders. It further encompasses an understanding of the development of pre-hospital and in-hospital emergency medical systems and the skills necessary for this development.”

Emergency Medical Services: According to the National Association of State EMS Directors (NASEMSD) and the National Association of EMS Physicians (NAEMSP) (1993:285, 288) the “the provision of services to patients with medical emergencies” (see definition for medical emergencies).

Emergency Medical Services system: Defined by the National Association of State EMS Directors (NASEMSD) and the National Association of EMS Physicians (NAEMSP) (1993:285,288) as “a comprehensive, coordinated arrangement of resources and functions which are organized to respond in a timely, staged manner to targeted medical emergencies, regardless of their cause or the patient's ability to pay, and to minimize their physical and emotional impact."

Guideline: A recommendation for a course of action or procedure that should be followed based on established principles and for the purpose of setting standards.

High-fidelity simulation: A simulation of a clinical condition in which aspects such as injuries, physiological presentation and responses expected in a real patient, as well as the environment, is replicated as far as possible, for the purpose of realism and authenticity (Boulet & Swanson 2004:120).

High-stakes testing: Using an assessment instrument (in this case, clinical simulation) for summative assessment, for the purpose of qualification, certification or licensure (Boulet 2008:1017).

Human patient simulator: A medium to high-fidelity, full-body, computer-driven model reflecting human anatomy and physiology that allows programming of realistic responses to medical conditions and interventions (Benson, Goodrow & Loyd 2006:36; LeBlanc, MacDonald, McArthur, King & Lepine 2005:440).

Integrated clinical simulation: The holistic process of assessing and managing a simulated patient in a realistic clinical setting using a human patient simulator; during this process appropriate medical procedures can be performed that portray appropriate physiological responses to management (Bradley 2006:258). This is also known as "full-scale, scenario-based simulation" or "full-mission" simulation (Alinier 2007:e247).

Medical emergency: Defined by the National Association of State EMS Directors (NASEMSD) and the National Association of EMS Physicians (NAEMSP) (1993:285, 288) as "a sudden and/or unanticipated medical event which requires immediate assistance."

Medical simulator: A model that captures essential characteristics of human anatomy and physiology (see simulator and medical simulation).

Part-task (skill) trainer: Medical simulators intended to imitate anatomical areas for the purpose of learning psychomotor skills (Boulet & Swanson 2004:120).

Simulation: The "imitation of the operation of a real-world process or system over time" (Banks 1999). Simulation is defined by the Oxford English Dictionary (OED:online) as. "the technique of imitating the behaviour of some situation or process (whether economic, military, mechanical, etc.) by means of a suitably analogous situation or apparatus, especially for the purpose of study or personnel training." In the clinical setting, Alinier (2007:e248) describes simulation as "a practical experience that produces a convincing re-creation of a real-life event or set of conditions."

Simulator: A model that encapsulates the key characteristics or behaviours of a selected process or system found in the real world (Banks & Georgia 1999:online).

Summary

Key terms: integrated assessment, summative assessment, assessment criteria, case types or scenarios, healthcare simulation, clinical simulation, simulation fidelity, focus-group interview, single, embedded case study.

An in-depth study was done into integrated clinical simulation with a view to identifying assessment criteria and case types in order to employ integrated clinical simulation as an instrument for summative assessment of learners by ALS emergency-care-education programmes in South Africa. Clinical simulation is mandated by the Health Professions Council of South Africa, Professional Board for Emergency Care (HPCSA: PBEC), for use by emergency-care-education programmes as a summative assessment instrument. The Higher Education Quality Committee (HEQC) calls for integrated assessment as a suitable test of applied competence reflecting the key purpose of a qualification. The South African Qualifications Authority (SAQA), using the outcomes-based education and training paradigm, provides a clear definition of “assessment criteria” and “integrated assessment” for employment when assessment of applied competence occurs (SAQA 2001:11, 21). These definitions were used to frame and focus the study.

This study sought to bridge the gap created by the absence of guidelines by PBEC for assessment criteria and case types or scenarios for use with integrated clinical simulation summative assessment. In this study the elements of assessment criteria, as defined by SAQA, relevant to integrated clinical simulation were explored. In tandem with assessment criteria, case types or scenarios appropriate to integrated clinical simulation were extrapolated. This study is situated in the field of Health Professions Education and focused on the profession of Emergency Medical Care.

The research methods comprised analysis of documents that contextualise the mandate and use of clinical simulation for assessment by emergency-care-education programmes in South Africa. A review of scholarship provided a conceptual framework for understanding healthcare simulation as an educational methodology and valid assessment instrument for assessing applied competence in an authentic situation. A conceptual understanding of the prerequisites for using healthcare simulation that ensures an authentic situation for meaningful student engagement was discoursed. Perspectives from literature that address assessment criteria and case types relevant to ALS paramedic practice were discovered. An embedded, single-case study design was employed and focus-group interviews were used as the method of data collection for the empirical phase of the study. Data from focus-

group interviews with experienced ALS paramedics was analysed and interpreted in conjunction with scholarly viewpoints and experience of the researcher to examine integrated clinical simulation as a summative assessment instrument, which was the main unit of analysis, and the subunits, namely, assessment criteria and case types.

From the analysis of focus-group discussions, seven themes informing the research questions were deliberated. The first theme addressed the integrated clinical simulation as an assessment instrument. The second theme spoke to the context and conditions of ALS paramedic practice that are relevant to the integrated clinical simulation. Theme three through to theme six tackled the knowledge framework together with the physical, cognitive, affective and the social-professional dimensions of ALS paramedic practice that are relevant to the integrated clinical simulation. Finally, theme seven engaged case types and scenarios for integrated clinical simulation as a summative assessment instrument.

The lack of fidelity of the integrated clinical simulation perceived by focus-group participants, together with its historical use as a summative assessment instrument challenges the application of integrated clinical simulation as an authentic assessment. Using a single, once-off integrated clinical simulation to assess competence in ALS paramedic practice is contested by the range of life-threatening emergencies possible across medical disciplines. In order for the integrated clinical simulation to assess competence it must cover the range of medical disciplines, incorporate the dimensions of ALS paramedic practice, reflect the conditions, complexity and range of life-threatening emergencies presented to ALS paramedics in South Africa and elicit the appropriate response modes required in practice.

Although no specific case types were identified for use in the integrated clinical simulation, characteristics of case types were identified and they provide a matrix for case-type selection. These characteristics refer to the categories of medical and trauma conditions, with a focus on life-threatening emergencies across the range of medical disciplines. The action-response mode of the ALS paramedic and life-support interventions required are determined by the nature of the presenting life-threatening emergency within the scope of practice prescribed by the PBEC. The context and conditions of ALS paramedic practice must also be represented if true competence is to be assessed.

This study informs a conceptual framework of healthcare simulation for use by emergency-care-education programmes in South Africa. The study serves to frame the breadth, depth and scope of assessment criteria applicable to integrated clinical simulation for use as a summative assessment instrument. Finally, this study provides a conceptual matrix for case type and case design for clinical simulation in emergency care.

Opsomming

Sleutelterme: Geïntegreerde assessering, summatiewe assessering, assesseringskriteria, gevaltipes of scenario, gesondheidsorgsimulasie, kliniese simulasie, simulasie-egtheid, fokusgroeponderhoud, enkele, vasgebakende, diepte, gevallestudie

‘n Vasgebakende diepte-gevallestudie oor geïntegreerde kliniese simulasie is uitgevoer om assesseringskriteria en gevaltipes te identifiseer ten einde geïntegreerde kliniese simulasie as instrument vir summatiewe assessering van leerders in gevorderde-lewenssteun noodsorg- opvoedkundige programme in Suid-Afrika toe te pas. Kliniese simulasie word deur die Raad vir Gesondheidsprofessies van Suid-Afrika, Professionele Raad vir Noodsorg (GBRSA: PRNSP) voorgeskryf as ‘n summatiewe assesseringsinstrument vir opvoedkundige programme in noodsorg. Die Raad op Hoër Onderwys Hoër Onderwys Gehalteversekering Komitee (RHO HOG) beskou geïntegreerde assessering as ‘n geskikte toets vir toegepaste vaardigheid wat die hoofdoel van 'n kwalifikasie weerspieël. Aan die hand van die uitkomsgebaseerde opvoedings- en opleidingsparadigma verskaf die Suid-Afrikaanse Kwalifikasie Outoriteit (SAKO) ‘n duidelike definisie van “assesseringskriteria” en “geïntegreerde assessering” vir indiensneming wanneer assessering van toegepaste vaardighede plaasvind (SAQA 2001:11, 21). Hierdie definisies is gebruik om die studie van ‘n raamwerk en fokuspunt te voorsien.

Hierdie studie het gepoog om die gaping te oorbrug wat geskep is deur die afwesigheid van riglyne deur PBEC rakende assesseringskriteria en gevaltipes of scenario’s, wat vir geïntegreerde kliniese simulasie vir summatiewe assessering gebruik kan word. In hierdie studie is die elemente van assesseringskriteria, soos deur SAQA gedefinieer en relevant tot geïntegreerde kliniese simulasie, ondersoek. Tesame met assesseringskriteria, is gevaltipes of scenario’s relevant tot geïntegreerde kliniese simulasie geëkstrapoleer. Hierdie studie is geleë in die veld van Gesondheidsorgonderwys, in die besonder die professie van Nood- Mediese Sorg.

Die navorsingsmetodes het behels ontleding van dokumente wat die opdrag rakende en gebruik van kliniese simulasie vir assessering by noodsorg onderwysprogramme in Suid-Afrika in konteks plaas. ‘n Oorsig van vakgeleerdheid het ‘n konseptuele raamwerk verskaf om ‘n begrip te ontwikkel van gesondheidsorg-simulasie as ‘n opvoedkundige metodologie, en as 'n geldige assesseringsinstrument wat toegepaste vaardigheid in ‘n egte situasie assesseer. ‘n Konseptuele begrip van die voorvereistes vir die gebruik van gesondheidsorg-

simulasie wat 'n egte situasie vir betekenisvolle studentebetrokkenheid verseker, is bespreek. Perspektiewe uit literatuur wat assesseringskriteria en gevaltipes aanspreek wat van toepassing is op gevorderde lewenssteun paramediese praktyk, is ontdek. ‘n Vasgebakende diepte-gevallestudie en fokusgroeponderhoude is gebruik om data te versamel vir die empiriese fase van die studie. Data verkry uit fokusgroeponderhoude met ervare gevorderde-lewenssteun-paramedici is ontleed en geïnterpreteer met inagneming van die navorser se vakkundige standpunte en ervaring, ten einde geïntegreerde kliniese simulasie as instrument vir summatiewe assessering te ondersoek. Die hoofeenheid van ontleding was die summatiewe assesseringsinstrument, en die ondergeskikte eenhede was assesseringskriteria en gevaltipes.

Sewe temas wat die navorsingsvrae inlig en wat uit die ontleding van die fokusgroepbesprekings ontstaan het, is ondersoek. Die eerste tema het gehandel oor geïntegreerde kliniese simulasie as ‘n assesseringsinstrument. Die tweede tema het verwys na die konteks en toestande van gevorderde lewenssteun paramediese praktyk wat van toepassing is op geïntegreerde kliniese simulasie. Temas drie tot ses het aandag geskenk aan die kennisraamwerk, tesame met die fisieke, kognitiewe, affektiewe en sosiaal-professionele dimensies van gevorderde lewenssteun paramediese praktyk wat relevant is vir geïntegreerde kliniese simulasie. Laastens is in tema sewe aandag geskenk aan gevaltipes en scenario’s vir geïntegreerde kliniese simulasie as ‘n summatiewe assesseringsinstrument.

Die gebrek aan egtheid van die geïntegreerde kliniese simulasie wat deur fokusgroepdeelnemers waargeneem is, tesame met die historiese gebruik van simulasie as ‘n summatiewe assesseringsinstrument, kan in die pad staan van die toepassing van geïntegreerde kliniese simulasie as ‘n egte assessering. Die gebruik van ‘n enkele, eenmalige geïntegreerde kliniese simulasie om vaardigheid in gevorderde lewenssteun paramediese praktyk te assesseer, word bevraagteken deur die verskeidenheid lewensgevaarlike noodgevalle wat oor mediese dissiplinies moontlik is. Indien die geïntegreerde kliniese simulasie vaardigheid moet assesseer, moet dit die verskeidenheid mediese dissiplines dek, dit moet oor al die dimensies van gevorderde lewenssteun paramediese praktyk handel, dit moet die toestande, kompleksiteit en verskeidenheid lewensgevaarlike noodgevalle waarmee gevorderde lewenssteun paramedici in Suid-Afrika gekonfronteer word, weerspieël, en dit moet toepaslike reaksiewyses wat deur die praktyk vereis word, ontlok.

Hoewel geen spesifieke gevaltipes wat in geïntegreerde kliniese simulasie aangewend kan word, geïdentifiseer is nie, is eienskappe van gevaltipies geïdentifiseer, en hulle verskaf 'n matriks vir die keuse van gevaltipes. Hierdie eienskappe verwys na kategorieë van mediese en traumatoestande, met die klem op lewensgevaarlike noodgevalle oor al die mediese dissiplines. Die tipe aksie-respons van die gevorderde-lewenssteun-paramedikus en die lewenssteuningryping wat vereis word, word bepaal deur die aard van die lewensgevaarlike noodgeval binne die omvang van die praktyk wat deur die PRNSP voorgeskryf word, voorkom. Indien vaardigheid geassesseer moet word, moet die konteks en toestande van die gevorderde lewensteun paramediese praktyk ook verteenwoordig word.

Hierdie studie is die basis van ‘n konseptuele raamwerk vir gesondheidsorgsimulasie wat in noodsorg- opvoedkundige programme in Suid-Afrika gebruik kan word. Die studie dien as ‘n raamwerk vir die breedte, diepte en omvang van assesseringskriteria wat toepaslik is vir geïntegreerde kliniese simulasie as 'n summatiewe assesseringsinstrument. Laastens verskaf die studie 'n konseptuele matrys vir gevaltipes en gevalontwerp vir kliniese simulasie in noodsorg.

INTEGRATED CLINICAL SIMULATION ASSESSMENT CRITERIA FOR EMERGENCY CARE EDUCATION PROGRAMMES IN SOUTH AFRICA

CHAPTER 1

OVERVIEW AND ORIENTATION TO THE STUDY

1.1 INTRODUCTION

Integrated clinical simulation is currently employed by Advanced Life Support (ALS) emergency-care-education programmes in South Africa as a summative assessment instrument. Integrated clinical simulation in ALS emergency-care programmes typically involves the use of human-patient simulators (a low, medium or high-fidelity full-scale mannequin simulator) to assess the holistic management of a medical emergency by an individual or a team in a simulated clinical setting. The clinical setting in the context of this study refers to an out-of-hospital emergency-care situation.

Medical simulators are designed to demonstrate key clinical characteristics or a set of clinical responses that mimic real-life conditions. Medical simulators include computer programs, part-task trainers, human-patient simulators (HPS) (or full-scale mannequins) and standardised patients (SP) (Lam, Ayas & Griesdale 2010:454-455; Rosen 2008:158; Ziv, Small & Wolpe 2000:490-492). For the purpose of this study, the simulator type is a full-body mannequin with low- to high-fidelity characteristics.

Integrated clinical simulation permits the design of a process and system that recreates an authentic clinical context and environment. This provides learners with the opportunity to assume the role of qualified practitioners. The learner is empowered to make decisions and perform diagnostic and therapeutic procedures, and to experience the full impact of successes and failures associated with clinical practice. The purpose of integrated clinical simulation in summative assessment is to obtain evidence through an authentic and integrated assessment process that proves that learners can manage life-threatening emergencies in the out-of-hospital context effectively, and that they are therefore deemed competent to practice. Furthermore, medical simulation has as its goal facilitating meaningful clinical experiences in a safe environment, in which the learner can refer to and transfer to authentic clinical contexts (Bond, Lammers, Spillane, Smith-Coggins, Fernandez, Reznek, Vozenilek & Gordon 2007:354).

Developments in medical simulator technology and simulation design position medical simulation as an authentic and integrated assessment instrument. Because the integrated clinical simulation is the assessment instrument, assessment criteria are required to inform the process of observing and rating learner performance, and the criteria are thus an essential constituent of the design of the assessment method.

This research project involved the researcher conducting an in-depth study into integrated clinical simulation with a view to identifying assessment criteria and case types in order to employ integrated clinical simulation as instrument for summative assessment of learners in ALS emergency-care-education programmes in South Africa.

The aim of Chapter 1 is to orientate the reader to the study. In order to achieve this, the researcher will provide an overview of and background to the research problem. This will be followed by a summary of the problem statement and research questions. The overall goal, aims and objectives of the study will then be presented. The demarcation of the field and scope of the study will then be highlighted. The significance and value of the study to the profession and educators will be then be summarised, followed by a brief synopsis of the research design and methods of investigation. A schematic outline of the study will be presented, together with a précis of the study, followed by the conclusion.

1.2 BACKGROUND TO THE RESEARCH PROBLEM

Summative assessment that uses integrated clinical simulation by means of low- to high-fidelity HPS is routinely conducted by ALS emergency-care-education programmes in South Africa, including the 2-year Emergency Care Technician Programme, the 3-year National Diploma, the 4-year Professional Degree in Emergency Medical Care, and the Critical Care Assistant (CCA) short course offered by some Ambulance Training Colleges (HPCSA: PBECP 2009a:23; HPCSA: PBECP 2011a:14, 23; HPCSA: PBECP 2011:15-17; HPCSA 2010:2-4). Although short-course emergency-medical-care (EMC) programmes are being phased out, at the time this study was conducted the CCA programme was still being offered.

The Health Professions Council of South Africa: Professional Board for Emergency Care (HPCSA: PBEC) is both the Standards Generating Body and the Education and Training Quality Assurance body (ETQA) for emergency-care qualifications in South Africa (SAQA n.d:online). Consequently, the body has published minimum assessment requirements for emergency-care short courses, which include the use of simulation as a mandatory assessment instrument (HPCSA: PBECP 2010:2-4). Summative assessment of clinical procedures, and holistic patient care through integrated clinical simulation is thus currently conducted routinely by ALS emergency-care-education programmes offered by public and private ambulance training colleges, as well as by universities of technology in South Africa (HPCSA: PBECP 2010:2-4; SAQA 2012a-d:online). As such, integrated clinical simulation forms a central part of summative assessment as prescribed by the HPCSA: PBEC (2010:2-4) and alluded to in the SAQA qualification documents for the various courses or programmes (SAQA 2012a-d:online).

McGaghie, Issenberg, Petrusa and Scalese (2010:59) state that, "The standardisation, fidelity and reproducibility of medical simulation make the technology well suited to formative and summative evaluations of clinical competence". Cregan and Watterson (2005:2 of 6) claim that simulation has the ability to assess the evolution from the "knows how" to the "shows how" category in Miller's pyramid. Labuschagne (2012:224-225) presents a comparison of Bloom's taxonomy and Miller's pyramid, and proposes the use of simulation for developing and demonstrating higher-order levels of thinking necessary for clinical practice. Development of simulator technology is accompanied by greater degrees of fidelity, therefore, simulators can be readily employed as precision instruments in the measurement of performance in the clinical setting. Simulators are therefore valid instruments for assessment, on condition that the simulator type has sufficient fidelity to elicit the expected competencies and performance levels (Alinier 2007:e246-247; Labuschagne 2012:87; Tavakol, Mohagheghi & Dennick 2008:78). Alinier (2007:e246-247) presents the relationship between Miller's pyramid of clinical-skill acquisition and the type of simulator required for developing clinical skill competence. The type of simulator, the degree of simulator fidelity and the nature of the skills that can be developed with each type of simulator are discussed and a typology of simulation presented.

The rationale for the use of integrated clinical simulation as an authentic assessment instrument by emergency-care programmes is assumed by the researcher to be that clinical simulation assesses a learners' ability to respond to out-of-hospital emergencies and correlates with his/her response to real-life emergencies. Another reason for using simulations as a summative assessment instrument would be to ensure compliance with HPCSA: PBECP guidelines (protocols) as a cognitive forcing strategy. Simulations as an assessment instrument can therefore be designed around assessing "protocol" or "guideline" compliance (Bond, Deitrick, Arnold, Kostenbader, Barr, Kimmel & Worrilow 2004:439).

Using formalised assessment criteria for clinical procedures is common practice in institutions offering the emergency-care programmes under discussion. Assessment of clinical procedures by using medical simulators is well documented and supported in the literature (Boulet & Swanson 2004:121; Tavakol *et al.* 2008:79; Wanless & Aldridge 2012:5). Although medical simulation as a method for developing technical and non-technical skills is well documented in the literature (Lam *et al.* 2010:447, 453-454; Passiment, Sacks & Huang 2011:10; Von Wyl, Zuercher, Amsler, Walter & Ummenhofer 2009:121, 125) there are few descriptions of the use of integrated clinical simulation as a summative assessment instrument in the context of undergraduate medical education (Boulet & Swanson 2004:121; Tavakol *et al.* 2008:79; Wanless & Aldridge 2012:5).

Medical simulation has been used successfully as a summative assessment instrument in various postgraduate medical programmes, certification and licensure bodies (Cregan & Watterson 2005:1 of 6; McGaghie *et al*. 2010: 59).

The Council on Higher Education (CHE 2004:20), as part of programme-accreditation criteria, requires that,

A range of appropriate assessment tasks is effective in measuring student attainment of the intended learning outcomes. There is at least one integrated assessment procedure for each qualification which is a valid test of the key purposes of the programme.

An integrated clinical simulation meets the CHE requirement for an integrated assessment instrument and, in the case of emergency medical care, has potential, as a summative assessment instrument, to be a *"valid test of the key purposes of the programme",* as stated above. The CHE (2004:21) also calls for,

A system for maximising the accuracy, consistency and credibility of results, including consistency of marking and concurrence between assessors and external examiners on the nature and quality of the evidence which indicates achievement of learning outcomes.

SAQA (2001:15) represents the following core principles for assessment: fairness, reliability, validity and practicability. When these principles are upheld in assessment practice, SAQA argues, such assessments are credible. In simulation literature, the two principles that seem to be reflected on most often are validity and reliability (Adamson, Kardong-Edgren & Willhaus 2012:e6; Boulet 2008:1020-1021; Boulet, Murray, Kras & Woodhouse 2008:73; Tavakol *et al*. 2008:78). Because simulators are designed to represent elements of the real world (clinical conditions) and the same case can be used repeatedly, simulations display both authenticity and reproducibility, which are essential for the credibility and reliability of assessment.

Various assessment methods have been suggested for grading and scoring practical performance in general, and simulation specifically. Schuwirth, Southgate, Page, Paget, Lescop, Lew, Wade and Baron-Maldonado (2002:926-928) recommend an appropriate mix of subjective, objective, qualitative and quantitative methods when assessing practical performance. In particular, they propose a Bayesian model for the purpose of practicality, defensibility and generalisability of the assessment results, which is of particular importance in high-stakes testing. The Bayesian model refers to a method of obtaining the best prediction of outcomes (in this case the assessment of competence that correlates with clinical practice) using a wide range of assessment methods and across medical disciplines (in the case of emergency care). Khan, Pattison and Sherwood (2011:2) propose a combination of Bayesian and psychometric models when using simulation as a summative assessment instrument (thereby maintaining the benefits of a formative assessment model).

Another approach to assessing practical competence of learners involves conducting assessments in the authentic clinical context. Road evaluations are employed by some emergency-care programmes; these evaluations involve learners accompanying an ALS paramedic who evaluates learners on their ability to manage patients in a real-world clinical setting. Boulet and Swanson (2004:122) identify a number of pitfalls relating to assessment of learners in the clinical-practice context: Cases on which learners are assessed contain inconsistencies. Cases in the out-of-hospital context vary considerably – from those of non-critical patients in a relatively controlled environment to critical patients in the context of a hazardous environment or a multi-casualty situation.

Additionally, the type and frequency of cases are unpredictable and there are often other learners present on the scene as well (Khan *et al.* 2011:1). In addition to the case-related factors, matters relating to practitioners who serve as assessors should also be considered. Learners are often expected to accompany ALS paramedics on calls, even though the paramedics have not been guided to acquire the necessary skills relating to mentorship, teaching or assessment. ALS paramedics have their own preferences about what should be done and how it should be done, which affects what they see as important when assessing learner performance (Cooper 2005:377). Qualified and experienced ALS paramedics could hesitate to permit learners to make clinical decisions and perform procedures, particularly on critically-ill or injured patients, thus preventing learners from demonstrating their true ability in this context (Gordon, Wilkerson, Shaffer & Armstrong 2001:470; Ziv, Wolpe, Small & Glick 2003:785). By preventing learners from making decisions, they are protected from the weight of responsibility that comes with being a qualified ALS. Therefore learners' clinical competence is not tested, and they do not experience the consequences of their clinical decision making and actions before they qualify (Brennan, Corrigan, Allard, Archer, Barnes, Bleakely, Collet & De Bere 2010:453,456).

In addition to the contextual and psychometric challenges involved in conducting meaningful assessment in the clinical context there are also the ethical challenges of letting inexperienced and not-yet-qualified learners practice on patients (Graber, Pierre & Charlton 2003:1331-1332; Murphy, Cremonini, Kane & Dunn 2007:1; Ziv *et al*. 2003:783-784). Patients are exposed to significant risk if they are treated by unqualified students, especially in the emergency-care situation.

Postgraduate programmes in emergency medicine have introduced simulation-based curricula involving the presentation of case types (Binstadt, Walls, White, Nadel, Takayesu, Barker, Nelson & Pozner 2007:500-501; McLaughlin, Doezema & Sklar, 2002:1311-1313). These case types include various medical and/or trauma conditions and their complications, which could give rise to imminent or actual life-threatening emergencies. The representation of such case types is directly linked to the organ and/or system involved, as well as the specific, associated life-threatening complications. Kneebone, Nestel, Vincent and Darzi (2007:808, 811) argue, "that simulation should also reflect commonly occurring non-crisis situations, allowing clinicians to develop an awareness of the complex events that underpin clinical encounters".

Case types for emergency care are indirectly reflected in the HPCSA protocols through provision of minimum clinical-skill requirements, drug indications and algorithms for a limited number of emergency conditions (HPCSA: PBEC 2006:100, 118). The various ALS programme curricula also stipulate the nature and contexts of emergencies that are expected to be managed by qualified ALS paramedics (HPCSA 1999:22-58; SAQA 2012b-d:online). The HPCSA accreditation process for offering ALS programmes includes the submission of simulation case descriptions as evidence of assessment planning (HPCSA: PBECP 2009a:36, 60-61; HPCSA: PBECP 2011:23; HPCSA: PBECP 2013:20).

Currently there is no formal classification of emergency-care case types, or standardised assessment criteria for conducting summative assessment by means of integrated clinical simulation for ALS emergency-care programmes in South Africa. It is likely that the combination of patient contexts, variation in patient profiles based on age and range of possible emergency conditions and time-response requirements in South Africa, may require a framework or matrix of factors that influence case design for simulation.

Case types for summative assessment using simulation will require the use of a medium-to high-fidelity HPS, and have to be designed to reflect the complexity of technical, clinical-reasoning and critical-thinking skills required by ALS paramedics. For the purpose of this study, integrated clinical simulation using SPs and hybrid simulators was not considered, due to the limitations involved in using invasive and emergency procedures such as defibrillation, synchronised cardioversion, transcutaneous pacing, and surgical airway and endotracheal intubation.

The gaps that have been identified in the use of integrated clinical simulation as a summative assessment instrument by emergency-care programmes in South Africa are therefore summarised as follows:

- *There are currently no standardised integrated clinical simulation assessment criteria for summative assessment for undergraduate ALS emergency-care-education programmes in South Africa.*
- *The appropriateness of simulation case types, with associated classification used by ALS emergency-care-education programmes in South Africa, has not been investigated.*

1.3 PROBLEM STATEMENT AND RESEARCH QUESTIONS

The problem that will be addressed by this study is the absence of both standardised assessment criteria and associated case types with classification when using integrated clinical simulation as a summative assessment instrument for ALS emergency-care-education programmes in South Africa.

The researcher found no studies addressing either assessment criteria for integrated clinical simulation, or case types with classification for such simulations for emergency-medical-care programmes in South Africa. A search of the National Research Foundation's (NRF) Nexus Database System did not yield relevant dissertations or theses addressing these issues. Disciplines in which aspects of clinical simulation were researched include medicine, nursing and pharmacology. Examples of scholarly work represented include

Simulation – its influence on clinical learning among first-year student nurses at Coronation Nursing College (Bruce 1992); Simulation – its reliability as an evaluation tool for clinical proficiency among the diploma student nurses at Ngwelezane College of Nursing (Dlomo 1995); Reliability of simulation to evaluate clinical competence in the basic nursing course (Dlomo 1997); Clinical simulation to enhance undergraduate medical education and training at the University of the Free State (Labuschagne 2012); and Effectiveness of simulation training to improve students' clinical competence (Powell: commenced 2012 incomplete).

In attending to the problem statement, the following research questions were addressed:

1. *How is integrated clinical simulation conceptualised and contextualised as a summative assessment instrument?*
2. *How are emergency case types conceptualised and contextualised for application in integrated clinical simulation?*
3. *What competencies should be assessed when using integrated clinical simulation as an assessment instrument by ALS emergency-care-education programmes in South Africa?*
4. *What factors should be included in the design of integrated clinical simulations that are used for the purpose of summative assessment?*
5. *What case types and classification should be employed when using integrated clinical simulation as an assessment instrument?*

1.4 GOAL, AIM AND OBJECTIVES OF THE STUDY

1.4.1 Goal of the study

The overall goal of this study is to present a set of assessment criteria and case types relevant to integrated clinical simulation when used as a summative assessment instrument by ALS emergency-care-education programmes in South Africa.

1.4.2 Aim of the study

The aim of the study is to establish a range of appropriate assessment criteria and case types from clinical practice in emergency care, which can be applied to the integrated clinical simulation context by ALS emergency-care-education programmes in South Africa for summative assessment.

1.4.3 Objectives of the study

In order to achieve the aim of the study, the following four objectives were pursued:

1. *To conceptualise and contextualise the development of integrated clinical simulation as an assessment instrument together with assessment criteria employed by emergency-care-educational programmes when using clinical simulation as a summative assessment instrument. This was achieved by analysing programme and policy documents relevant to ALS emergency-care-education programmes in South Africa (contextual relevance) and by conducting a literature review to obtain broader perspectives on the use of integrated clinical simulation as an assessment instrument and associated assessment criteria (conceptual relevance). This objective speaks to research question 1.*

2. *To recommend case types that can be used by ALS emergency-care-education programmes in South Africa. This objective was achieved by analysing programme and policy documents relevant to ALS emergency-care-education programmes in South Africa (contextual relevance) and conducting a literature study (theoretical perspectives) to explore current understanding in the context of emergency-care programmes (conceptual relevance). This objective was also explored by means of focus-group interviews by obtaining perspectives from the clinical experience of ALS practitioners in the South African context. This objective speaks to research questions 2 and 5.*

3. *To identify and elucidate competencies that should be assessed when using integrated clinical simulation as an assessment instrument by ALS emergency-care-education programmes in South Africa. This objective was explored by means of focus-group interviews, to obtain perspectives from ALS practitioners. Practitioners' perspectives were compared to perspectives expressed in the literature. This objective speaks to research question 3.*

4. *To qualify factors that should be included in the design of integrated clinical simulations for the purpose of summative assessment. This objective was explored by means of focus-group interviews, to obtain perspectives from ALS practitioners. This objective speaks to research question 4.*

1.5 DEMARCATION OF THE FIELD AND SCOPE OF THE STUDY

This study is interdisciplinary in that it was conducted in the field of Health Professions Education and has its application in the field of Emergency Medical Care. This study has a specific focus on identifying assessment criteria for using integrated clinical simulation as a summative assessment instrument and associated case types with classification. This knowledge contributes to developing guidelines for using integrated clinical simulation as a summative assessment instrument by educators in emergency-care programmes in South Africa.

A detailed demographic and professional profile of the researcher is presented in Chapter 5 (c.f. Section 5.2.2). The study was conducted from January 2013 to June 2015, with the empirical phase carried out from January to February 2014.

1.6 SIGNIFICANCE AND VALUE OF THE STUDY

The value of the study lies in its contribution to identifying assessment criteria and case types for using integrated clinical simulation as an assessment instrument. These assessment criteria and case types can be incorporated into an assessment instrument and standardised for use by educators in emergency-care programmes in South Africa. They can also be developed into standards that can be used as part of programme reviews by the HPCSA and HEQC.

This study serves to inform ALS emergency-care educators about assessment criteria and case types when they employ integrated clinical simulation for summative assessment.

1.7 RESEARCH DESIGN OF THE STUDY AND METHODS OF INVESTIGATION

A qualitative research design using focus-group interviews was employed. The reason for using focus-group interviews was to tap the clinical experience and educational background of ALS paramedics relevant to the research problem. Focus-group interview questions concentrated on eliciting perspectives on the competencies, behaviours and attitudes expected in emergency-care practice. An understanding of case types relevant to emergency care in a South African context was shaped through the focus-group discussions. The insights from the experiences of focus-group participants into the integrated clinical simulation summative assessment were explored.

Document analysis and literature review were conducted to determine current perspectives on simulation types exercised in emergency care and emergency medicine, and to identify criteria appropriate for instances when integrated clinical simulation was employed as a summative assessment tool. Specific clinical conditions and emergencies expected to be managed by ALS personnel were identified and extrapolated from the various ALS paramedic programme curriculum documents.

Focus-group-interview questions were constructed from the document analysis and literature review. Discussion was stimulated to elicit perspectives from emergency-care professionals on appropriate simulation case types and assessment criteria, based on own experiences with simulation assessment as students or post-qualification, as well as insights from clinical practice.

Focus-group interviews were conducted with four separate groups comprising ALS paramedics who had at least two years operational experience each. These ALS paramedics were recruited from the Bloemfontein area in accordance with a convenience sampling method (cf. Chapter 3). The demographics of focus-group participants are presented in Chapter 3 to clarify representativeness of the ALS population.

The researcher's intention was to conduct two focus-group interviews with medical doctors from the Bloemfontein area who had at least two years clinical experience of working in emergency centres or trauma units. On conclusion of the fourth focus-group interview, there was agreement between the researcher and focus-group-interview facilitator that saturation had been achieved and that it was unnecessary to conduct focus groups with medical doctors. A schematic overview of the study is provided in Figure 1.1.

1.8 IMPLEMENTATION OF THE FINDINGS

A practical and appropriate set of assessment criteria relevant to clinical practice and a case typology framework for clinical simulation is presented. These assessment criteria can be developed into an assessment method that can be applied when using integrated clinical simulation as a summative assessment instrument in ALS emergency-care-education programmes.

FIGURE 1.1 SCHEMATIC OVERVIEW OF THE STUDY

(Compiled by the researcher, Campbell 2014)

1.9 ARRANGEMENT OF THE STUDY

This chapter, Chapter 1, **Overview and orientation to the study**, presents background to the research problem, the problem statement and research questions, and goal, aim and objectives of the study. This chapter demarcates the field and scope of the study, explains the significance and value of the study, describes the research design of the study and methods of investigation, and refers to the implementation of the findings**.**

Chapter 2, **Contextualising simulation as a summative assessment instrument in Advanced Life Support emergency-care-education programmes in South Africa**, documents informing the regulatory framework and guidelines for assessment relevant to emergency-medical-care programmes will be deliberated. The educational methodology under which assessment practice is subsumed will be presented. Perspectives gained from documents and literature on the context and conditions of ALS paramedic practice in South Africa, which underpins assessment criteria, will be discussed.

Chapter 3, **Conceptualising assessment criteria and case types when using integrated clinical simulation for summative assessment**, provides a review of the literature in order to obtain broader perspectives on the value of clinical simulation as an integrated assessment instrument. A conceptual understanding of healthcare simulation as an educational methodology and integrated assessment instrument will be deliberated. An in-depth discussion of the elements of assessment criteria relevant to ALS paramedic practice will be provided. Case types and classification will be considered in the framework of ALS paramedic practice and assessment criteria.

In Chapter 4, **Research design and methodology**, the research method and research design will be deliberated. To achieve this, theoretical perspectives on the research design and methodology will be presented. The research methods will be elucidated, followed by a discussion on the trustworthiness of the methodology and the ethical considerations of the study.

In Chapter 5, **Results and discussion of the findings of the focus-group interviews**, the results and discussion of findings from the focus-group interviews will be presented. The contextual setting of the focus groups will be discussed, including the demographic profile of participants and the researcher. This will be followed by a thematic presentation of qualitative data in the form of relevant responses of participants in support of themes and categories. A discussion of results will then be presented.

Chapter 6, **Conclusion and limitations of the study,** provides an overview of the study, identifies the significance and limitations of the study, and makes suggestions for further studies and research that are needed with regard to the research problem.

1.10 CONCLUSION

Chapter 1 provided an orientation to the study. This was achieved by providing an overview of and background to the research problem. The background was followed by a summary of the problem statement and research questions. The overall goal, aims and objectives of the study were then presented. The field and scope of the study was demarcated and the significance and value of the study to the profession and educators summarised. A brief synopsis of the research design and methods of investigation was provided, together with a schematic outline and précis of the study.

In Chapter 2, entitled **Contextualising simulation as a summative assessment instrument in Advanced Life Support emergency-care-education programmes in South Africa**, the documents informing the regulatory framework and guidelines for assessment relevant to emergency-medical-care programmes in South Africa will be analysed and deliberated. The educational methodology under which assessment practice is subsumed will be presented. The position and conceptual representation of clinical simulation as an integrated assessment instrument for emergency medical care will be explained. Perspectives from documents and literature on the context and conditions of ALS paramedic practice in South Africa, which underpins assessment criteria, will be discussed.

CHAPTER 2

CONTEXTUALISING SIMULATION AS A SUMMATIVE ASSESSMENT INSTRUMENT IN ADVANCED LIFE SUPPORT EMERGENCY-CARE-EDUCATION PROGRAMMES IN SOUTH AFRICA

2.1 INTRODUCTION

In Chapter 1, an orientation to the study was provided. An overview and background to the research problem was presented, followed by a summary of the problem statement and research questions. The overall goal, aims and objectives of the study were then specified. The demarcation of the field and scope of the study were highlighted. The significance and value of the study to the profession and educators were then summarised, followed by a brief synopsis of the research design and methods of investigation. A schematic outline of the study was presented, together with a précis of the report.

In this chapter, an analysis of documents informing the regulatory framework and guidelines for assessment relevant to emergency-care-education programmes in South Africa will be deliberated. The educational methodology under which assessment practice is subsumed will be presented. The position and conceptual representation of clinical simulation as an integrated assessment instrument for emergency medical care will be set out. Perspectives gained from documents and literature on the context and conditions of ALS paramedic practice in South Africa underpinning assessment criteria will be discussed.

2.2 CHAPTER OVERVIEW

The schematic overview of Chapter 2 is presented in Figure 2.1. Key to acronyms used in Figure 2.1 are as follows: **PBEC**: Professional Board for Emergency Care; **SGB**: Standards Generating Body; **ETQA**: Education and Training Quality Assurance Body; **SAQA**: South African Qualifications Authority; **HEQC**: Higher Education Quality Committee; **OBET**: Outcomes based education and training; **ALS**: Advanced life support

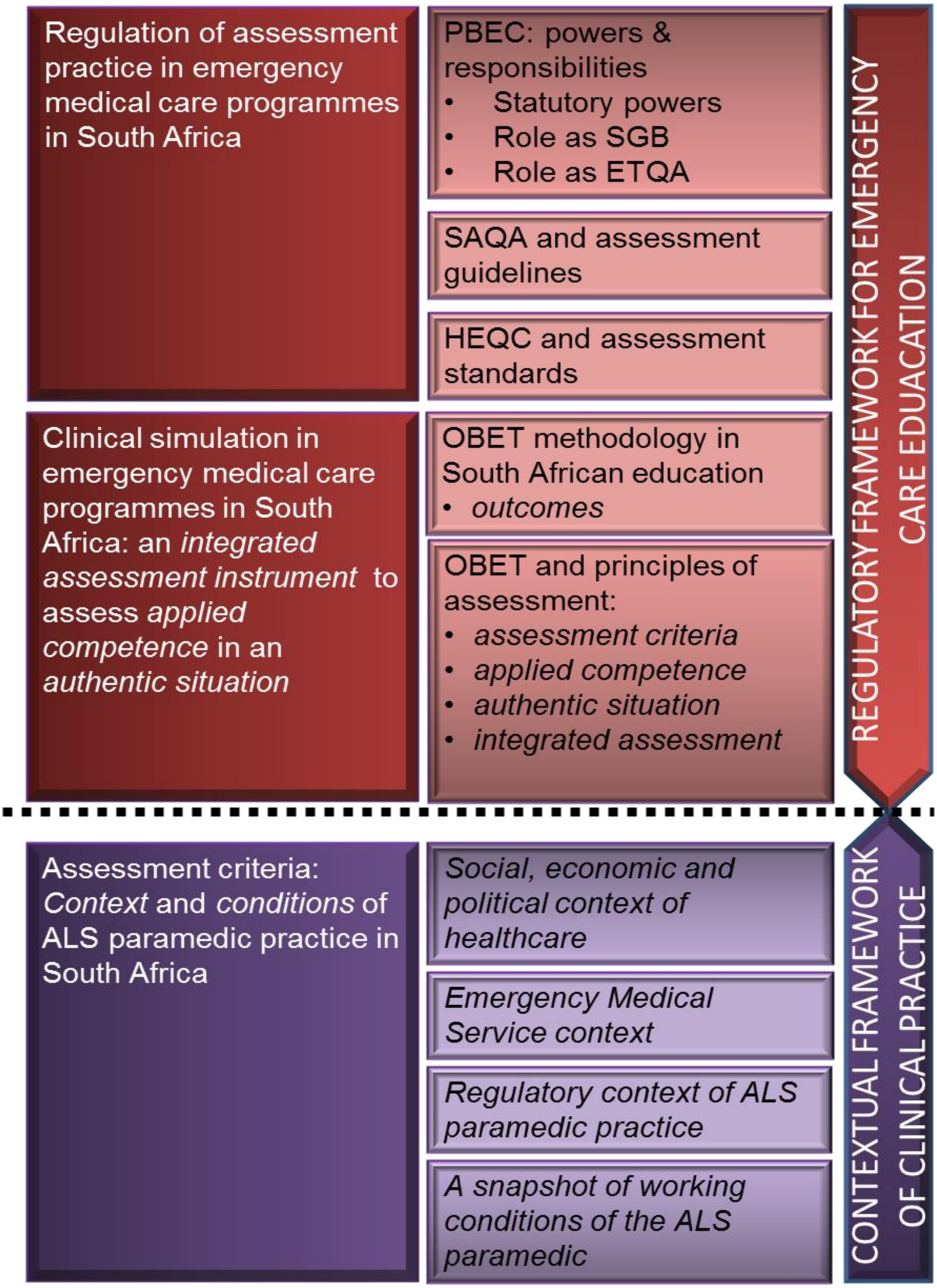

FIGURE 2.1: SCHEMATIC OVERVIEW OF CHAPTER 2

(Compiled by the researcher, Campbell 2015)

2.3 REGULATION OF EMERGENCY–MEDICAL-CARE EDUCATION IN SOUTH AFRICA

The historical and current influence of the Health Professions Council of South Africa: Professional Board for Emergency Care (HPCSA: PBEC, referred to by the researcher as PBEC) on assessment practices will be considered in order to contextualise the research problem and provide a framework for data interpretation (understanding perspectives of participants). The role of the South African Qualifications Authority (SAQA) and the Higher Education Quality Committee (HEQC) in shaping the educational landscape and the relationship to the PBEC will also be deliberated.

Although the phasing out of short courses is changing the landscape of education in emergency medical care, PBEC policy and procedures relating to short-course programme accreditation and assessment practices have significantly influenced the mindset regarding assessment practices in higher-education programmes. The following discussion encompasses both short-course and tertiary-education programmes in order to understand the influence current assessment practices relevant to the research problem on these programmes.

2.3.1 Regulatory powers of the Professional Board for Emergency Care in relation to South African emergency-medical-care-education

The HPCSA is a statutory body instituted by the Health Professions Act (No. 56 of 1974) (RSA 1999). The Act establishes the presence and powers of professional bodies (RSA 1999:1.13-1.14). The emergency-medical-care profession is regulated by the PBEC, of which the regulatory function includes education in the profession and registration of qualified practitioners. The following statements set out the mandate of the PBEC with regard to education (RSA 1999:1.13):

(c) To control and to exercise authority in respect of all matters affecting the training of persons in, and the manner of the exercise of the practices pursued in connection with, any profession falling within the ambit of the professional board;
(d) To promote liaison in the field of the training contemplated in paragraph (c), both in the Republic and elsewhere, and to promote the standards of such training in the Republic;

This mandate to *"*control and to exercise authority*"* and "promote standards*"* in the training of emergency-medical-care personnel is further clarified as follows (RSA 1999:1.14-1.15):

(1) No person or educational institution, excluding a university or a technikon, may offer or provide any training unless such training has been approved by the professional board concerned.
(2) Any person or educational institution wishing to offer such training as is referred to in subsection (1) shall, before offering such training, apply to the professional board concerned in writing for its approval of such training and shall furnish such particulars regarding such training as the professional board concerned may require.
(3) The professional board concerned may grant or refuse any application and, having granted such application, may prescribe such conditions and requirements as it may deem fit subject to which the training in question may be provided.

The position of power of the PBEC is summarised by the following relationships:

- Conditions and standards for emergency-medical-care education and training programmes are determined by the PBEC;
- Practices associated with education and training are determined by the PBEC;
- Compliance with such conditions, standards and practices leads to accreditation of education and training providers;
- Accreditation leads to offering the relevant emergency-medical-care programme(s);
- Graduates obtaining the qualification may register with the PBEC;
- Registered persons have a licence to practice at their level and are accountable to the PBEC as individual practitioners;
- Emergency medical services (employers) can only employ registered persons to perform emergency-medical-care duties; and
- Registered persons can earn money from performing emergency care.

This position of power is established through legislation and authority to sanction non-compliance (RSA 1999:1.13, 1.15). This authority is reflected by the following:

- Non-compliance of conditions and standards means accreditation for training may be withheld;
- Accreditation may be withdrawn once given if conditions and standards have been violated;

- Non-compliance may be punished with fines or imprisonment;
- Persons awarded a qualification not accredited by the PBEC may not be registered;
- Misconduct or malpractice by registered persons may be subject to disciplinary action by the PBEC; and
- A registered person may lose his/her licence to practice by being "struck from the register".

The manner in which the PBEC has exercised its powers is illustrated by the publication of various documents addressing accreditation of emergency-care-education programmes. These include:

- Form 169A: guidelines for the completion of the portfolio for education and training centres wishing to offer the Basic Ambulance Assistant (BAA), Ambulance Emergency Assistant (AEA), Operational Emergency Care Orderlies (OECO) and Critical Care Assistant (CCA) short courses (HPCSA: PBEC 2013);
- Form 332: Guidelines for the completion of the portfolio for institutions wishing to offer the Emergency Care Technician (ECT) and Emergency Care Practitioner (ECP) programmes (HPCSA: PBEC 2011); and
- Form 295: Accreditation guidelines for the Emergency Care Technician qualification (companion document to Form 332) (HPCSA: PBEC 2009a).

Additional to these forms, documents that address assessment-related practices and guidelines are the following:

- Form 323: Examination rules for BAA, AEA and CCA courses (HPCSA: PBEC 2010, updated 2014); and
- Form 294: Template and guidelines for the completion of the External Moderator's report (HPCSA: PBEC 2014).

A clear distinction is evident between short-course emergency-medical-care qualifications and SAQA-registered tertiary emergency-medical-care qualifications. The guidelines and documents for short-course qualifications are more detailed and prescriptive in nature, as illustrated by the following:

- The accreditation process requires proof of specified student-staff ratios, depending on the course being applied for (HPCSA: PBEC 2013:8). Organisational aspects include specific positions such as a “principal” and “training manager”, with associated criteria (HPCSA: PBEC 2013: 9-10). The minimum prescribed equipment list is linked to the student-staff ratio (HPCSA: PBEC 2013:14-15); and

- The assessment rules specify the assessment instruments that are to be used (as a minimum), the weighting of each instrument and how many summative assessments and attempts are permitted for such assessments (HPCSA: PBEC 2014: 2-6).

2.3.2 Relationship between the Professional Board for Emergency Care, the Higher Education Quality Committee and the South African Qualifications Authority

SAQA-registered tertiary emergency-medical-care qualifications fall under the Higher Education Qualifications Framework (HEQF) and thus under the Department of Higher Education and Training (DHET). Responsibility for quality assurance in higher education in South Africa has been assigned to the Council on Higher Education (CHE) (RSA 1997:10 of 53). The Higher Education Quality Committee (HEQC) is a permanent subcommittee of the CHE and is responsible for quality assurance of tertiary programmes. The directive of the HEQC includes programme accreditation, institutional audit and quality promotion (CHE 2004:1).

The relationship between professional bodies and the HEQC was expressed at the Professional Bodies Forum hosted by the CHE on 28 February 2012, in a presentation by Dr. Hays, who stated that, “as they [HEQC, professional bodies and higher-education institutions] have an interest in academic programmes; their responsibilities are separate and complementary*”.* The PBEC serves as the Education and Training Quality Assurance body (ETQA) for short-course programmes and in conjunction with the HEQC for tertiary-level registered emergency-care-education programmes in South Africa. Furthermore, the PBEC serves as the Standards Generating Body (SGB) for both short-course and tertiary programmes (Vincent-Lambert 2011:5).

The PBEC reflects this complementary relationship by including the HEQC accreditation criteria in both the short-course and tertiary emergency-medical-care qualification documents, as illustrated by the following:

[T]he Professional Board for Emergency Care has by and large adopted the very same accreditation criteria processes and criteria used by the HEQC for the accreditation of training providers… [and consequently] In the case of qualifications leading to professional

registration with a legislative body such as the HPCSA, training providers also need to satisfy the requirements of the registering authority, as well as the HEQC (HPCSA: PBEC 2011:1).

[T]o the extent that such additional accreditation may be required, you are also encouraged to visit the websites of the Council for Quality Assurance in General and Further Education and Training ("Umalusi"), the Higher Education Quality Assurance Council ("HEQC"), the Department of Higher Education and Training ("the DoE") and the South African Qualifications Authority ("SAQA"). (HPCSA: PBEC 2011:2).

As both the SGB and ETQA, the PBEC is required to adhere to policies and guidelines as generated by SAQA (SAQA 2000:4). These policies require submission of qualifications for accreditation and registration with the National Qualifications Framework (NQF) (SAQA 2000:4). SAQA is also the body responsible for overseeing the development of the NQF (SAQA 2000:4) and "the final authority that registers qualifications and part qualifications on the NQF" (SAQA 2013:6).

As part of the NQF, 12 National Standards Bodies (NSB) have been established; they cover all disciplines and economic sectors (called organising fields) in South Africa (SAQA 2000:6). SGBs function in subfields within the organising fields. The PBEC functions as an SGB within NSB 09 in the organising field Health Sciences & Social Services, under the subfield of Curative Health (SAQA 2000:7; SAQAa-d 2012).

SAQA (2012:2) acknowledges "the critical role of professional bodies in quality assurance and standards development in the NQF environment". As such, a platform for collaboration in developing qualifications and quality assurance has been established through registering of professional bodies with SAQA (SAQA 2012). The HPCSA: PBEC (the umbrella statutory body) was registered as such with SAQA in 2012 (SAQA online).

2.3.3 Regulation of assessment practices in emergency-medical-care-education programmes in South Africa

HEQC criteria for programme accreditation include two criteria specific to assessment practices (CHE 2004:20-21). The SAQA guidelines for assessment are embodied in these criteria and reflect the outcomes-based education and training (OBET) system. In particular, the guidelines state that, "Assessment criteria are commensurate with the level of the qualification, the requirements of SAQA and, where appropriate, professional bodies, and are made explicit to staff and students" (CHE 2004:20).

2.3.3.1 *Simulation represented as an integrated summative assessment instrument in emergency-medical-care-education programmes in South Africa*

Included in standards for qualifications registered on the NQF, the following element of a qualification includes, "The skills the learner will have – the status, recognition, credentials and licensing of the qualifying learner; the learner's marketability and employability and the further learning that the learner may access" (SAQA 2001:43). In relation to this element, the design of assessment should include,

The integration of roles, actions, skills, behaviours, etc. as specified in the learning outcomes, and whether the integration of these is evidence of understanding of the purpose of the qualification and the achievement of applied competence" (SAQA 2001:43).

SAQA (2001:11, 21; 2005:3) refers to "practical competence" as the "ability to perform a set of tasks and actions in authentic contexts (situations)". SAQA identified integrated assessment as the mechanism by which this can be determined (SAQA 2005:4). In clarifying what is meant by authentic situations, SAQA (2005:4) suggests it refers to "meaningful application of knowledge and may include 'simulations' or other approaches as the context requires".

SAQA identifies simulation and role play in its list of assessment instruments (SAQA 2001:29, 35). The conditions suggested as suitable for using simulation include, "where demonstrations and observation will provide reliable and valid results, but where, for a number of reasons, it is difficult or not practicable to assess under actual conditions" (SAQA 2001:35).

Role-play is an essential component of clinical simulation; the role of a qualified practitioner is assumed in the context of "a situation, [presented with] a problem or an incident, to which they have to respond" (SAQA 2001:35). SAQA suggests that role play as assessment instruments "are open-ended and are person-centred [and can be used to assess] a wide range of behavioural and interpersonal skills" (SAQA 2001:35).

The PBEC's explicit identification of simulation as an assessment instrument is illustrated in the following documents:

- In Form 169A (HPCSA: PBEC 2013:24), as an addition to accreditation criteria for assessment, there is a requirement for, "An examination bank of at least 10 simulation scenarios appropriate to the course(s) applied for, plus the assessment rubric" (HPCSA: PBEC 2013:24).
- The examination rules for short courses promulgated by the HPCSA: PBEC (2010 and revised 2014:2-4) require the presence and contribution of "patient simulation" to the midterm and final examination.
- In Form 294 (HPCSA: PBEC 2014:6), the template and guidelines for the external moderator report includes a section detailing a descriptive report on simulation assessment.
- The N.Cert:ECT qualification document (SAQA 2012d:9 of 16) states that, "Integrated patient care is demonstrated in simulated patient scenarios."
- The National Diploma: Emergency Medical Care (N.Dip:EMC) qualification document (SAQA 2012c:4 of 5) lists "simulation" under the heading, "Integrated assessment".
- The Bachelor Degree: Emergency Medical Care (BD:EMC) qualification document (SAQA 2012b:5 of 9) states that, "Integrated assessment takes the form of a variety of appropriate assessment methods, which include … simulated medical … scenarios".

2.3.3.2 *Representation of simulation and simulator tools used in emergency-medical-care-education programmes for summative assessment*

In order to understand the meaning of simulation in the context of emergency-medical-care education in South Africa, the terms in use should be presented. From the researcher's experience of emergency-medical-care-education programmes and the contents of PBEC documents (cf. Section 2.3.3), summative assessment of practical competence is categorised into three distinct components.

The first component assesses specific psychomotor skills relevant to emergency medical care, also referred to as clinical procedures or capabilities. This type of assessment involves a learner demonstrating a skill on a simulator (part-skill trainer or full-body mannequin with features that enable skill performance). In the summative assessment context, this assessment is referred to as an objective structured clinical evaluation (OSCE).

A list of clinical capabilities for which competence needs to be demonstrated is provided for the range of ALS qualifications in the following resources:

- The ECT and ECP programmes (HPCSA: PBEC 2011:15-17); and
- Scope of practice documents for the ECT (HPCSA: PBEC 2009c:5-7) and paramedic (CCA and N.Dip:EMC) (HPCSA: PBEC 2006:118-119).

The second component of assessment is categorised as “cardiopulmonary resuscitation (CPR)”, which is classified according to levels as “basic life-support CPR”, “intermediate life-support CPR” and “advanced life-support CPR” (HPCSA: PBEC 2010; 2014:2-4). CPR categories are also identified according to three distinct population groupings, namely, “infant, child and adult”. (HPCSA: PBEC 2010; 2014:2-4). This assessment component involves performing the sequence and routine actions required for treatment of a patient in cardiac arrest at the different levels of care.

The final component is referred to as simulation. Other terms used for the simulation category by the PBEC include “patient simulation” (HPCSA: PBEC 2010, 2014:2-4), “simulated patient scenario” (SAQA 2012d:9 of 16) and “simulated medical … scenarios” (SAQA 2012b:5 of 9). This assessment component involves using a full-body mannequin to simulate a clinical situation involving an emergency to which the learner must respond (assess and treat).

In PBEC documents and in emergency-medical-programme assessment practices, the OSCE, CPR and simulation represent three distinct categories of practical assessment. Each of these practical components is represented as a once-off, high-stakes (summative) assessment with conditional options for “remedial” and “supplementary” assessment (HPCSA: PBEC 2010, 2014:5).

It stands to reason that the simulators and simulator tools prescribed by the PBEC seek to address the practical component to be assessed. It is assumed trainers and educators would apply these simulators and simulator tools to the appropriate assessment component, as described previously. A list of simulator tools as stipulated by the PBEC is provided in Table 2.1 as examples.

TABLE 2.1: MINIMUM EQUIPMENT LIST OF SIMULATORS PRESCRIBED FOR THE EMERGENCY-CARE-TECHNICIAN PROGRAMME AND THE CRITICAL-CARE-ASSISTANT COURSE (HPCSA: PBEC 2009a:23 of 67;HPCSA: PBEC 2013:14-15)

Emergency-Care-Technician (ECT) Programme	**Critical-Care-Assistant Course (CCA)**
Description	**Description**
CPR Manikin – Adult	CPR Manikin – Adult
CPR Manikin – Child	CPR Manikin – Child
CPR Manikin – Infant	CPR Manikin – Infant
Wound Simulation Kit	Wound Simulation Kit
	Automatic External Defibrillator (AED) Trainer
Obstetrics Manikin	Obstetrics Manikin
Arrhythmia Trainer	Cardiac Dysrhythmia Simulator
Cricothyroidotomy Trainer	Cricothyroidotomy Trainer
	Ext. Jugular and Femoral Vein Simulator Manikin
Chest Decompression Manikin	Chest Decompression Simulator Manikin
Infusion Trainer	Infusion Trainer
	Intraosseous Trainer – Infant
	ALS Infant Manikin
	ALS Paediatric Manikin
Adult Simulation Manikin with Defibrillation and Intubation Capabilities	ALS Adult Manikin
	Umbilical Vein Trainer
	Pacing Simulator
	Male and Female Urinary Catheterisation Trainers
	Full Body Manikin
Intubation Trainer - Adult	ETT Intubation Trainer – Adult
	ETT Intubation Trainer – Child
	ETT Intubation Trainer – Infant
Extracted from Form 295 (HPCSA: PBEC 2009a:23 of 67)	Extracted from Form 169A (HPCSA: PBEC 2013:14-15)

It is clear from the use of terminology and the absence of a clear definition and guidelines for simulation by either SAQA or the PBEC that emergency-care educators and learners could vary in their understanding of simulation, posing the risk of unchallenged perpetuation of bad practices and myths about simulation, and leading to dissociation between the real purpose of simulation in emergency medical care and its application in these programmes. As stated by Halliwel, Ryan and Jones (2012:online), "Far too often in paramedic education ambulance tutors have taught what they themselves were taught, often perpetuating the myths that surround paramedic care".

2.4 EDUCATIONAL METHODOLOGY INFORMING EDUCATION PRACTICE IN SOUTH AFRICA

Simulation as represented by the PBEC as a distinct category for assessment is exemplified as "integrated clinical simulation" in the context of this study. Integrated clinical simulation will be analysed in the context of educational methodology informing assessment practice and applied to emergency medical care in South Africa.

Assessment guidelines published by SAQA (2001; 2005) and embedded in regulatory documents (CHE 2004; HPCSA: PBEC 2009a; 2011; 2013) provide an important background to understanding assessment procedures and practices in emergency-care-education programmes. Rules, regulations and criteria promulgated by PBEC (cf. Section 2.3.1) express the inclusion and interpretation of these guidelines in the context of these programmes.

2.4.1 Outcomes-based education and training system (OBET)

As a regulatory authority, one of SAQA's mandates is to provide operational guidelines informing assessment policy, procedures and systems for ETQAs and educational service providers (SAQA 2001:5) The educational methodology adopted by SAQA and the foundation of the NQF is an outcomes-based education and training system (OBET) (SAQA 2001:6). This system, together with the imperative need to transform the South African education landscape, provides the motivation for generating qualifications, and informs assessment guidelines, policies, procedures and practices (SAQA 2001:8).

Malan (2000:24) summarises the key characteristic features of OBET as follows:

- OBET is needs-driven, meaning that the acquisition of knowledge, skills and attitude is relevant to the world of work, society and the world at large. Programmes are thus designed to equip graduates and learners for lifelong learning.
- OBET uses a design-down approach, that is, the end purpose of learning (need and purpose of qualification) provides the desired outcomes, for which relevant content is selected as a means to achieve these outcomes and the goals of lifelong learning.
- OBET is outcomes-driven, so the process seeks to align training needs, curriculum design, learning outcomes, assessment criteria and assessment processes to achieve the desired purpose of the qualification. The focus of outcomes incorporates a framework for the holistic development of the learner and achievement of learning outcomes or a qualification provides a foundation for further learning.
- OBET specifies levels of outcomes, which are framed in the context of learning taxonomies that reflect levels of complexity in the cognitive, affective and psychomotor domains. Outcomes are articulated according to accepted guidelines, to achieve clarity of their meaning.
- OBET is learning-centred and subscribes to a student-centred learning approach. Lecturers move from being the centre of information to facilitating learning opportunities. Diversity of learning styles is accommodated in facilitation and assessment of learning.

2.4.1.1 *Outcomes in outcomes-based education and training*

In the OBET system outcomes are central to assessment (SAQA 2001:6), therefore a brief discussion of the different types of outcomes in OBET is warranted. Outcomes as defined in the OBET system refer to, "the contextually demonstrated end-products of the learning process" (SAQA 2001:70). This has been expanded by SAQA (2013:4) to,

Include knowledge, skills and values [and] could be generic in that they apply across many fields of learning (generic outcomes include aspects such as "ability to problem-solve" or "understanding the world as a set of inter-related systems").

At the broadest level, a generic set of outcomes, referred to as "critical cross-field outcomes", informs the types of competencies that would be expected of any learner in any field of study (SAQA 2001:23-24; Du Plessis 2005:28).

SAQA (2001:23) translates this to the purpose of assessment in the OBET system as being,

not only focused on what learners can do, but intends to develop learners holistically … learners are also required to demonstrate certain life-skills, which will not only enhance their learning, but will also ensure that these skills are transferable to their private lives.

"Exit level outcomes" are specific to qualifications and "refer to the outcomes which define the level of performance according to which a candidate completing the qualification is assessed" (SAQA 2013:4). These outcomes must "capture the planned combination of learning outcomes" (SAQA 2000:43). Subservient yet reflective of the exit-level outcomes, "specific outcomes" are the specified learning outcomes, which "together reflect and capture the purpose of the unit standard [or learning unit within a qualification] in ways that are measurable and verifiable … [and] focus on competence outcomes" (SAQA 2000:38-39).

2.4.1.2 *Assessment criteria in outcomes-based education and training*

SAQA (2001:16; 2005:i) defines assessment as, "A structured process for gathering evidence and making judgments about an individual's performance in relation to registered national standards and qualifications." Assessment criteria are defined by SAQA (2001:21) as,

Statements that describe the standard to which learners must perform the actions, roles, knowledge, understanding, skills, values and attitudes stated in the outcomes. They are a clear and transparent expression of requirements against which successful (or unsuccessful) performance is assessed. … [and are] the standards used to guide learning and assess learner achievement and/or to evaluate and certify competence (SAQA 2013:4).

A shift in focus can be observed, from standards as applying primarily to assessment, to standards being applicable to both learning and assessment. The principle, then, is that assessment is inseparable from learning and thus integral to the learning process (SAQA 2005:7). This integration of assessment into the learning process is encapsulated in the CHE programme accreditation criteria, which state that,

Assessment is an integral part of the teaching and learning process and is systematically and purposefully used to generate data for grading, ranking, selecting and predicting, and for providing timely feedback to inform teaching and learning and to improve the curriculum (CHE 2004:19; HPCSA: PBEC 2011:12).

According to SAQA (2001:21) assessment criteria should address the following aspects of assessment.

- What is being assessed, such as “knowledge, understanding, action(s), roles, skills, values and attitudes” (SAQA 2001:21);
- The standard or quality that needs to be demonstrated for each outcome;
- The level of complexity that needs to be achieved or demonstrated; and
- The conditions and context in which achievement of these outcomes must be shown.

Assessment criteria are therefore performance measures against which assessors can make judgements about learner competence and determine whether sufficient evidence has been provided by learners for such judgements (SAQA 2001:21). Through explicit communication of such criteria learners know what is expected of them and assessors know what to expect of learners (SAQA 2001:22). This expectation then guides the learning process (SAQA 2005:7).

This contributes to credibility of assessment through “the explicit and transparent specification of competence, outcomes and assessment criteria … to ensure [fairness,] validity and practicability of assessment” and where “The nature of assessment methods and instruments should match the assessment criteria specified” (SAQA 2001:23).

2.4.1.3 *Competence in outcomes-based education and training*

Competence is defined as “the application of knowledge, skills and values … in a specific context to a defined standard of performance” (SAQA 2000:16). This definition is refined in the context of OBET to mean “applied competence”, which is defined as “a learner’s ability to integrate concepts, ideas and actions in authentic, real-life contexts” (SAQA 2005:3), and also as “a combination of practical competence, foundational competence and reflexive competence” (SAQA 2001:11). Practical competence is defined as, “The demonstrated ability to perform a set of tasks and actions in authentic contexts (situations)” (SAQA 2001:11); foundational competence is defined as, “The demonstrated understanding of what we are doing and why we are doing it” (SAQA 2001:11), and reflexive competence is expressed as, “The demonstrated ability to integrate our performances with our understanding so that we are able to adapt to changed circumstances and explain the reason behind these adaptations.” (SAQA 2001:11).

2.4.1.4 *Assessment types in outcomes-based education and training*

Assessment types in OBET are described as formative assessment and summative assessment (SAQA 2001:26). Formative assessment is defined as, “Assessment that takes place during the process of teaching and learning and which has as its purpose the progressive development of learners’ abilities” (SAQA 2005:i). The intention of assessment is developmental, the goal of assessment is to determine progress in learning, inform facilitation practices and provide feedback to learners to improve learning strategies (SAQA 2001:26; SAQA 2005:9). Formative assessment may be used for grading but is not its purpose.

Summative assessment is defined as, “An assessment undertaken to make a judgment about achievement. This is carried out at the end of a learning programme” (SAQA 2005:i). The intention of this assessment is to make final judgements about achievement of learning outcomes at the end of a defined learning period; assessment is used to grade student performance for the purpose of gaining credits or achieving a qualification (SAQA 2001:26).

Both formative and summative assessment can be conducted on a continuous basis and at any point within the learning process. Both types of assessment permit the use of a wide spectrum of assessment instruments and methods, provided that the instruments and methods adhere to the principles of assessment (cf. Section 2.2.3.2; SAQA 2001:26-27).

2.4.1.5 *Integrated assessment in outcomes-based education and training*

Integrated assessment is one of the NQF principles informing assessment policy and procedures (SAQA 2001:10-11; CHE 2004:20). It is an inclusion criterion for the registration of a qualification with SAQA (2013:7-8) and is defined as, “A form of assessment which permits the learner to demonstrate applied competence and which uses a range of formative and summative assessment methods” (SAQA 2001:11; CHE 2004:35; SAQA 2005:i). The idea is therefore that integrated assessment is not a single event nor is it limited to summative assessment (SAQA 2005:1). Characteristics of integrated assessment include:

- The assessment of more than one outcome and assessment criteria is possible and encouraged;

- Critical cross-field, exit-level and specific outcomes are assessed;
- The assessment is designed to gauge the assimilation of theory and practice, knowledge and skills;
- The assessment collects evidence of performance in authentic environments; and
- Multiple sources of evidence are usually required to provide sufficiency of evidence (SAQA 2001:55, 57; SAQA 2005:8).

SAQA (2005:7, 14) argues that integrated assessment is not practicable or possible without integrated learning and that "teaching, learning and assessment activities" must clearly articulate and inform with one another (cf. Section 3.3.1.2). The HEQC (CHE 2004:20) incorporates integrated assessment as part of the programme accreditation criteria in which evidence of,

A range of appropriate assessment tasks is effective in measuring student attainment of the intended learning outcomes. There is at least one integrated assessment procedure for each qualification which is a valid test of the key purposes of the programme.

2.4.2 Principles and evidence of assessment in outcomes-based education and training

Since the end-point of assessment is the achievement of credits and qualifications leading to "personal, social and economic progression and mobility in society" (SAQA 2001:16), quality assessment is described in terms of the credibility, authenticity, sufficiency and currency of the results of assessment and the accumulation of evidence proving achievement.

2.4.2.1 *Credibility of assessment*

Credibility of assessment is described in terms of the degree to which the assessment process subscribes to the principles of fairness, validity, reliability, practicability and authenticity (SAQA 2001:19).

Fairness of assessment

SAQA (2001:16-17) explains fairness as the implementation of an accountable and transparent assessment process involving equality of resources and opportunities. The following aspects are applied to the concept of fairness:

- Content and approach to assessment is made explicit to learners;
- Methods and styles of facilitation and learning enable knowledge acquisition, deep understanding and skill development appropriate to qualification outcomes, and adequately prepare learners for assessment;
- The assessment is linked to criterion referencing (performance against set criteria to achieve a standard) rather than comparison with other learners (norm-referencing) (SAQA 2001:25);
- Learning styles, home language, values, life experience, gender, age, ethnicity, disability and social class are factored into the assessment approach and the design of assessment instruments and methods, to eliminate bias; and
- Procedures for appeal and reassessments are available to all learners.

Validity of assessment

SAQA (2005:15) states that validity "is concerned with the appropriateness, usefulness and meaningfulness of inferences made from the assessment results". As such assessments should measure what they are actually supposed to measure. This requires that the approach to assessment, and the assessment instruments, methods and materials elicit and capture the criteria being assessed. The methods of assessment must provide the right kind of evidence and sufficient evidence to prove achievement (or non-achievement) of the outcome. Outcomes and assessment criteria must be clearly defined to ensure validity of assessment (SAQA 2001:17-18). In order to achieve validity, SAQA (2005:15) suggests "setting authentic or applied tasks in the learning programme that closely simulate real world contexts."

Reliability of assessment

SAQA (2001:18) describes reliability in assessment as "consistency … [that] refers to the same judgements being made in the same, or similar contexts each time a particular assessment for specified stated intentions is administered." Both SAQA (2001:18) and the

CHE (2004:20) provide guidelines for assessment practices that reinforce reliability. These include:

- Appropriate level of knowledge, experience and training of assessors;
- Interpretation and application of outcomes and standards;
- Adherence to assessment criteria;
- Gathering sufficient evidence to make meaningful judgements about learner achievement;
- Mitigating the effect of assumptions, biases and fatigue on assessors' judgements;
- Ensuring accountability through collaboration, use of multiple assessors and moderation;
- Ensuring conditions, procedures, instruments and methods for the same assessment are similar; and
- Recording assessment processes and results accurately.

Practicability of assessment

Practicability refers to the degree to which establishing and maintaining assessment processes and practices is sustainable within a context, given the following enabling and disabling factors:

- Financial resources;
- Facilities;
- Equipment; and
- Time.

As an example, SAQA (2001:19) warns that, "Assessments that require elaborate arrangements for equipment and facilities, as well as being costly, will make the assessment system fail" (sic).

2.4.2.2 *Authenticity of assessment*

In this context, authenticity refers to evidence that the work being assessed originated from the learner being assessed. Appropriate measures need to be in place when assessing indirect work (where a learner is not being observed or questioned), such as assignments and group work (SAQA 2001:27).

2.4.2.3 *Sufficiency of assessment*

This refers to the requirement for the right quantity and quality of evidence from which judgements can be made regarding applied competence and achievement of intended outcomes (SAQA 2001:37).

2.4.2.4 *Currency of assessment*

SAQA (2001:37) defines currency of assessment as the "applicability of skills, knowledge and understanding in the present circumstances", which reflects relevancy in any given discipline or field.

2.4.3 Integrated assessment in emergency-care-education programmes in South Africa: assimilating the concepts of "assessment criteria", "integrated assessment", and "authentic situations"

Examples of inclusion of integrated assessment in emergency care education programmes are as follows:

- N.Dip:EMC (SAQA 2012c:online): A list of assessment instruments for formative and summative assessment is offered under the heading of integrated assessment. For formative assessment the list includes, "tutorials; clinical practice feedback; peer group evaluations; presentations and seminars; clinical evaluations; self-assessment through portfolios and reflective journals". For summative assessment the list includes, "Tests and examinations using multiple evaluation strategies; viva voce; projects and assignments; fieldwork reports (experiential learning); simulations; case studies; Objective skills (sic) Competence Evaluation clinical evaluations" (OSCEs);

- The qualification description of the BD:EMC states that,
  Integrated assessment strategies across related modules and critical cross-field outcomes are applied … [and] takes (sic) the form of a variety of appropriate assessment methods, which include: written and oral examinations, problem solving assignments, projects presentations, case studies, portfolios, log books, clinical reports and objectively structured clinical examinations, reflective practice journals and simulated medical and rescue scenarios (SAQA 2012b:5 of 9).

- The short-course accreditation document and the portfolio guidelines for the ECP and ECT qualifications (Form 169A and Form 332 respectively) state that, "There is at least one integrated assessment procedure for each qualification which is a valid test of the key purposes of the course [programme]." (HPCSA: PBEC 2011:13; HPCSA: PBEC 2013:20).

Wiggins (1989:703, 706) contends that a "true test" reproduces the challenges and performance standards of already qualified persons working in the real-world setting. In the emergency-medical-care context, a "true test" would comprise the same or similar conditions of stress, complexity of cases, scenarios and environmental conditions, and distractions that ALS paramedics face on a daily basis, and the expectation of the same standard of care as measured against the rules, norms and science underpinning emergency-care practice (cf. Section 2.5; Section 3.4-3.5). Wiggins (1989:704) states that, "an authentic test not only reveals student achievement to the examiner, but also reveals to the test-taker the actual challenges and standards of the field." Intrinsic to this purpose is recognising that "the test is central to instruction", which emphasises effective preparation of learners to achieve a standard of practice in an authentic setting (Wiggins 1989:704).

The components of assessment criteria presented by SAQA (2001:21) also mention these characteristics of the "true test" by demanding clarity in relation to "the standard and quality … the level of complexity … the conditions and in which context this … [knowledge, understanding, action(s), roles, skills, values and attitudes] … must be shown". Assessment criteria point to integrated assessment as a means of satisfying these criteria by placing assessment in the authentic situation (cf. Section 2.3.2.1). Assessment criteria also inform the scope and design of the integrated clinical simulation as an assessment instrument.

2.5 ADVANCED LIFE SUPPORT PARAMEDIC PRACTICE IN SOUTH AFRICA: THE CONDITIONS AND CONTEXT OF ASSESSMENT CRITERIA

By integrating critical cross-field outcomes, exit-level outcomes and specified outcomes for emergency-care-education programmes in South Africa, the qualified ALS paramedic will possess the competencies, capabilities and qualities required of an entry-level practitioner (cf. Section 2.4.1.1). In order to understand the "conditions and ... context" elements of assessment criteria (cf. Section 2.4.1.2), the setting of emergency-care provision in South Africa will be discussed below.

2.5.1 The social, economic and political context of healthcare in South Africa

South Africa has a population of approximately 54 million (Tables 2.2 and 2.3; Statistics SA 2014:3). In the context of a new dispensation of democracy and in an attempt to recover from an oppressive apartheid system South Africa's revolutionary constitution and bill of rights ensures equality for all, access to healthcare and the right to emergency care (RSA 1996:Chapter 2, Section 27).

TABLE 2.2: MID-YEAR 2014 POPULATION ESTIMATE FOR SOUTH AFRICA BY GENDER AND POPULATION GROUP

Population group	Male		Female		Total	
	Number	% of male population	Number	% of female population	Number	% of total population
African	21 168 700	80,3	22 165 000	80,2	43 333 700	80,2
Coloured	2 305 800	8,7	2 465 700	8,9	4 771 500	8,8
Indian/Asian	677 000	2,6	664 900	2,4	1 341 900	2,5
White	2 214 400	8,4	2 340 400	8,5	4 554 800	8,4
Total	**26 366 000**	**100,0**	**27 635 900**	**100,0**	**54 002 000**	**100,0**

(Reproduced from Statistics SA 2014:7)

TABLE 2.3: MID-YEAR 2014 POPULATION ESTIMATES BY PROVINCE

Province	Population estimate	% of total population
Eastern Cape	6 786 900	12,6
Free State	2 786 800	5,2
Gauteng	12 914 800	23,9
KwaZulu-Natal	10 694 400	19,8
Limpopo	5 630 500	10,4
Mpumalanga	4 229 300	7,8
Northern Cape	1 166 700	2,2
North West	3 676 300	6,8
Western Cape	6 116 300	11,3
Total	**54 002 000**	**100**

(Reproduced from Statistics SA 2014:3)

The healthcare system and its regulation is spelled out in the National Health Act, No. 61 of 2003 (RSA 2003), which expresses the commitment of the new democracy to progressively operationalise the ideals of the constitution through healthcare delivery to the nation. The principle of justice refers to equitable distribution of resources, and stewardship to the way those resources are managed in order to realise these ideals. Healthcare resources, a limited and vulnerable resource, are encapsulated in public and private healthcare services and systems.

The National Health Act (RSA 2003) recognises the “the socio-economic injustices, imbalances and inequities of health services of the past” and declares that the state must institute “reasonable legislative and other measures within its available resources to achieve the progressive realisation of the right of the people of South Africa to have access to health care services”.

According to its economic structure and gross domestic product per capita South Africa is classified as an upper-middle-income country (Van der Berg 2010:3). However, a disparity becomes clear when social indicators are used as evaluators, such as education quality, life expectancy and infant mortality – these indicators place South Africa closer to lower-middle-income or low-income countries (Van der Berg 2010:3). This disparity between economic and social indicators suggests an unequal distribution of resources and prospects, where a minority of high-income earners escalates average incomes, with minimal influence on average social indicators.

The healthcare system comprises the public (or government) and private sectors. Statistics SA (2013:7) categorise the various healthcare providers as public hospitals and public clinics; private hospitals, private clinics and private doctors; pharmacies, work-based facilities, and alternative and traditional healers (including homeopaths and spiritual healers).

After 21 years under this new dispensation there are still significant discrepancies between the expressed ideals of this democracy and the manifestation of these ideals in South African society. The inequality in healthcare resource distribution is gross, and visible in the distribution of use of healthcare facilities and providers in South Africa.

Access to private healthcare is determined primarily by the ability to pay for such services. Private healthcare in South Africa accounts for approximately 50% of healthcare resources, yet services only approximately 20% of the population. According to Statistics SA (2013:7) public-sector facilities (hospitals and clinics) are primarily used by black Africans (88%) and coloureds (63%), and by only 10.5% of whites. Conversely, 88% of white people and 64% of Indian/Asian people use private providers. Only 17% of the black population uses private providers (Statistics SA 2013:7).

Problems in the public health sector include massive debt and non-payment of suppliers and staff, inadequate staffing and lack of staff and supplies at district hospitals (Bateman 2010:414-416; Harrison 2009:28-29). Examples in the context in which the researcher finds himself are as follows:

- Deficiencies plaguing district hospitals are reported to be occurring in large urban tertiary hospitals in the Free Sate; and
- The loss of specialised staff has an impact on specialist medical care and education of healthcare professionals at university level (Bateman 2010:416; eNCA 2015:online; Daily Maverick 2015:online).

The crisis in resource availability in the Free State is summarised by a claim that, “medical staff are forced to make the best use of the medication and consumables available, which is often inappropriate and against their better judgement and ethical values”, and concern for healthcare delivery by the statement that, “Many hospitals teeter on the brink of collapse, barely managing on minimal doctors and nursing staff. This is the position that the majority of Free State hospitals are in” (Daily Maverick 2015:online). In response to these claims, the Free State Department of Health referred to the long-term challenges it faces, and efforts by the Department to address health-related issues (Daily Maverick 2015:online).

Conditions in healthcare facilities have an impact on education, because students are placed in these facilities for work-based learning and experience. The challenging circumstances faced by facilities result in loss of placement opportunities (through closure of sections/departments or reduced numbers of students who can be accommodated) or poor learning opportunities (insufficient staff, poor morale and compromises regarding patient care due to inadequate equipment). Furthermore, these dire conditions create complex ethical dilemmas. The current situation and conditions of healthcare delivery are important situational considerations for learning and have bearing on the scope and design of clinical simulation and the “authentic situation” (cf. Section 2.3.3.1).

2.5.2 Emergency-medical-service context in South Africa

The majority of emergency-medical-care personnel (88%) who are registered with the PBEC only possess a qualification gained after four weeks of training at the basic-life-support level (Table 2.4). The ALS paramedic population in South Africa accounts for only 1.9% of the total number of registered EMS personnel (Table 2.4). The number of personnel on the register does not reflect whether personnel are employed or in which sector they are working (public or private) or whether they occupy clinical, management or education positions (Govender 2010:53).

TABLE 2.4: SUMMARY OF EMERGENCY-MEDICAL-CARE QUALIFICATIONS AND PBEC REGISTRATION NUMBERS PER CATEGORY (Data retrieved from HPCSA 2015:online)

Level of Care	Course Duration	Qualification Name	HPCSA PBEC Register	*Number Registered (%)
Basic Life Support (BLS)	4 weeks	Basic Ambulance Assistant	Basic Ambulance Assistant	130 547 (88,4%)
Intermediate Life Support (ILS)	4 months	Ambulance Emergency Assistant	Ambulance Emergency Assistant	142 63 (9.7%)
	8 months	Operational Emergency Care Provider – South African Military Health Services qualification		
Advanced Life Support (ALS)	2 years	Emergency Care Technician	Emergency Care Technician	914 (0.6%)
	9-12 months	Critical Care Assistant	Paramedics	1 605 (1.1%)
	3 years	N.Dip:EMC		
	1 or 2 years post N.Dip:EMC	B.Tech:EMC	Emergency Care Practitioner	356 (0.2%)
	4 years	BD:EMC		
			TOTAL:	147 685 (100%)

Tables 2.5–2.7 present the demographic profile of the ECT, paramedic and ECP cohort of ALS paramedics in South Africa. By way of explanation; the “none” category under ethnicity means there was insufficient information available to allocate a person to an ethnic category (Daffue 2015:personal communication). The gender distribution and ethnic grouping amongst the ALS paramedic categories extracted from Table 2.5-2.7 are presented in Tables 2.8 and 2.9 respectively.

TABLE 2.5: ECT DEMOGRAPHIC PROFILE (Daffue 2015:HPCSA IT Department; Statistics & Data Analysis)

Emergency Care Technician (ECT)

		Age Categories							
Gender	**Ethnicity**	**20-29 yr**	**30-39 yr**	**40-49 yr**	**50-59 yr**	**60-69 yr**	**70-79 yr**	**(No DOB)**	**Total**
Female	African	97	104	33	2				**236**
	Coloured	22	9	2					**33**
	Indian	1		1					**2**
	White	11	5	1	2				**19**
	Female Total	**131**	**118**	**37**	**4**				**290**
Male	African	171	240	64	4				**479**
	Coloured	28	30	21	2				**81**
	Indian	4	5	2	1				**12**
	None		2	1					**3**
	White	20	20	9					**49**
	Male Total	**223**	**297**	**97**	**7**				**624**
	ECT Total	**354**	**415**	**134**	**11**				**914**

TABLE 2.6: PARAMEDICS DEMOGRAPHIC PROFILE (Daffue 2015:HPCSA IT Department; Statistics & Data Analysis)

Paramedics (CCA & N.DIP:EMC)

		Age Categories							
Gender	**Ethnicity**	**20-29 yr**	**30-39 yr**	**40-49 yr**	**50-59 yr**	**60-69 yr**	**70-79 yr**	**(No DOB)**	**Total**
Female	African	45	48	9					**102**
	Coloured	10	16	6					**32**
	Indian	2	5	3	2				**12**
	None	1	4	17	6	1	1	1	**31**
	White	36	75	39	12		2		**164**
	Female Total	**94**	**148**	**74**	**20**	**1**	**3**	**1**	**341**
Male	African	59	139	62	13	3			**276**
	Chinese	1							**1**
	Coloured	19	63	42	10				**134**
	Indian	7	31	64	11	1			**114**
	None		10	132	71	13	1	1	**228**
	White	54	193	222	37	4	1		**511**
	Male Total	**140**	**436**	**522**	**142**	**21**	**2**	**1**	**1 264**
	Paramedics Total	**234**	**584**	**596**	**162**	**22**	**5**	**2**	**1 605**

In terms of age distribution, 60% of the ECT cohort is 30-59 years old, compared to 84% of the paramedic cohort and 71% in the ECP category. In terms of gender, the national gender distribution across the ALS paramedic categories reflects a majority of men (75%) (cf. Table 2.8).

TABLE 2.7: ECP DEMOGRAPHIC PROFILE (Daffue 2015:HPCSA IT Department; Statistics & Data Analysis)

Emergency Care Practitioner (ECP)

		Age Categories							
Gender	**Ethnicity**	**20-29 yr**	**30-39 yr**	**40-49 yr**	**50-59 yr**	**60-69 yr**	**70-79 yr**	**(No DOB)**	**Total**
Female	African	8	13						**21**
	Coloured	5	3						**8**
	Indian	2	2	3					**7**
	White	22	36	6					**64**
	Female Total	**37**	**54**	**9**					**100**
Male	AFRICAN	20	8	7					**35**
	Coloured	7	7	6					**20**
	Indian	2	12	29					**43**
	None	1		1					**2**
	White	34	80	38	3	1			**156**
	Male Total	**64**	**107**	**81**	**3**	**1**			**256**
	ECP Total	**101**	**161**	**90**	**3**	**1**			**356**

The paramedic cohort has the highest proportion of men (79%) and the ECT the lowest (68%). The reasons given by Govender (2010:102) for a much smaller female cohort in the ALS paramedic population is the physically demanding nature of the job, long working hours and personal safety considerations (cf. Section 3.5.1.1).

TABLE 2.8: NATIONAL GENDER DISTRIBUTION OF ADVANCED LIFE SUPPORT PARAMEDICS (Data extracted from Tables 2.5-2.7)

ALS CATEGORY	**NATIONAL (RSA)**	**MALE**	**FEMALE**
Emergency Care Technician	n=914 (27%)	624 (68%)	290 (32%)
Paramedic (CCA & N.Dip:EMC)	n=1605 (63%)	1264 (79%)	341 (21%)
Emergency Care Practitioner (B.Tech:EMC & BHS:EMC)	n=356 (10%)	256 (72%)	100 (28%)
Total registered ALS Paramedic	N=2875 (100%)	2144 (75%)	731 (25%)

The distribution of ALS paramedics amongst the nine provinces of South Africa is summarised in Table 2.10. The category of "foreign" in Table 2.10 refers to practitioners who have postal addresses outside South Africa.

TABLE 2.9: NATIONAL ETHNIC DISTRIBUTION OF ADVANCED LIFE SUPPORT PARAMEDICS (Data extracted from Tables 2.5-2.7)

	ALS CATEGORY							
ETHIC GROUP	**ECT**	**%**	**PARAMEDIC**	**%**	**ECP**	**%**	**TOTAL**	**%**
BLACK	715	78.2	378	23.6	56	15.7	1 149	40.0
COLOURED	114	12.5	166	10.3	28	7.9	308	10.7
INDIAN	14	1.5	126	7.9	50	14.0	190	6.6
WHITE	68	7.4	675	42.1	220	61.8	963	33.5
NONE	3	0.3	259	16.1	2	0.6	264	9.2
ASIAN	0	0.0	1	0.1	0	0.0	1	0.0
TOTAL	914	100	1 605	100	356	100	2 875	100

What is evident is that Gauteng (32.2%), KwaZulu-Natal (17.5%) and the Western Cape (24%) contain the majority (73.7%) of the ALS paramedic population; in total the paramedics in these three provinces serve 55% of the national population. When considering only the paramedic and ECP categories, then this proportion of ALS distribution to these three provinces is higher (82.3%). Christopher (2007:21 of 219) states that "EMS's (sic) in the Gauteng, Western Cape and KwaZulu-Natal provinces are generally better funded and well resourced" than the other six provinces. MacFarlane, Van Loggerenberg and Kloeck (2005:146) present similarly disproportionate emergency-medical-service resources in their comparison of the province of Gauteng with the Eastern Cape.

Meaningful for perspectives relevant to the context of ALS paramedic practice, information on private versus public service distribution of ALS paramedics and the rural versus urban distribution could not be located by the researcher. The researcher has noted, through informal interaction with Central University of Technology (CUT) graduates, a high turnover of ALS paramedics in rural areas of the Free State, and a typical concentration (saturation) of ALS paramedics in urban centres. Work-related reasons stated by graduates for leaving rural areas include long working hours, long response and transport distances, poor managerial support and insufficient equipment.

TABLE 2.10: DISTRIBUTION OF ADVANCED LIFE SUPPORT PARAMEDICS AMONGST THE PROVINCES OF SOUTH AFRICA (Daffue 2015:HPCSA IT Department, Statistics & Data Analysis)

Province	ALS Register Category	Number recorded per category	% of ALS category	Ave % of ALS for RSA	Population estimate	% of total population
Eastern Cape	ECT	21	2.3	3.7	6 786 900	12,6
	Paramedic	86	5.4			
	ECP	12	3.4			
Free State	ECT	84	9.2	6.1	2 786 800	5,2
	Paramedic	72	4.5			
	ECP	16	4.5			
Gauteng	ECT	279	30.5	32.2	12 914 800	23,9
	Paramedic	495	30.8			
	ECP	125	35.1			
KwaZulu-Natal	ECT	49	5.4	17.5	10 694 400	19,8
	Paramedic	333	20.7			
	ECP	94	26.4			
Limpopo	ECT	48	5.3	3.0	5 630 500	10,4
	Paramedic	44	2.7			
	ECP	4	1.1			
Mpumalanga	ECT	34	3.7	2.5	4 229 300	7,8
	Paramedic	51	3.2			
	ECP	2	0.6			
Northern Cape	ECT	36	3.9	1.8	1 166 700	2,2
	Paramedic	18	1.1			
	ECP	1	0.3			
North West	ECT	182	19.9	8.0	3 676 300	6,8
	Paramedic	54	3.4			
	ECP	3	0.8			
Western Cape	ECT	181	19.8	24.0	6 116 300	11,3
	Paramedic	405	25.2			
	ECP	96	27.0			
FOREIGN	ECT	0	0.0	1.3	NA	
	Paramedic	47	2.9			
	ECP	3	0.8			
Total	ECT	**914**	**100**	**100**	**54 002 000**	**100**
	Paramedic	**1605**	**100**			
	ECP	**356**	**100**			

The National Development Plan 2030 (RSA NDP n.d:332) highlights the discrepancies between healthcare resources and spending in South Africa and subsequent need to address these discrepancies urgently. Expenditure on emergency health services for 2012/2013 came to 4.14% of total health expenditure for South Africa (Day & Gray 2014:301).

The relative shortage of ALS paramedics and varying levels of qualification of other emergency-care personnel establish a unique on-scene dynamic of inter-professional relationships. Added to this dynamic is the presence of and interaction with other emergency-service agencies, such as fire departments, traffic services and the South African Police Services (SAPS). The importance of teamwork and good communication is recognised as essential for error reduction in the emergency-care setting (Zimmer, Wassmer, Latasch, Oberndörfer, Wilken, Ackermann & Breitkreutz 2010:884). Consultation and accountability in clinical care is also essential and underpins the patient's right to "a second opinion" (HPCSA 2008b:3). The dynamics of on-scene interactions are thus an important consideration when developing an authentic assessment using integrated clinical simulation. These interactions also inform the "social primary frames" and contribute to stressors in the emergency care context (cf. Sections 3.2.1.3 & 3.5.3.3)

Resource limitations also provide a set of challenges for the ALS paramedic. Limitation of assistance with patient care, delays in transportation and long transport times to medical facilities add a dynamic to patient care that demands improvisation in practice (Naudé & Rothmann 2003:93). This contributes to conditions, context and complexity elements of assessment criteria relevant to the authentic situation (cf. Section 2.4.1.2).

2.5.3 Regulatory context of Advanced Life Support paramedic practice in South Africa

The emergency-medical-care profession in South Africa is regulated by the PBEC (cf. Section 2.3.1). ALS paramedic practice is "protocol bound", where the scope of practice is defined by a specific set and range of clinical procedures that can be performed under specified conditions, and is set out as "provider guidelines" or "protocols" by the PBEC (HPCSA: PBEC 2006; 2009b-c; Christopher 2007:24 of 219). The skill set is different for the three ALS paramedic categories (cf. Section 2.5.2: Table 2.4) and the protocols reflect capabilities and drugs that each group can use.

The intended purpose of guidelines and protocols is to ensure a uniform standard of care and patient safety (Christopher 2007:29 of 219). The dissonance between what constitutes protocol versus a guideline is debated in the context of the scope of practice for each ALS category (Christopher 2007:70 of 219). A protocol refers to a fixed rule, such as a drug dose, from which there are no grounds for deviation, and a guideline provides a framework for decision-making based on sound clinical judgement in specific clinical settings (Christopher 2007:29 of 219). In the context of PBEC documents there is a lack of explanation of terms and an inadequate framework for interpretation in practice.

This is seen by Christopher (2007:70, 101 of 219) to contribute to increased risk of non-compliance through deviation from protocol, and/or abdication of clinical judgement through strict adherence to protocol.

While the majority of EMS systems in first-world countries have a strong system of medical direction, this is not the case in South Africa (MacFarlane *et al.* 2005:146). From 1992 ALS paramedics have been required to register with the HPCSA to practice. As of 1999, ALS paramedics (excluding ECTs) are no longer required to contact a medical officer (medical doctor) for permission to administer certain drugs and perform certain procedures, but can now make these decisions independently (Christopher 2007:106 of 219). The ECT, however, requires a degree of medical direction (consultation and permission) to administer certain drugs and perform certain procedures (HPCSA: PBEC 2009c). Some emergency services have maintained a level of medical direction and have a system of clinical governance (patient treatment review and feedback), but this not a legal requirement

ALS paramedics register as “independent practitioners”, which affords a high level of autonomy and responsibility unknown to many of their counterparts around the world. The meaning of independent is captured by Christopher (2007:35 of 219), who suggests that,

A competent independent practitioner would not only be one that is legally qualified to perform acts within a specific ranges of skill (sic), knowledge and ability but, would assume responsibility for one’s own skills, knowledge and ability.

The PBEC provider guidelines and protocols present an important framework for education and training in emergency-care-education programmes, and for assessment in particular. The principle of independent practice suggests a level of applied competence that encompasses effective clinical reasoning and sound clinical judgement in the out-of-hospital context and an essential focus for curriculum design, learning facilitation and assessment (cf. Section 2.3.2.1). Christopher (2007:135) emphasises the role of the PBEC to,

Ensure that the learning outcomes and curriculum approved by the PBECP provides the ALS practitioner with the knowledge, attitudes and behavioural attributes that support the ALS practitioner's status as an independent practitioner.

On qualifying, there is no required internship programme; the qualified ALS paramedic immediately assumes full clinical responsibility as an "independent practitioner". This is supported by the following statement contained in a draft document (out for comment) on minimum skills required for demonstration in the course of the BD:EMC programme:

Assessment of clinical competence prior to graduation becomes very important in the context of the South African Emergency Care profession as there is currently no post-graduation internship. This means that, unlike medical school graduates, EMC students do not have the opportunity to "find their feet" during mentored post-qualification internship. For this reason Universities and academic managers are responsible to ensure that the students they graduate from their EMC programmes are clinically competent and ready for independent practice on the day of graduation (HPCSA 2015:1 of 7)*.*

An investigation of protocol non-compliance in ALS paramedic practice in the Western Cape was conducted by Christopher (2007) (Figure 2.6). Non-compliance, or acting outside the scope of practice, is represented as illegal, perceived as dangerous, posing an increased risk of harm to patients and is subject to disciplinary action by the PBEC (Christopher 2007:70 of 219). Christopher (2007:109 of 219) expresses concern that the process of educating and training paramedic students may be encouraging "an attitude and image … within the profession that rewards speed of action, bravado and quick autocratic decision making", by placing emphasis in patient care simulations on "memory recall of the PBECP guidelines and protocols and [enforcement of] unrealistic time restrictions."

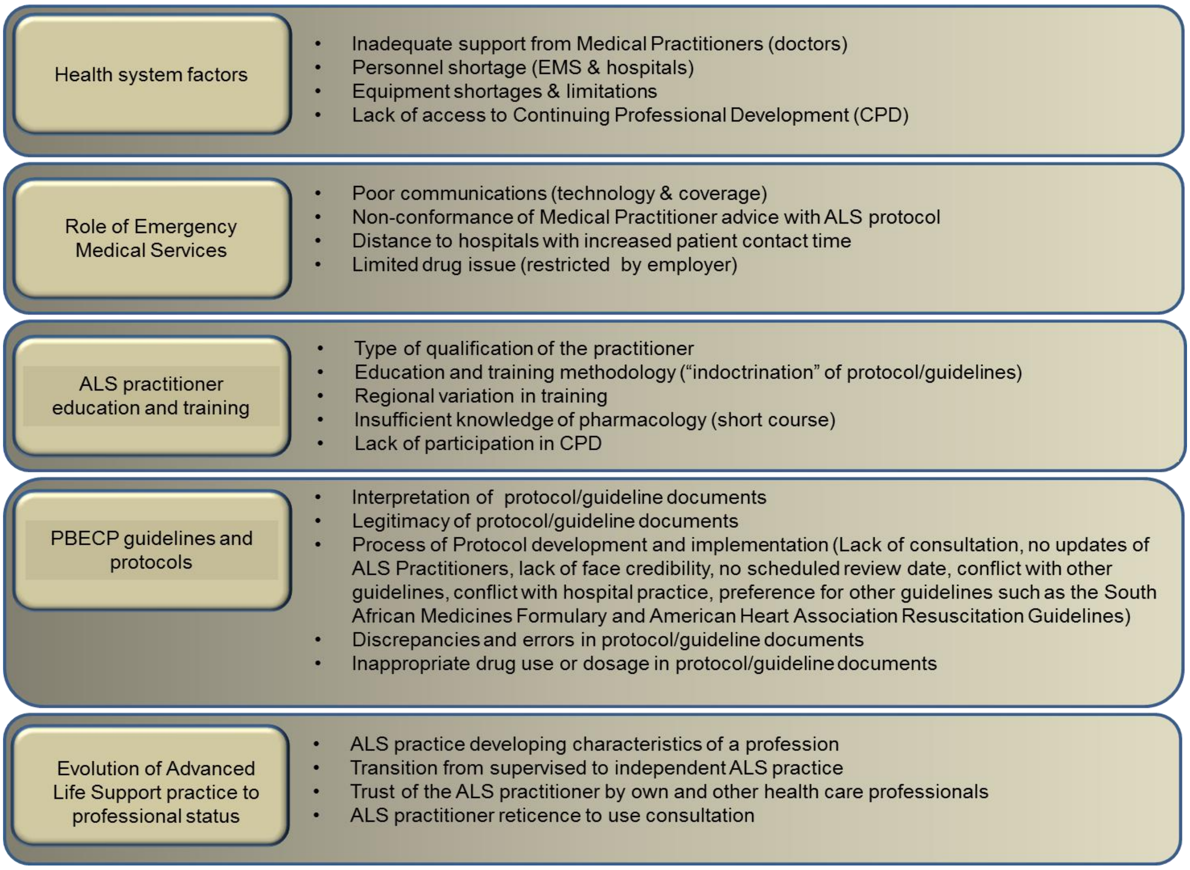

FIGURE 2.2: REASONS FOR PROTOCOL NON-COMPLIANCE BY ADVANCED LIFE SUPPORT PARAMEDICS (adapted from Christopher 2007:55-110 of 219).

New challenges influencing simulation design come into play when exploring the use of simulation to assess protocol compliance. The complex nature of the health-systems context, the job requirements of the ALS paramedic, higher levels of education, the emergence of the ALS paramedic as a professional, and the global evolution of evidence-based guidelines relevant to emergency medical care creates the need to reframe the concepts protocol and guidelines for the South African ALS paramedics. The historical paternalistic and autocratic approach to regulation of the profession by the PBEC needs to transform to a collaborative, responsive and transformative regulation process.

2.5.4 A snapshot of working conditions of the Advanced Life Support paramedic in South Africa

ALS paramedics in South Africa face many challenges that add to the already stressful nature of the job. These challenges incorporate aspects such as limited or deficient on-scene resources, working alone on a response unit, long waiting times for ambulances, long response and transport distances in rural areas, poorly maintained equipment and vehicles, and insufficient medical supplies (MacFarlane *et al.* 2005:147; Motumi 2015:online). Added to these challenges are racial tension, language barriers and threats to personal safety in the form of assault, rape and hijacking (Naudé & Rothmann 2003:93; Govender 2012:63; Hirsch 2015:online; Krige & Tsotetsi 2014:online; SA Gov 2015:online; SAPA 2012:online; Molosankwe 2014:online).

Reasons for low morale amongst paramedics in the KwaZulu-Natal government sector emergency medical services are cited by Naidoo (2015:online) to include,

Outstanding income [from overtime] … poor rate of pay, poor hygiene standards, lack of basic and essential tools of their trade, defective vehicles, paying for their own Public Driving Permits and paying for their annual membership with Health Practitioners Council of South Africa.

Further reasons, and cited by Govender (2012:61) as proof of a need for more ALS paramedics in South Africa, are the "high rate of trauma, increased burden of poverty and communicable diseases, maldistribution of health care institutions and emergency facilities, and long pre-hospital times.*"*

Govender (2012:60) cites poor working conditions, personal safety and remuneration as key drivers for ALS paramedics seeking work outside South Africa. Planning policies for EMS acknowledge the shortage of ALS paramedics and the need for wellness support for personnel in the "emotionally and physically challenging environment of EMS" (WCDoH 2014:122).

2.6 CONCLUSION

In this chapter, an analysis of documents informing the regulatory framework and guidelines for assessment relevant to emergency-care-education programmes in South Africa was presented. The educational methodology under which assessment practice is subsumed was presented. Perspectives from documents and literature on the context and working conditions of ALS paramedic practice in South Africa and that underpins assessment criteria were discussed. The position and conceptual representation of clinical simulation as an integrated assessment instrument for emergency-care-education programmes in South Africa was explained.

In Chapter 3, entitled **Conceptualising assessment criteria and case types when using integrated clinical simulation for summative assessment**, literature will be reviewed to obtain broader perspectives on the use of integrated clinical simulation as an assessment instrument, and associated assessment criteria will be explored. In order to achieve this, a conceptual understanding of healthcare simulation will be deliberated and the scope of the competencies healthcare simulation can develop and assess will be summarised. An in-depth discussion of the competence framework relevant to ALS paramedic practice will be provided with regard to assessment criteria. A brief overview of scope of life-threatening emergencies will be presented as a framework for case types and classification.

CHAPTER 3: CONCEPTUALISING ASSESSMENT CRITERIA AND CASE TYPES WHEN USING INTEGRATED CLINICAL SIMULATION FOR SUMMATIVE ASSESSMENT

3.1 INTRODUCTION

In Chapter 2, an analysis of documents informing the regulatory framework and guidelines for assessment relevant to emergency-medical-care programmes was deliberated. The educational methodology under which assessment practice in South Africa is subsumed was presented. Perspectives from documents and literature on the context and conditions of ALS paramedic practice in South Africa that underpin assessment criteria were discussed. The position of clinical simulation as an integrated assessment instrument in emergency-medical-care-education programmes was explained.

In this chapter, a review of the literature is explored to obtain broader perspectives on the use of clinical simulation as an integrated assessment instrument. In order to achieve this perspective, a conceptual understanding of healthcare simulation will be deliberated. An in-depth discussion of the elements of assessment criteria relevant to ALS paramedic practice will be provided. Factors relevant to case types and classification will be considered in the framework of ALS paramedic practice and assessment criteria.

3.2 CHAPTER OVERVIEW

The overview of Chapter 3 is achieved by means of Figure 3.1. In Figure 3.1, the acronym “ALS” refers to Advanced Life Support.

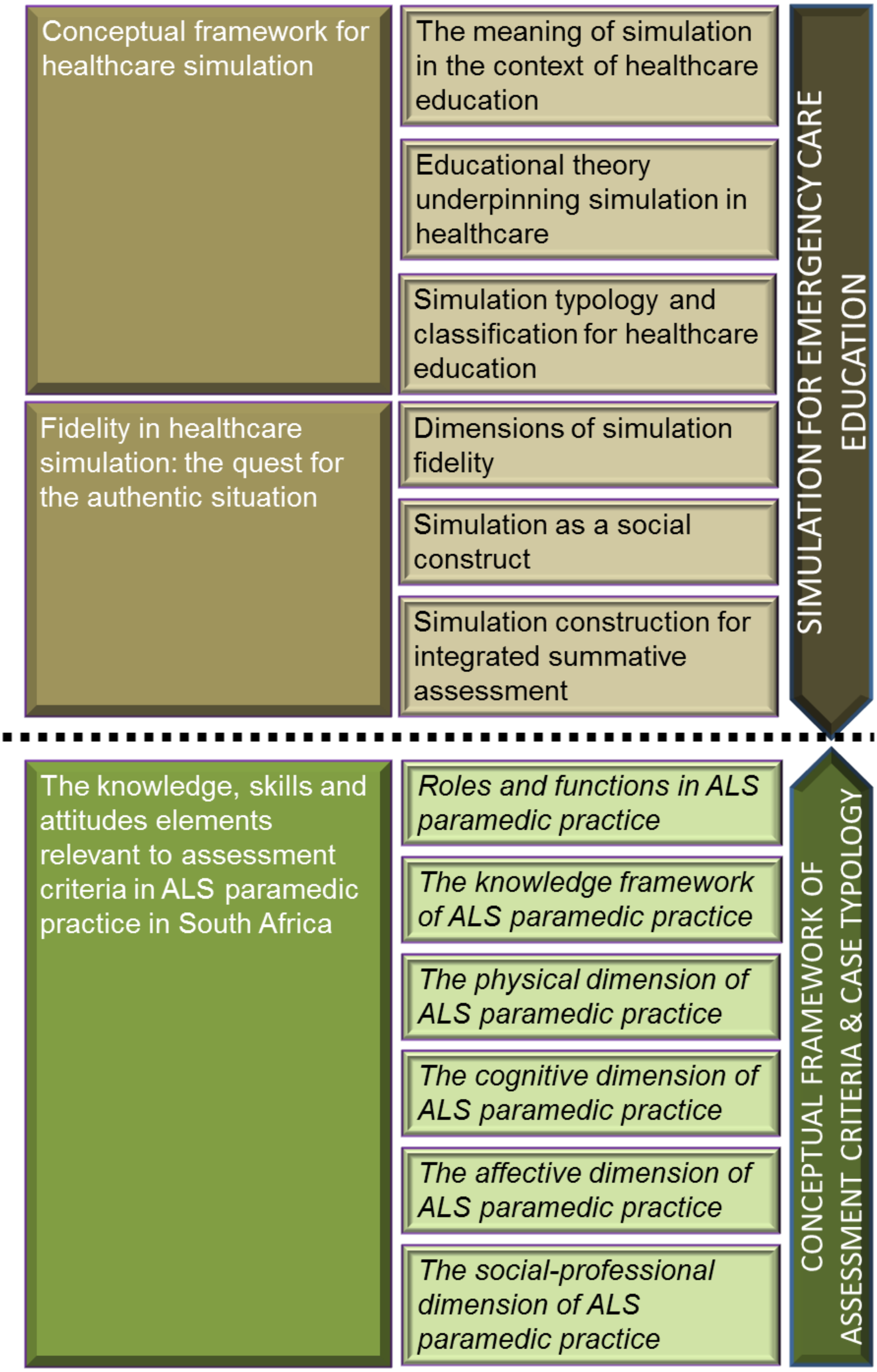

FIGURE 3.1: SCHEMATIC OVERVIEW OF CHAPTER 3

(compiled by the researcher, Campbell 2015)

3.3 SIMULATION PROPERTIES: FIT FOR PURPOSE

3.3.1 Conceptual framework for healthcare simulation

Terminology used to describe and explain facets of simulation in the literature was found to be confusing and inconsistent. A need to provide standardised definitions of terms linked to best practices in healthcare simulation has been identified (INASCL 2011:S3). The reasons for standardising definitions include provision of "guidance and clear communication and ... [to reflect] shared values in simulation experiences, research, and publications" (INASCL 2011:S3).

Although the term simulation is presented as an assessment instrument by both SAQA and the HPCSA: PBEC (cf. Section 2.3.3), what is meant by this term is not clearly defined. Alinier (2007:e243) identifies the absence of a clear definition for simulation as problematic when simulation is implemented in health education. The use of simulation is determined by the perceptions and understanding of educators and this leads to diverse and varied application of simulation in health education (Alinier 2007:e244). A clear definition of simulation in the context of health education is thus required to interpret the term's meaning and relevance in the context of this study.

3.3.1.1 *The meaning of simulation in the context of healthcare education*

Simulation is defined broadly as the "imitation of the operation of a real-world process or system over time" (Banks & Georgia 1999:online). Gorman, Meier and Krummel (1999:online) suggest that simulation is considered "as a case study, with the participants 'on the inside'". Simulation is also defined as, "the technique of imitating the behaviour of some situation or process (whether economic, military, mechanical, etc.) by means of a suitably analogous situation or apparatus, especially for the purpose of study or personnel training" (OED:online; Bradley 2006:254).

Kneebone (2003:276) defines medical simulation as "the creation of artificial alternatives to clinical practice by the use of inanimate physical models, computers or both". Beaubien and Baker (2004:i52) state, "a simulation (or a simulator) is a device that attempts to recreate characteristics of the real world". They conclude multi-dimensional forms of reality as central to the definition of simulation.

Gaba (2007:126) defines simulation as, “a technique, not a technology, to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion”. In the clinical setting, Alinier (2007:e248) describes simulation as, “a practical experience that produces a convincing re-creation of a real-life event or set of conditions.” Rosen, McBride and Drake (2009:842) define medical simulation as the “imitation of human processes and interactions by a model system”, which “may include any or all aspects of a theatrical production such as scripts, roles, actors, props, cameras, video, computers, and improvisation.”

In order for a medical simulation to occur, an appropriate model or simulator is required. A simulator is defined as a model that encapsulates the key characteristics or behaviours of a selected process or system found in the real world (Banks & Georgia 1999:online). In the context of health education, Gaba (2007:126) describes a medical simulator as, “a device that presents a simulated patient (or part of a patient) and interacts appropriately with the actions taken by the simulation participant”, and Alinier (2007:e244) refers to it as “patient-like interactive robots” and “simulation tools”. From the various definitions of simulations presented above the following key features of clinical simulation relevant to the study can be identified:

- A model or simulator that accurately represents anatomical and/or physiological characteristics of real patients with interactive features (in part or as a whole);
- A process or event that imitates the real-world context in which interaction with patients would occur in relation to patient responses and environmental conditions (process, context and time);
- It is not the real thing, but strives to achieve real-world replication to elicit experiences that have meaning in the real world (artificial yet immersive); and
- Requires realistic, convincing engagement of learners in the simulation event, where learners obtain clinical experiences and demonstrate performance relevant and transferable to real-world clinical context (learning, experience and application).

3.3.1.2 *Educational theory underpinning simulation in healthcare*

A discussion of educational theory is necessary to establish the integral relationship between learning and assessment. Modern educational theory embraces learner-centeredness as its core tenet. Education is a learning-focused enterprise, where approaches that focus on the needs of the learner are highly valued and endorsed.

Kolb (1984:38), speaking from an experiential learning theory (ELT) paradigm, defines learning as, “the process whereby knowledge is created through the transformation of experience”. Propositions of ELT as summarised by Kolb and Kolb (2005:194) include the following:

- Learning is a process, not a set of outcomes. Students need feedback on their progress in order to reconstruct meaning from their experiences. This feedback is in itself a form of assessment;
- Relearning or recreation of knowledge is central to learning, where ideas are analysed, tested, integrated with new ideas and refined;
- Differences, disagreement and conflict drives the learning process and therefore conflict resolution is a necessary component of learning;
- Learning requires an all-inclusive adaptation to the world, encompassing cognitive, behavioural and emotional aspects of life;
- Learning involves collaborative engagement of the person with his/her environment. A tension in the adaptation process is created through the assimilation of new experiences into existing beliefs and visa versa; and
- Learning in the ELT paradigm supports the constructivist theory of learning, whereby “social knowledge is created and recreated in the personal knowledge of the learner.” (Kolb & Kolb 2005:194).

The constructivist theory of education explains how students develop knowledge, skills and attitudes through a process of discovery by engaging in active learning opportunities (Hodge, Baxter Magolda & Haynes 2009:18). The meaning of knowledge evolves through the iterative process of engagement and the student develops an internalised construct of reality. Education is therefore a catalyst in the conceptual evolution of meaning, where the learner is the person constructing meaning, and is not simply a conduit of information from the teacher as the source (Joseph & Juwah 2012:52; Biggs 1996:348).

Kolb and Kolb (2005:194) summarise two modes of experiential learning. The first mode describes how experience is comprehended within the continuum between the two dialectic poles of concrete experience and abstract conceptualisation. The second mode informs how experience is transformed within this continuum between the two dialectic poles of reflective observation and active experimentation. Experiential learning is thus a process of constructing knowledge through creative tension among the four learning modes, which are sensitive to circumstantial requirements. These modes incorporate experience, reflection, thought and action. This recurrent cycle of learning is presented in Figure 3.2.

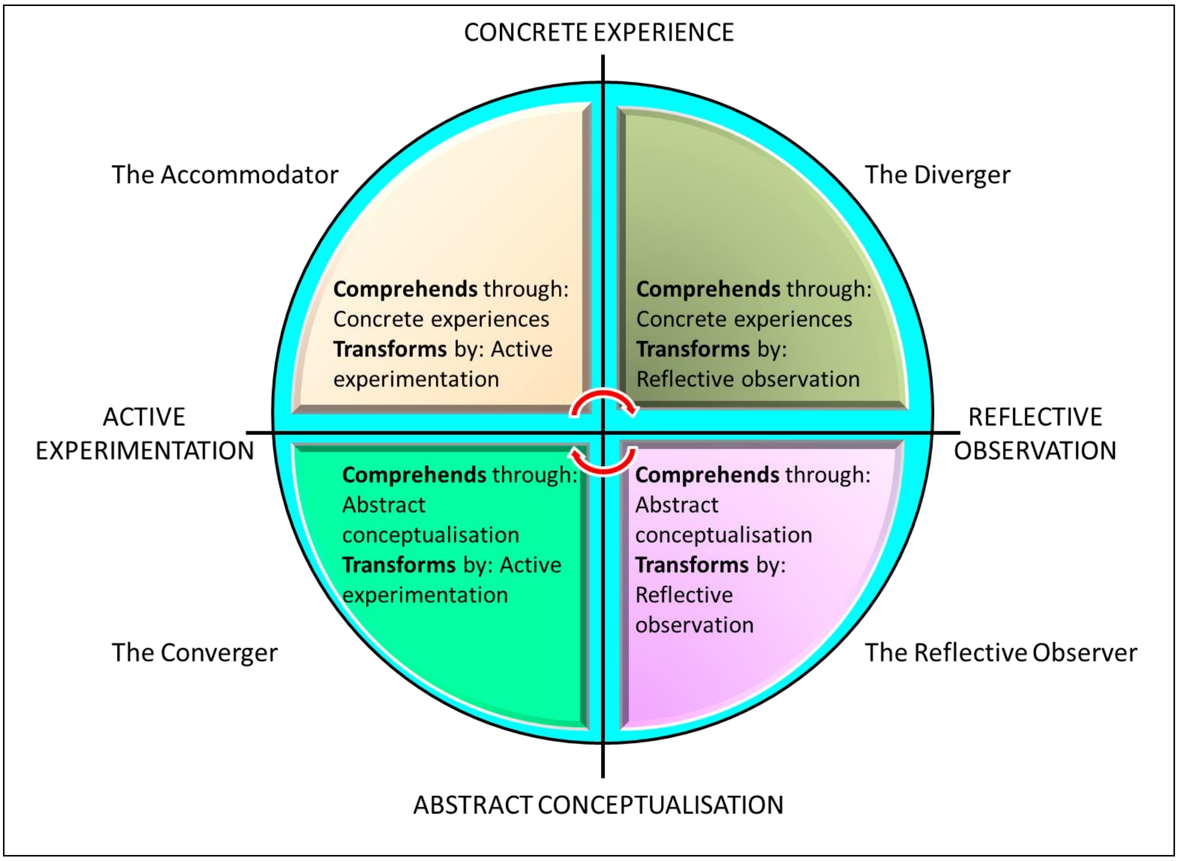

FIGURE 3.2: KOLB'S CYCLE OF MODES OF EXPERIENTIAL LEARNING (adapted from Kolb & Kolb 2005)

Hodge *et al.* (2009:18) suggest that, as the structures for determining meaning become more complex, transformational learning is required. Learning structures start as externally imposed and transform through the process of "self-authorship", which "enables learners to evaluate information critically, form their own judgements and collaborate with others to act wisely" (Hodge *et al.* 2009:18). Self-authorship necessitates a shift from reliance on external authority to the formation of internal authority. The researcher in the current study suggests that this supports the premise and requirements for independent practice (cf. Section 2.5.3), assertiveness and the acceptance of responsibility required by the ALS paramedic in practice, elements of which need to be demonstrated in the integrated clinical simulation assessment.

Constructive alignment in education emerges from the constructivist paradigm and informs the process of aligning the facets of the education process, in order to engage meaningful learning. These facets include the curriculum, instructional methods, assessment procedures and the institutional climate (Biggs 1996:360-361; Joseph & Juwah 2012:53). INASCL (2011:S6) captures the education paradigm in their definition of simulation, stated as, “A pedagogy using one or more typologies to promote, improve and/or validate a participant’s progression from novice to expert.”

Learning involves the cognitive, psychomotor and affective domains of human engagement. A number of taxonomies have been generated to categorise and explain levels of complexity within these domains. Bloom’s taxonomy provides a six-level framework of complexity and the SOLO (Structure of the Observed Learning Outcome) provides a five-stage description of progression, from simple to complex levels of learning (Figure 3.3) (Chan 2010:online).

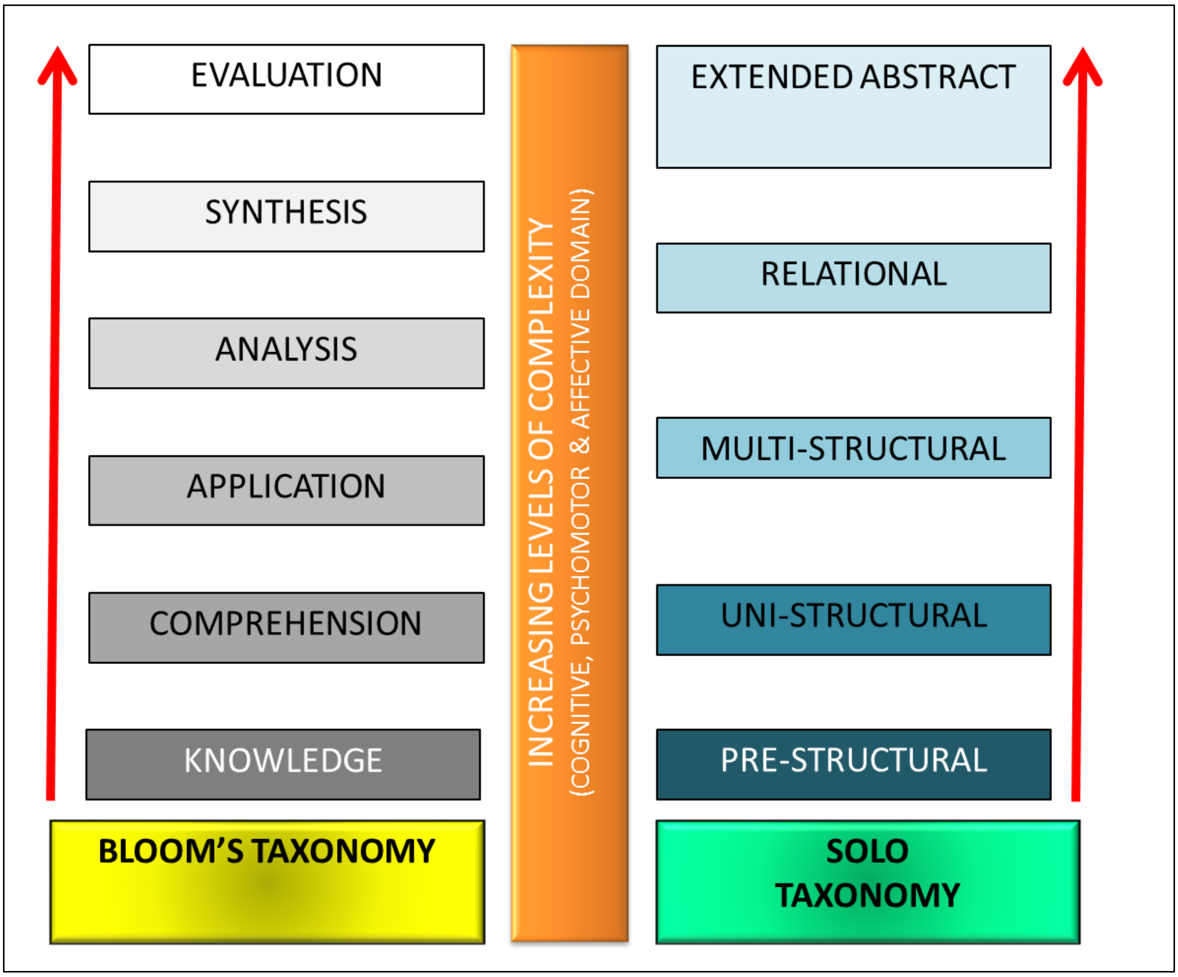

FIGURE 3.3: BLOOM’S TAXONOMY AND THE SOLO TAXONOMY (adapted from Chan 2010:online)

Miller (1990:S63) proposes a hierarchy of development by which clinical competence is achieved along the continuum from theory to application in practice (Figure 3.4).
Because assessment drives the curriculum, Miller proposes that medical educators "seek both instructional methods and evaluation procedures that fall in the upper reaches of this triangle" (1990:S63).

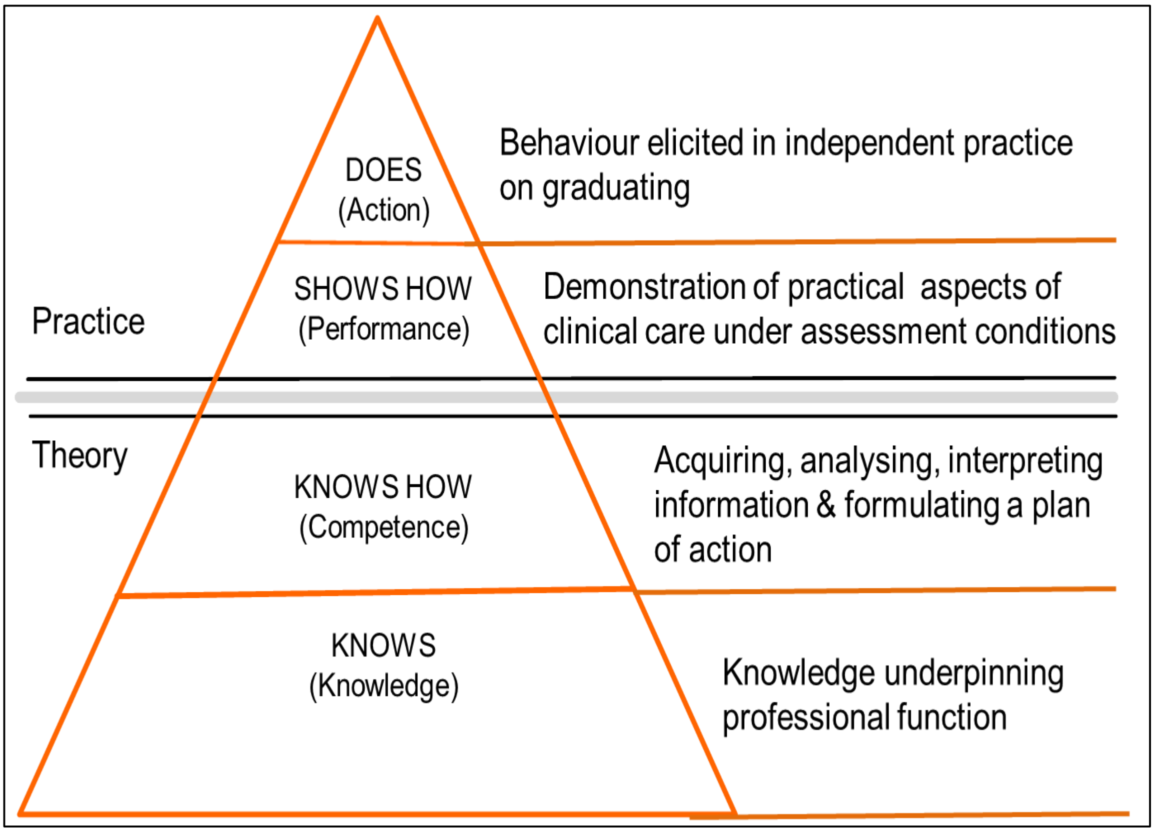

FIGURE 3.4: MILLER'S FRAMEWORK FOR CLINICAL ASSESSMENT (adapted from Miller 1990:S63)

Dreyfus (1981:14-24) postulates a five-stage description of skill acquisition applied to business management (Figure 3.5). Dreyfus (1981:24) argues that this skill-acquisition process occurs as a consequence of the "successive transformation of four mental capacities", each of which has a basic and complex form. The four mental capacities are non-situated or situated recognition of elements, ability to identify significance and priority, analytical or holistic thinking and, last, rational or intuitive thinking. The application of the Dreyfus model to skill acquisition in the ALS paramedic is postulated by the researcher in the current study in Figure 3.5.

		Skill acquisition in ALS paramedic practice
EXPERT	Extensive collection of experience Appropriate responses are intuitive Subconscious synthesis of elements from prior experience New perspectives present opportunity for future change	Extensive and relevant experience in ALS practice Nuances in patient care identified and intuitive decisions made to accommodate this Broader more complex issues relevant to patient care entertained (EMS systems, healthcare delivery)
PROFICIENT	Extensive experience in area Principles or maxims develop based on effectiveness of previous plans and perspectives Normal patterns and deviations from normal identified Priorities encapsulated for typical events Decision-making more efficient and comfortable Analytical process still conscious and decision-making rational	Patient care seen from holistic perspective Alternative patient care options are considered and evaluated according to risk vs. benefit Practitioner displays confidence in decision-making More comfortable with novel situations Aware of analytical process and can justify decisions by linking to rules, guidelines and principles of clinical practice
COMPETENT	Tasks are linked to bigger picture and formulated into a plan Tasks prioritised in the context of this bigger picture Perspective emerges from plan and determines future actions	Recognises where skill is applied in the patient care context Skill performed in patient care context using own judgement and meeting the standard of performance required
ADVANCED BEGINNER	Situational attributes of task identified through experience Guidelines for task develop from situational attributes Attributes treated equally Rule subscription internalised and subconscious	Understands safety and efficiency aspects of a procedure relevant to a patient and formulates steps in the procedure relevant to these Follows steps in skill sheet without needing to refer to them Instruction and demonstration no longer necessary Supervision needed to ensure standard of skill is met
NOVICE	No experience base Non-institutional task attributes identified Subscribes to external set of rules for task	Learns and sticks to skill sheet Reliance on clear instruction and demonstration Deliberate practice required under careful supervision

FIGURE 3.5: DREYFUS' FIVE-STAGE DEVELOPMENTAL MODEL OF SKILL ACQUISITION (modified by researcher from Dreyfus 1981:14-24)

The Justice Institute of British Columbia's (JIBC) paramedic curriculum model employs a "simple-to-complex" approach (Dreyfus-based model) to achieving competence by paramedic students (Bowles 2009:2-4 of 8).

This JIBC staged approach is illustrated as the “JIBC practice ladder”, which incorporates simulation as “learning practice activities” (Bowles 2009:3 of 8). The simulation activities used by JIBC reflect a typology of simulation similar to that proposed by Alinier (2007; cf. Section 3.3.1.3). INASCL (2011:S6) incorporates Dreyfus’ model in their definition of skill acquisition, which is stated as, “the ability to integrate the knowledge, skills (technical and nontechnical), and attitudes necessary to provide safe patient care. The individual progresses through five stages of proficiency: novice, advanced beginner, competent, proficient, and expert”.

Learning in the real clinical context provides limited support of the learner-centred approach promoted by the constructivist paradigm. For example, regarding the best-interest principle, the need of the patient in a real clinical context supersedes the needs of the learner. In the context of clinical practice Kneebone (2005:551) concludes that, “learning is an opportunistic process, grafted onto clinical practice.” Referring to the context of real patient encounters, the National Occupation Competency Profile (NOCP) published by the Paramedic Association of Canada (2011:5, 10-11) states that, “Students undergoing learning or assessment in Clinical or Preceptorship Performance Environments require adequate supervision” (Paramedic Association of Canada 2011:16).

Simulation supports the constructivist and experiential learning theory paradigm. Where learning is a by-product of patient care in the clinical context, simulation purposefully places the needs of the student first, by seeking to establish “conditions of best practice for teaching” (Kneebone 2005:551).

Rosen *et al*. (2009:842) suggest that the “main premise for applying simulation to medical education is the recognition that learning is an active process which demands the implementation of student-centred, interactive teaching methods.” Simulation in health education provides the opportunity to create repeatable and “on demand” active engagement experiences, where both commonly occurring and rarely occurring cases with varying facets of complexity can be presented (Maran & Glavin 2003:23; Fraser, Ma, Teteris, Baxter, Wright & McLaughlin 2012:1056). The interactive and immersive qualities of healthcare simulation are what make it a unique instructional method for healthcare education (cf. Section 3.3.1.1). The opportunity now exists for deliberate practice of basic tasks through to complex multi-task situations. The limitations of “see one, do one, teach one” in the clinical setting is transformed by simulation to “see one, simulate many, do one competently, and teach everyone” (Kharasch, Aitchison, Ochoa, Menon, DeGarmo, Donlan, Flaherty & Wang 2011:679-680) and "rehearsal, repetition, and reaction within a master-apprentice atmosphere" (Greenberg, Tokarczyk & Small 2011:715).

Simulation also supports the safety dimension of medical education. Learning in the clinical environment introduces risk of harm to patients and psychological harm to learners (Binstadt *et al.* 2007:495). In support of patient safety, the NOCP states that "skills must be demonstrated on a human subject where legally and ethically acceptable" and be performed under direct supervision of a clinical preceptor (Paramedic Association of Canada 2011:13). Conversely, the NOCP states that, "Supervision [by a clinical preceptor] is not required during assessment by High Fidelity Simulation" when high-fidelity simulation replaces the real-patient context as the performance setting (Paramedic Association of Canada 2011:16).

Simulation provides a safe environment where learners can make mistakes and learn from them without harm to a real patient (Akaike, Fukutomi, Nagamune, Fujimoto, Tsuji, Ishida & Iwata 2012:32). Simulation also enhances learning through "repetition, reinforcement of concepts in the debriefing session, and self-reflection that is critical to improved learning" (Kharasch, Aitchison, Ochoa *et al*. 2011:679-680). Competence with clinical skills requires repeated practice and over-learning, which simulation provides (Kneebone 2003:267).

Binstadt *et al.* (2007:497) present a staged learning model in the context of emergency medicine and applied to clinical simulation training at their healthcare simulation centre. The model presented by Binstadt *et al*. (2007:497) is schematically represented as a pyramid and consists of four domains of learning deemed essential for effective emergency-care delivery. These four domains are, "knowledge, decision-making, skill performance and teamwork" (cf. Section 3.4). The NOCP recognises "the increasing accessibility and efficacy of simulation equipment" and has endorsed the use of high-fidelity simulation as "an acceptable assessment process within the Clinical and Preceptorship Performance Environments." (Paramedic Association of Canada 2011:16; cf. Section 3.3.1.3; 3.3.2.4).

3.3.1.3 *Simulation typology and classification for healthcare education*

Kneebone (2003:269-270), in the context of surgery, provides a simplified classification of simulation that focuses on the model or simulator used. He identifies three types of simulation. The first is "model-based simulation", where isolated body regions are simulated for the purpose of teaching clinical procedures. The second is "computer-based simulation", which consists of computer-based software programs and technology that enable varying degrees of learner interaction. These include 2- and 3-dimensional platforms that elicit a range of visual, tactile and immersion illusions that enhance reality of experience. The final category is “hybrid simulation”, which combines physical models and computer-based programs that permit the use of real medical equipment.

In a sub-classification of simulators, Kneebone (2003:272-273) refers to “integrated procedure simulators” that have the purpose of linking “a number of separate tasks to recreate whole procedures.” His example refers to hybrid simulation applied to “combine high tech manikins with computer programs to produce realistic clinical environments, where teams work within simulated scenarios to practise crisis management and other complex tasks.”

Beaubien and Baker (2004:i53-i54) propose a typology of simulation based on three categories of simulation technology incorporating various dimensions of realism, which are:

Case studies and role play: Case studies are paper-based descriptions of cases that test knowledge application and attitudes of participants. Participants may have the opportunity to project different actions or choices in the context of the case – performance of actions and experiencing consequences of actions are not possible in this context. Role-plays are described as an extension of case studies, where participants can re-enact the event without the use of props, extending opportunities for developing teamwork skills, such as communication.

Part-task trainers: The focus is developing proficiency in specific procedures or components of complex tasks, such as intravenous (IV) cannulation or endotracheal intubation (as part of a more complex task of rapid sequence intubation). Binstadt *et al*. (2007:497) emphasise the focus or purpose for which the simulator is used, rather than the limitation of simulator use. An example of this is using a full-body high-fidelity mannequin as a part-task trainer for procedures such as manual defibrillation or transcutaneous pacing.

Full-mission simulations: These simulations involve complex tasks and interactions, such as a full-scale patient resuscitation that includes the complexities of the environment. The cycle of full-mission simulations include adequate preparation and briefing, immersion in a scenario or event and post-incident debriefing or feedback. Full-mission simulations typically require full-body mannequins with varying representation of anatomical and physiological features from low to high fidelity.

Beaubien and Baker (2004:i53-i54) argue for the relevance of this typology in the progressive development of necessary knowledge, skills and attitudes and their integration in a realistic context to develop a range of teamwork skills necessary to ensure patient safety and for achieving a meaningful standard of medical practice.

Alinier (2007) proposes a six-level system for categorising simulation (Figure 3.6). The scope of each category is related to simulation technology, realism, the mode of interaction, the role of the learner and instructor and the skills that can be learned or assessed. Two modes of simulation use are presented by Alinier (2007:e247). The first mode includes skill or protocol practice and demonstration; the second mode is scenario-based simulation.

The use of simulation technology to achieve progressive development from knowing about (a clinical problem) to taking action (implementing meaningful solutions to addressing clinical problems) requires an educationally focused simulation typology (Alinier 2007:e246). Alinier (2007:e246) combines Miller's pyramid with the levels of simulator complexity in order to clarify the relationship between simulator technology and the transitional development of clinical competence from theory to practice (Figure 3.7) (cf. Section 3.3.1.2).

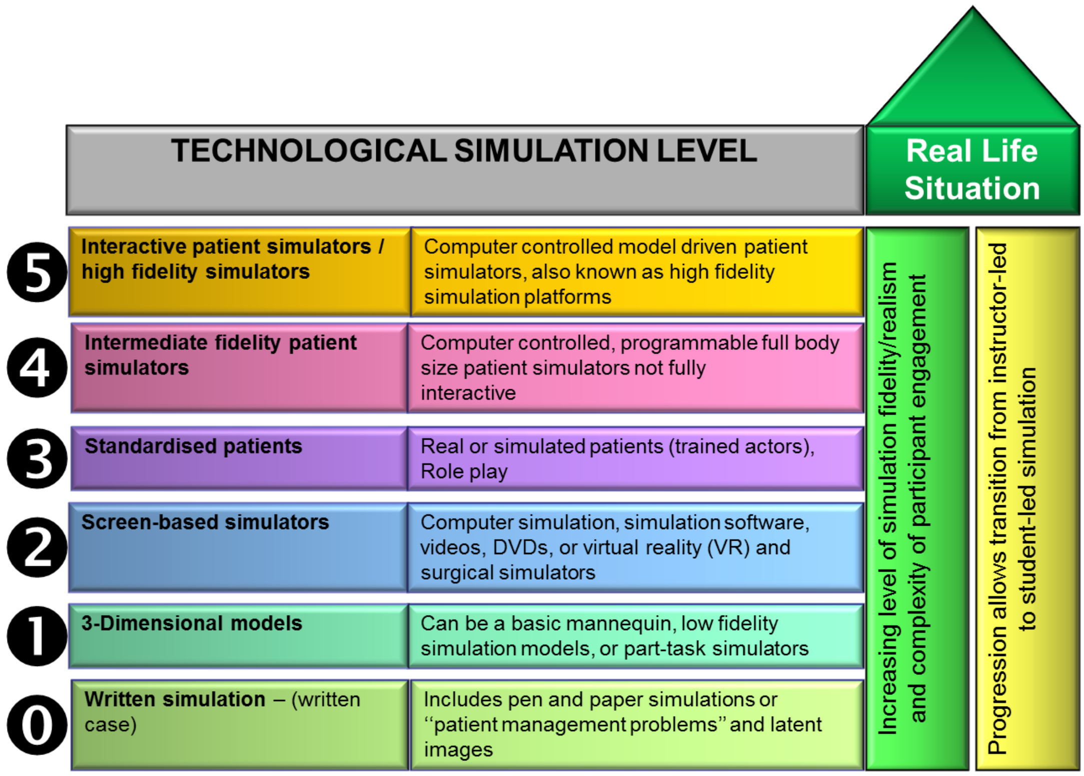

FIGURE 3.6: SIX-LEVEL TYPOLOGY OF SIMULATION

(adapted from Alinier 2007:e245-e247)

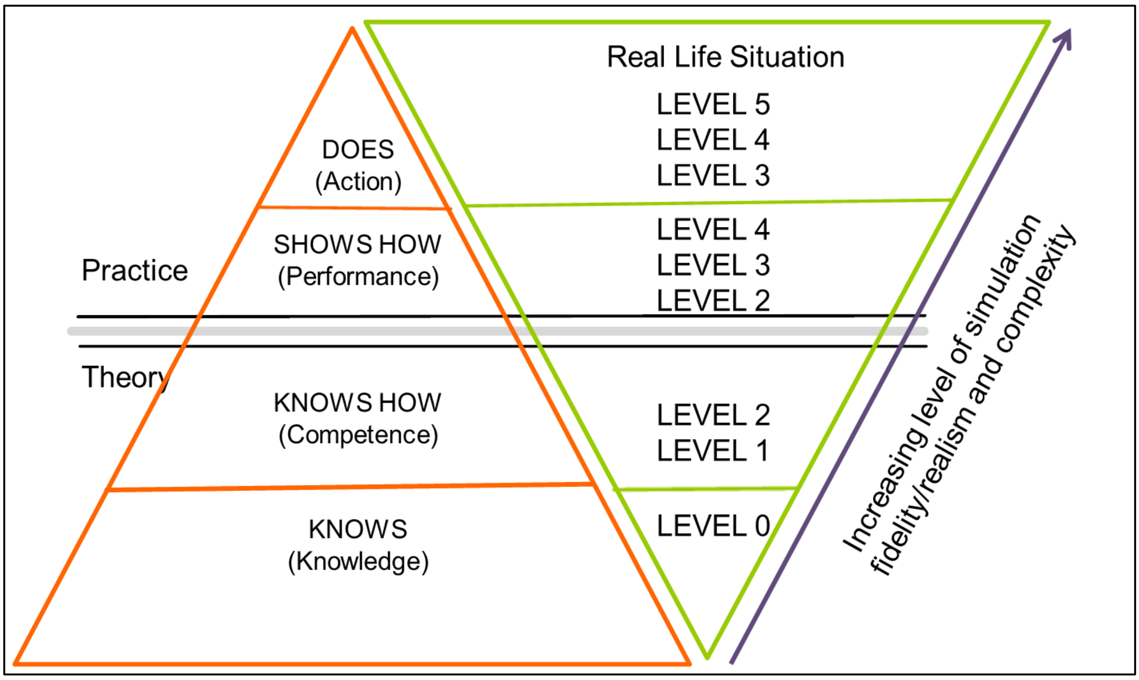

FIGURE 3.7: ALINIER'S SIX-LEVEL SIMULATION TYPOLOGY INTEGRATED INTO MILLER'S FRAMEWORK FOR CLINICAL ASSESSMENT

(adapted from Alinier 2007:e246)

Gaba (2007:127-130) proposes 11 dimensions of simulation as “a comprehensive framework for understanding the diversity of applications of simulation in healthcare” (Figures 3.8a & b). Each dimension highlights a particular attribute of simulation, some of which include progression options. Gaba (2007:126) argues that there is a need for simulation in healthcare to have similar conditions as other complex and high-risk industries, such as nuclear power and aviation, in which simulation is constantly used to establish and maintain safety standards. He argues that, unlike these machine-based industries, the human engagement factor of patient care increases the complexity of healthcare provision (Gaba 2007:130). The framework presented by Gaba is not limited to education but offers a broader scope for the use of simulation across healthcare structures. He argues that the comprehensive integration of simulation can contribute to improving patient safety and transforming patient care (Gaba 2007:126).

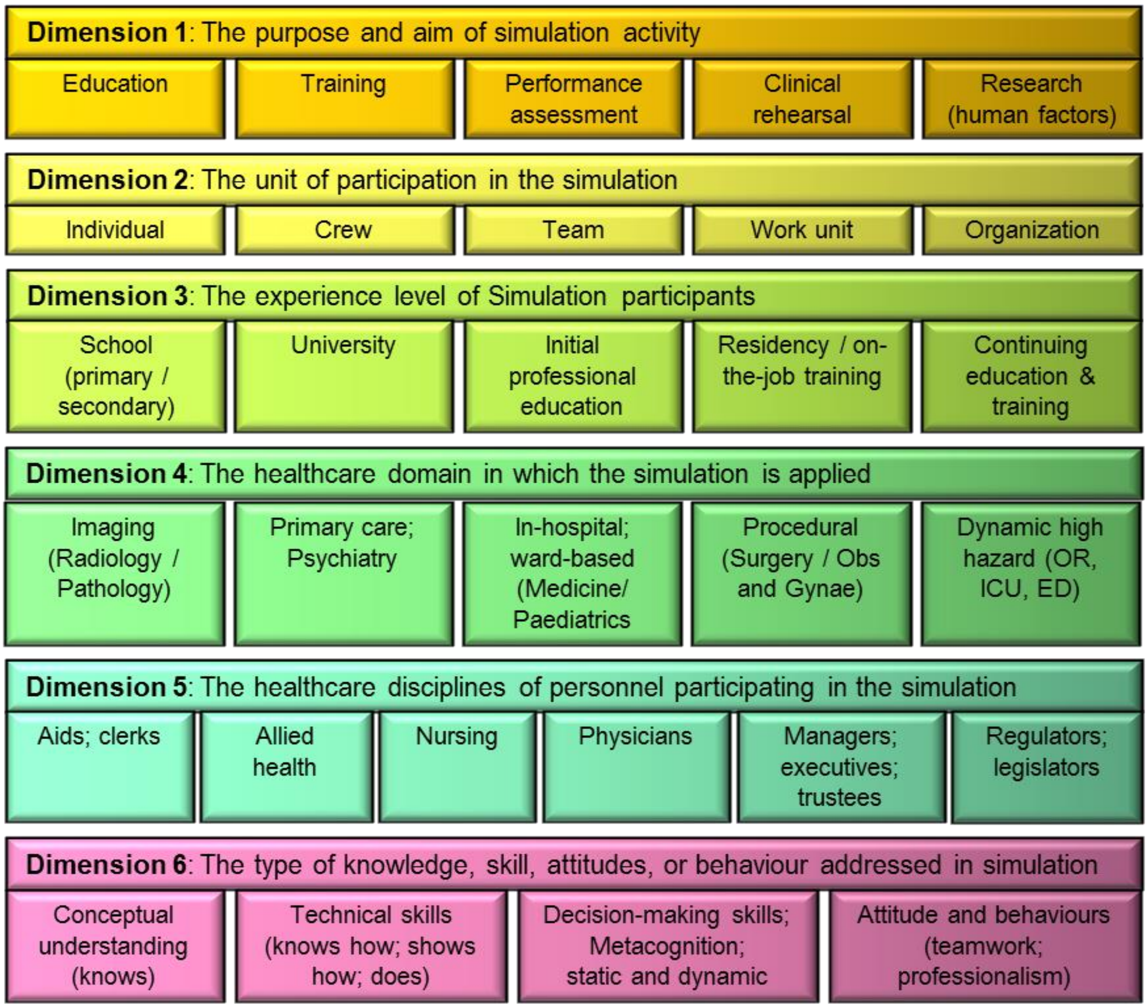

FIGURE 3.8a: **SIMULATION FRAMEWORK: 11 DIMENSIONS OF SIMULATION (adapted from Gaba 2007:127)**

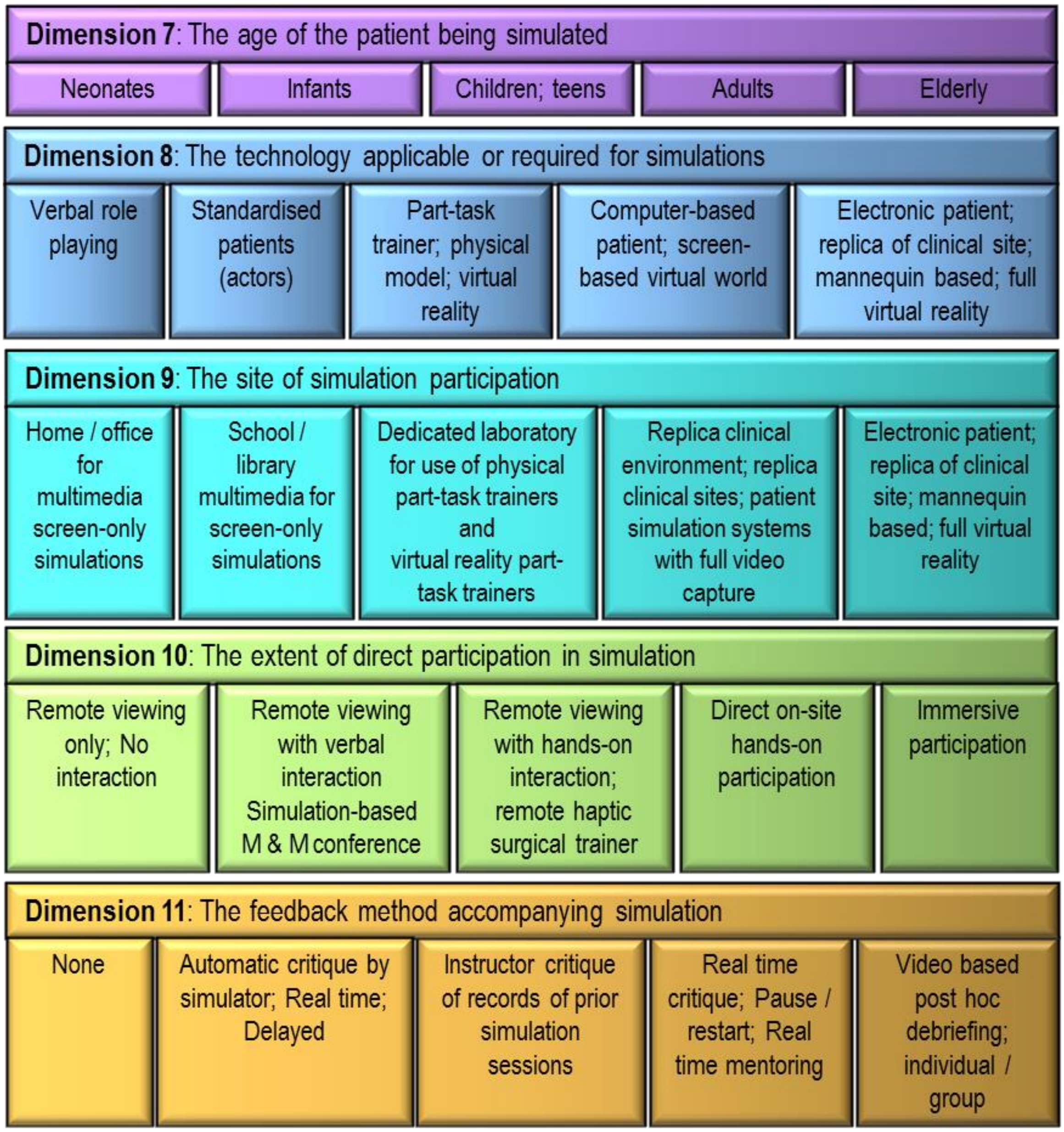

FIGURE 3.8b: **SIMULATION FRAMEWORK: 11 DIMENSIONS OF SIMULATION (adapted from Gaba 2007:127)**

Rosen *et al*. (2009:842) classify simulation into two broad categories, which are discussed in the context of basic sciences education, namely, technical simulation and non-technical simulation. Technical simulation involves various types and sophistication of technology-based simulators. These include anatomical models, part-skill trainers for psychomotor skills, interactive computer-based programs, surgical trainers and full-body mannequins. High-fidelity, computer-driven, full-body mannequins for “human patient simulation” represent the upper spectrum of advanced technological simulation (Rosen *et al*. 2009:843).

The second category of non-technical simulation includes devices not requiring supplementary equipment or personnel to illustrate a range of relevant concepts and which are able to integrate clinical examples with these concepts. They advocate this category of simulation to include:

Problem-based learning (PBL), role play, and case-based multiple choice questions … in its simplest forms [and in] its most advanced form, non-technical simulation employs standardized patients … [who are defined as] lay people who play the role of a patient, family member, healthcare provider or other ancillary personnel for the purpose of medical student education and evaluation (Rosen et al. 2009:842).

It is clear from the discussion of the meaning of simulation (cf. Section 3.3.1.1) and simulation typology in healthcare (cf. Section 3.3.1.3) that all three categories of practical assessment stipulated by the PBEC meet the characteristics and criteria for simulation (cf. Section 2.3.3.2).

3.3.2 Fidelity in healthcare simulation: The quest for the "authentic situation"

Fidelity or realism in simulation is an important consideration for its role in authentic assessment and its validity as an integrated summative assessment instrument (cf. Section 2.3.2). The question is: What turns an artificially constructed event into a realistic clinical experience?

3.3.2.1 *Toward a definition of fidelity: Dimensions of fidelity*

High-risk industries, such as aviation and nuclear power, have long recognised the need to address technical and human-factor issues central to safe practice using simulation (Bradley 2006:254-255). The use of simulation in aviation is expressed as an extremely important resource "due to a variety of factors, including cost and time savings that can be realized, the ability to reproduce and examine situations that would be unsafe using actual equipment, and the control and measurement of human-machine performance" (Rehmann, Mitman & Reynolds 1995:vii).

Simulators in these industries replicate machines and environments in which these machines are used; the machines have been developed to provide training in controlled and secure settings (Bradley 2006:255).

The world of healthcare differs fundamentally from these high-risk industries in that these industries work with machines (aircraft, power plants, etc.). In the healthcare context, the machine is replaced by a patient and a human patient is far more complex than a machine (Gaba 2007:130).

Rehmann *et al.* (1995) discuss the centrality of fidelity in the aviation simulation context with respect to the importance of developing competence that is transferable to real-world contexts. Simulator fidelity is linked directly to achieving the desired purpose of simulation within the confines of technology and cost. Fidelity is understood in terms of the effectiveness of a simulator in achieving the intended outcome (Rehmann *et al.* 1995:vii).

Rehmann *et al.* (1995:viii) propose two dimensions on which simulators compare with real equipment. These dimensions create cues or signals that are either true to reality or false (unrealistic). Dieckmann, Manser, Wehner and Rall (2007:152) refer to these as “reality cues” and “fiction cues” respectively. The two dimensions identified by Rehmann *et al.* (1995:viii) are “equipment cues” and “environment cues”. Equipment cues translated into the healthcare context would be the degree to which the simulator reflects real-patient anatomical and physiological features, including visual, tactile and other sense realities. Environmental cues in the healthcare context include the realism of the environment in which the procedure would be performed (part-task training) or in which the patient is treated (clinical simulation), including visual, tactile and other sense realities that fit the real environment. The right combination of dimensions and the detailed inclusion of cues need to be matched with intended outcomes of the simulation (Rehmann *et al*. 1995:viii, x).

In the context of full-mission simulation, Rehmann *et al.* (1995:viii) identify “scenario fidelity” as central to participants’ perceptions of reality and subsequent match of performance to the real world. Scenario fidelity in a clinical simulation would reflect how realistically the events unfold in terms of time, the illness or injury profile and progression, the patient story and response to interventions. “Perceptual fidelity” is the degree to which participants experience the simulation as real (Rehmann *et al.* 1995:7).

Beaubien and Baker (2004) extend the concepts of fidelity presented by Rehmann *et al.* (1995) to a typology of simulation fidelity relevant to teamwork training in the healthcare context. Three domains of fidelity are identified, namely, equipment fidelity, environmental fidelity and psychological fidelity (Beaubien & Baker 2004:i52). Equipment fidelity refers to “the degree to which the simulator duplicates the appearance and feel of the real system” (p. i52). Environment fidelity is described as “the extent to which the simulator duplicates motion cues, visual cues, and other sensory information from the task environment" (p. i52). Psychological fidelity denotes "the degree to which the trainee perceives the simulation to be a believable surrogate for the trained task … Alternatively, it could be defined as the match between the trainee's performance in the simulator and the real world" (p. i52). Central to the effectiveness of simulation is the design in combining these dimensions of fidelity to achieve the educational goals intended, whether for learning part of a process or assessment of end-point contextual application (Beaubien & Baker 2004:i53).

Dieckmann, Gaba and Rall (2007:184-185) argue that realism can best be understood in terms of how people think about reality. They elucidate simulation fidelity in terms of three modes of thinking about reality, which are, "physical, semantical and phenomenal". The physical mode of thinking is described as, "entities that can be measured in fundamental physical and chemical terms using measurable dimensions (e.g., centimeters, grams, and seconds)." This mode of thinking applies to physical aspects of the simulator and the simulation environment. Simulators can be described in terms of physical dimensions such as mass and shape or features such as pupil size. The simulation environment can be described in terms of physical arrangement of equipment and furniture (props) as well as movement within the simulation environment. Physical fidelity encapsulates the concepts of physical cues and environmental cues presented by Rehmann *et al.* (1995), and incorporate the concepts of equipment and environmental fidelity described by Beaubien and Baker (2004).

The semantical mode of thinking "concerns concepts and their relationships – such as theories, meaning, or information – presented via text, pictures, sounds, or events" (Dieckmann, Gaba *et al.* 2007:184). The facts of any given situation are constructed and have meaning as agreed upon for a given context. In the simulation setting, the manner in which information about the patient or intervention is delivered can be interpreted realistically even if the source of information is not realistic. An example would be using a water-filled syringe as a surrogate for a drug-filled syringe. The participant assumes when the water is injected it is the drug being administered and a drug-related response is anticipated and assessed for.

The phenomenal mode refers to "emotions, beliefs, and self-aware cognitive states of rational thought that people directly experience while in a situation" (Dieckmann, Gaba *et al*. 2007:185).

This phenomenal mode of thinking helps to explain how a participant can simultaneously experience a simulation as both,

a complex real-time situation (e.g. interacting with the simulator mannequin and equipment within the logic of the simulated case), and a real educational event that is set up to physically approximate another real situation (a clinical situation with an actual patient).

Dieckmann, Gaba *et al.* (2007:185) argue that, if simulation participants understand the relationship between the simulation scenario and clinical practice, they are more likely to accept physical, semantical and phenomenal differences between the two. They suggest that psychological fidelity as described by Beaubien and Baker (2004) is understood better in terms of semantical and phenomenal modes of thinking.

Rudolph, Simon and Raemer (2007:162) present a parallel argument in support of Dieckmann, Gaba *et al*. (2007) in order to “propose slightly different terminology and attempt to clarify their argument … to make the framework and nomenclature more accessible.” The “physical mode” of thinking parallels that presented by Dieckmann, Gaba *et al*., whereas the “semantic mode” is replaced by “conceptual mode” and the “phenomenal mode” is replaced by “emotional and experiential” mode of thinking (Rudolph *et al.* 2007:162).

The notion of “conceptual mode” is developed to encompass cause-and-effect relationships (if this, then that), which include processes such as “diagnostic problem solving, decision-making, and prediction” (Rudolph *et al.* 2007:162). The “emotional and experiential” mode of thinking in the simulation setting is expanded to include “holistic experience of the situation, and to actions and relationships of an emotional kind … [which] may relate to trainees’ feelings of higher or lower activation combined with pleasant or unpleasant feelings” (Rudolph *et al.* 2007:162).

Rudolph *et al.* argue that, when simulation design blends these modes of thinking effectively, participants are able to “suspend disbelief”, which enables realistic engagement in the simulation event. The complex dimensions of realism in simulation is summed up in the statement that,

A successful scenario is not based on the realism of the simulation itself, but rather the alchemy of participants stepping into their roles, connecting with others in the scenario, and actively linking to their previous social, clinical, and psychological experience. A well-

designed scenario gradually "draws people in" such that they are increasingly engaged, and no single element of realism violates their expectations in a way that disrupts the engagement (Rudolph et al. 2007:162).

The effectiveness of healthcare simulation involves the contractual agreement between the designers of simulation, the instructor and simulation participants. This contractual arrangement is termed the "fiction contract" (Dieckmann, Gaba *et al.* 2007:189; Rudolph *et al*. 2007:162). The significance of this contract is identified by Dieckmann, Gaba *et al.* (2007:189) in their statement that,

If participants, due to social influences, are not willing to suspend disbelief and do not engage into a 'fiction contract', there is no way that the physical characteristics of the simulator can make them change their minds.

Dahl, Alsos and Svanæs (2010:445) describe fidelity in the context of "its role in controlled usability assessments of mobile information and communication technology (ICT) for hospitals." They suggest further subdivisions of the "psychological fidelity" component to include, "task fidelity" and "functional fidelity". Task fidelity is described as*,*

the degree to which tasks involved in the actual environment for a given domain are replicated in the simulation … and affects the extent to which participants experience the simulation as operationally realistic" (Dahl et al. 2010:454).

Functional fidelity "describes the degree to which the simulation reacts like 'the real thing,' that is, that it provides realistic responses to the tasks and actions executed by the participant." (Dahl *et al.* 2010:455). They suggest that both task fidelity and functional fidelity are vital for the legitimacy of simulation training, the credibility of which forms the central basis for skill transfer to clinical contexts.

Nanji, Baca and Raemer (2013:143) contribute to the debate by defining a fiction contract as "the implicit or explicit agreement between the parties about how the subject is expected to interact with the simulated situation and how the educators will treat that interaction." They argue that, in any given simulation setting, the perception of the participant of simulation fidelity across the three dimensions of reality, together with motivation to engage in simulation, determines the relevance of the experience. This means that two participants could have two different experiences of realism in the same simulation event. They thus reason that, "realism is a property of the individual rather than of the simulation itself". It stands to reason that the decision of the individual to engage determines the subsequent quality of learning gained from the experience. The fiction contract is argued to have a major bearing on this decision.

Paige and Morin (2013:e484-e485) present a visual fidelity matrix reflecting the three commonly expressed dimensions of “physical, psychological, and conceptual dimensions” within a range of applications from low to medium to high fidelity. The physical dimension is subdivided to include equipment and environmental attributes, and the psychological dimension is subdivided to include task and functional attributes. In order to capture the complex nature of fidelity, INASCL (2011:S6), as part of best practice in simulation, defines fidelity as,

Believability, or the degree to which a simulated experience approaches reality; as fidelity increases, realism increases. The level of fidelity is determined by the environment, the tools and resources used, and many factors associated with the participants. Fidelity can involve a variety of dimensions, including (a) physical factors such as environment, equipment, and related tools; (b) psychological factors such as emotions, beliefs, and self-awareness of participants; (c) social factors such as participant and instructor motivation and goals; (d) culture of the group; and (e) degree of openness and trust, as well as participants’ modes of thinking.

Groom, Henderson and Sittner (2014:338-340) conclude, from a “review of the state of the science” that, although fidelity is considered a major construct in simulation scenario design, there is little empirical evidence that demonstrates improved learning or retention using high-fidelity compared to low-fidelity simulators. They acknowledge that the “social dynamic” aspects may have a more dominant role to play in the realism of the experience than the physical aspects of the simulator or setting (Groom *et al*. *2014*:340).

3.3.2.2 *Simulation as a social construct: The negotiated space*

Dieckmann, Gaba *et al.* (2007:183) state that simulation is “a complex social endeavour, in which human beings interact with each other, a simulator, and other technical devices”. They suggest that the social facets of simulation and subsequent experience are influenced by motivation and goals of participants and instructors, the culture of interaction between participants and instructors, the manner in which feedback is given, and the content and structure of the event.

In order to explain the individualistic meaning given to a simulation experience, they argue that interpretation of events occurs in the context of cognitive structures referred to as "primary frames" (Dieckmann, Gaba *et al.* 2007:185). These include aspects such as, "attitudes, beliefs, information, prior experiences, or common choices … expected perceptions, assumed relationships, preferred related actions, or anticipated failure pathways" (Dieckmann, Gaba *et al.* 2007:185).

These primary frames inform the aspects an individual will pay attention to in any given situation. Individuals with different levels of experience may observe different components and ascribe differing values to them within a given scenario. An example in the emergency-care setting is the way a novice learner is likely identify only one or two possible causes for "wheezing" as a "respiratory problem" in an adult patient, whereas a senior learner can expand this framework to include airway obstruction and cardiogenic causes as well as causes unique to specific age groups (neonates, infants, children and adults).

Two types of primary frames include "natural primary frames", which relate to laws and relationships governing the natural world we live in, such as gravity, friction and human anatomy (Dieckmann, Gaba *et al.* 2007:185). Natural primary frames provide the basis for rules and facts by which we make sense of information. An example of a natural primary frame in emergency care would be knowing a formula to calculate a drug dose, or knowing normal physiological values (such as pulse rate and blood pressure) for a population group, to interpret values obtained from a patient within that group (such as an adult male or preschool child).

The second primary frame is the "social primary frame", in which various social interactions are understood. These frames provide the basis for human interaction, motivation and decision-making. They determine the nature and patterns of interaction between people (Dieckmann, Gaba *et al.* 2007:185). Examples include the interaction between the ALS paramedic and patient, the ALS paramedic and ambulance crew, and the ALS paramedic and nursing staff or doctors at the receiving facility. In a clinical simulation event the social primary frames govern role play and interaction with confederates (persons inserted into the event to provide relevant contextual interaction, such as a policeman or fireman). Kneebone (2005:551) argues that learning occurs in a "community of practice" and is thus "situated". He states that simulation "must reflect the contextual realities of everyday practice if it is to provide an effective adjunct to clinical experience".

The notion of natural and primary frames has relevance for simulation in the sense that the importance of the simulation experience is not primarily in the event, but in the way this event (in part or as a whole) is interpreted by those engaged in it. This helps to explain the importance and contribution of feedback (or debriefing) to learning (Dieckmann, Gaba *et al.* 2007:187) and observation in assessment (factors influencing consistency in mark allocation amongst assessors).

Variations in the primary frame, termed "modulations", include constructs such as "play, rituals and 'as-if' situations" (Dieckmann, Gaba *et al.* 2007:187). Because a healthcare simulation can replicate a clinical case it can be described as a modulation. The primary frame would be the clinical case and the modulation would be the simulation. For a modulation to have integrity and not become construed as a deception, sufficient aspects of the clinical case need to be present. Variations from the clinical case need to be identified. Where the simulation differs from the clinical case, arrangements need to be provided to participants on how to interpret these differences. An example would be a verbal cue given when a simulator cannot elicit the visual cue expected in a real patient. The narrator might repeat the verbal cue to enhance awareness that would be expected if the visual cue was present. This also requires set rules and boundaries within which the modulation happens, including simulation rituals, such as time duration, the location, and what signals the start and ending of a simulation event (Dieckmann, Gaba *et al.* 2007:188).

The rules by which a clinical case is turned into a simulation scenario should also be known by the participant and instructors. An example in emergency medical care is the procedures that are expected to be performed in detail and what procedures are "fast-tracked". Endotracheal intubation may be expected to be performed whereas physical IV cannulation may not be required but assumed to be accomplished once the IV cannula, administration set and drip are placed next to the site of insertion. Confusion arises when different rules are applied (by the same or different instructors), or where instructions in the simulation event are given by more than one person, or where one person provides more than one source of information (e.g. where the narrator provides verbal simulation cues and plays the role of a confederate in the simulation) (Dieckmann, Gaba *et al*. 2007:188).

Day (2006:62) suggests that factors such as case selection and limited response options may confound realism and mislead students. In emergency medical care the case selection is typically an acute life-threatening emergency. More commonly occurring, less severe cases might not be used, giving a false sense of the frequency of severe cases and then instilling an expectation of the case type in clinical practice (as a routine) and projected for the assessment. Projecting false timelines and fast-tracking patient responses in the simulation setting due to time limits may create false expectations for real clinical actions and responses. Fast-tracking procedures may eliminate time needed by students to rethink actions during a routine procedure, or could prevent them from experiencing the pressure of time while executing an action fully. Providing only protocol-derived response options in a clinical pathway may lead to oversimplification of clinical problems and could force a narrow set of responses, inconsistent with best-practice guidelines or appropriate alternative options.

Dieckmann, Gaba *et al.* (2007:289) suggest that the concept of “as-if” is central to the success of healthcare simulation. This concept applies to the methods used to motivate participants to treat the mannequin as if they were treating a real patient. In emergency medical care this would include aspects such as assigning the responsibility of a fully qualified ALS paramedic to a participant, with associated expectations of performance within a defined scope of practice, and then making it possible for the student in this role to experience the consequences of decisions and interventions (or delaying them), even though neither the qualification held by the student nor consequences, however badly things proceed, to the “patient” are real – a real patient is not harmed.

By including this “as-if” principle, the “conceptual mode” and “emotional and experiential mode” of thinking generate perceptions of realism despite the differences between the simulation and the clinical case (cf. Section 2.4.1.4; Dieckmann, Gaba *et al.* 2007:189). This phenomenon could explain why some studies show no statistical improvement in learning from simulation when using low-fidelity versus high-fidelity simulators (De Giovanni, Roberts & Norman 2009:662, 664; Donoghue, Durbin, Nadel, Stryjewski, Kost, & Nadkarni 2010:17-18; Norman, Dore & Grierson 2012:645).

Dieckmann, Manser *et al.* (2007:152) discuss the application of “perceived reality” to the context of simulation. Perceived reality is rooted in media psychology and describes the “subjective impression that the experience enabled by the media product is realistic” (Dieckmann, Manser *et al.* 2007:152). In this case the “media product” is the simulation event and it concurs with the idea expressed by Rosen *et al.* (2009:842), who likens simulation to a theatrical production (cf. Section 3.3.1.1). Perception is a function of the individual, influenced by background and experience. When facets of the simulation event enhance perceptions of a real clinical scenario they are referred to as “reality cues”. When aspects of the simulation event are perceived as artificial or unrealistic they are referred to as “fiction cues” (Dieckmann, Manser *et al.* 2007:152).

De la Croix and Skelton (2013:50) suggest a complex social dynamic in the context of simulation, where the simulation is an amalgamation of a clinical and educational setting and where rules from both spheres apply. In their study of student interactions with standardised patients they used discourse analysis to determine power relationship differentials through dominance in conversations. Their findings lead them to suggest that the dominance rules of education take precedence over the clinical rules in the context of simulated patient encounters (De la Croix & Skelton 2013:50). The researcher of the present study suggests this is an important consideration when inserting role players into the simulation event. Although the student is taking on the role of the ALS paramedic (an "as if" condition) the student may inadvertently assume a subordinate stance when a recognised instructor in emergency care is playing a role in the simulation event. This may confound the role of the student and negatively affect the "emotional and experiential" mode of thinking (Rudolph *et al.* 2007:162), as well as evoke conflicting "social primary frames" (Dieckmann, Gaba *et al.* 2007:185).

From the discussion it is evident that a successful simulation programme relies on buy-in from management, instructors (facilitators) and students, and it must be integrated into the curriculum rather than being an add-on. Given the social nature of simulation and the complexity of factors contributing to its effectiveness as both learning and assessment instruments, careful attention to its purpose, implementation and development in emergency-medical-care programmes is required. Kharasch, Aitchison, Ochoa *et al*. (2011:685), in reflecting on the growth and development of the simulation programme at the NorthShore University (Illinois, USA), suggest their success was based on a positive culture, achieved through a learner-centred approach; the needs of learners were central to driving simulation, resulting in "a powerful experience that was preferred by students, nurses, paramedics, and residents alike."

3.3.2.4 *Deconstructing the simulation event and reconstructing the integrated clinical simulation for summative assessment*

The simulation event is deconstructed as follows:

- The clinical case: This is defined as "a patient state requiring a specific set of diagnostic and treatment steps" (Dieckmann, Manser *et al.* 2007:149). The case is labelled as it would be for a real patient (e.g. acute coronary syndrome presenting with unstable bradycardia) and may be included as a part-mission or full-mission simulation event;

- The clinical setting: This is defined as the "spatiotemporally and socially limited event during which humans interact in a goal-oriented way with each other and medical equipment to treat patients" (Dieckmann, Manser *et al.* 2007:149). The clinical setting is the aspect of the event in which the environmental and social practice features of simulation occurs (cf. Section 3.3.2.2); and
- The simulation scenario is construed to mean the dynamic evolution of a clinical case within a clinical setting, where the instructor has ability to (remotely) control variables (Dieckmann, Manser *et al*.2007:149).

The simulator represents the model that encapsulates the clinical case (cf. Section 3.3.1.1). The simulator type for the integrated clinical simulation is usually a full-body mannequin with a range of anatomical and interactive physiological fidelity features. Full-body mannequins are classified according to the range of these features from low to high fidelity (Maran & Glavin 2003:25; Benson, Goodrow & Loyd 2006:36; LeBlanc, MacDonald, McArthur, King & Lepine 2005:440).

Simulator features may include the presence of selected pulses, the possibility of obtaining a manual blood pressure, physical chest rise, along with various auscultation sounds, such as breath, heart and bowel sounds. Additionally, simulator features allow for demonstration of critical actions, such as basic and advanced airway interventions, peripheral IV access and fluid therapy, 3-Lead electrocardiographic (ECG) monitoring, electrotherapy and drug administration.

At the top end of full-body mannequin simulators are the high-fidelity, computer-driven, interactive simulators (Maran & Glavin 2003:25). These simulators allow for additional manifestations, such as eye-opening, blinking and pupil response; sweating, salivating, urinating, bleeding, comprehensive pulse points, drug administration detection with programmable responses to interventions, and verbal responses for patient interaction, amongst others.

In being subjected to a simulation event, the learner is expected to demonstrate the roles, responsibilities and actions appropriate to patient care according to assessment criteria at the expected level of ALS practice within a protocol framework that clarifies the purpose and scope of the event, or what Beaubien and Baker (2004:i54) refer to as the "mission" (cf. Section 3.3.2.4). This assessment typically focuses on the "on-scene phase" of the ALS paramedic response to a call (Studnek, Fernandez, Shimberg, Garifo & Correll 2011:1178;

cf. Section 3.4.1). This acute phase of patient care is believed to provide the best opportunity to test the requisite exit-level competencies (as a sample of the response cycle in practice). This clarifies the context, conditions and complexity of the “mission” and informs “scenario fidelity” (cf. Section 3.3.2.1).

The researcher suggests that the idea of “full-mission” simulation does not apply when only one aspect of the ALS paramedic response cycle is being assessed. It is suggested that this is a “part-mission” simulation event. Irrespective of this, the complexity of this part-mission event warrants the same conditions as a “full-mission” event, for which Beaubien and Baker (2004:i54) recommend that “a high-fidelity simulator needs to be used, the environment must be medium to high-fidelity”. In support of the dimensions of fidelity the design and execution of the event must engage the “conceptual” and “emotional and experiential” mode of thinking and maximise “perceived reality” (cf. Section 3.3.2.1). The extent to which these criteria are met will determine the degree of immersion and support the claim of an authentic situation (cf. Section 2.4.1.3). A full-immersion experience is defined as, “any situation which is highly interactive and engages the learner in such a way that disbelief is suspended and the learner becomes an active participant in the experience” (Chiniara, Cole, Brisbin, Huffman, Cragg, Lamacchia, Norman & Canadian Network for Simulation in Healthcare, Guidelines Working Group 2013:e1383).

Formative assessment provides the opportunity for immediate feedback through the debriefing process, which has been shown to be a key contributing factor to learning as it proceeds according to the constructivist paradigm and experiential learning theory (Cantrell 2008:e20; cf. Section 3.3.1.2). Learning in formative assessment has been identified as a key objective of the formative assessment process (cf. Section 2.4.1.4), which requires the use of a post-event debrief. The objective of summative assessment is making judgments about competence as the outcome of learning (cf. Section 2.4.1.4). In this context, clinical reasoning and decision-making may be assessed through a post-event oral exam or through a reflective report.

3.4 THE KNOWLEDGE, SKILLS AND ATTITUDES AS ELEMENTS OF ASSESSMENT CRITERIA IN ADVANCED LIFE SUPPORT PARAMEDIC PRACTICE IN SOUTH AFRICA

The “conditions” and “context” elements of assessment criteria specific to the ALS paramedic in South Africa were presented in Chapter 2 (cf. Section 2.5). In this section the “knowledge, understanding, action(s), roles, skills, values and attitudes” (SAQA 2001:21), as elements of assessment criteria, will be deliberated in the context of ALS paramedic education and clinical practice. This, in turn, serves to enlighten the “standard or quality” and the “level of complexity” elements of assessment criteria. Exploration of the literature and experience of the researcher will be utilised to achieve this.

The researcher uses both the staged learning model applied to emergency medicine by Binstadt *et al.* (2007:495) and the “Core competencies for undergraduate students in clinical associate, dentistry and medical teaching and learning programmes in South Africa” (HPCSA: MDPB 2014) as the basis for the knowledge framework and dimensions of ALS paramedic practice (cf. Sections 3.4.1; 3.5). Although some emergency-medical-care qualifications include the field of medical rescue, the following discussion is limited to clinical practice and associated responsibilities.

3.4.1 Roles and functions in Advanced Life Support paramedic practice

An understanding of the clinical work “cycle” in ALS paramedic practice is necessary to clarify roles and responsibilities and inform the scope of the clinical simulation scenario (cf. Section 3.3.2.4). The phases of response occur in the context of time, from receipt of a call until the moment the ALS paramedic is available for the next call (Figure 3.9). The phases in red represent high-risk activity. This includes traffic hazards associated with response driving, on-scene hazards and traffic hazards during transport to the receiving facility.

An ALS paramedic in South Africa typically mobilises to calls using various modes and configurations of transport, as follows:

- A rapid-response vehicle without patient-transport capability (single or double crew);
- An ambulance (double crew with patient-transport capability);
- A rotary-wing aircraft (flight and medical crew with patient-transport capability); or
- Fixed-wing aircraft (flight and medical crew with patient-transport capability).

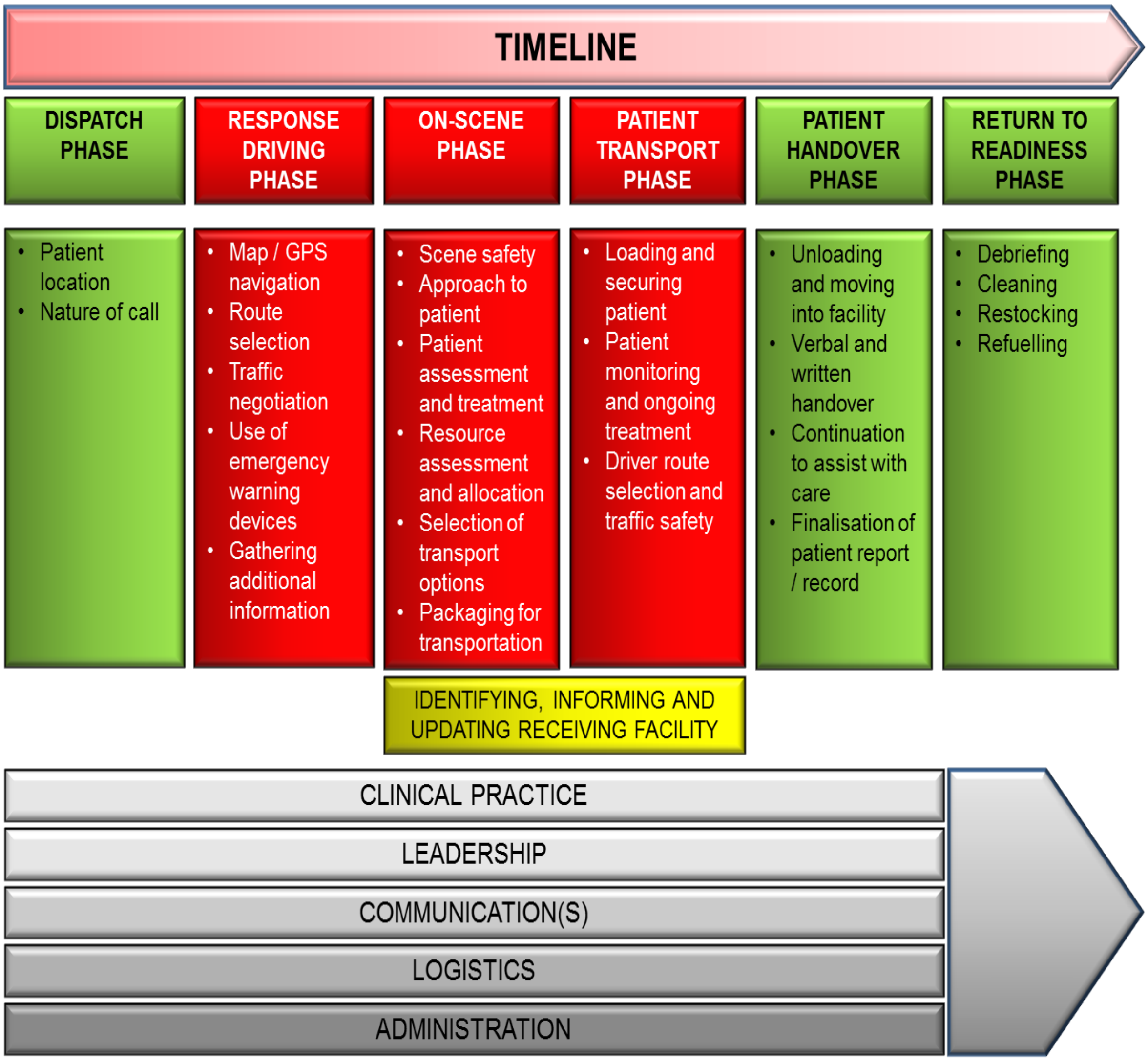

FIGURE 3.9: PHASES OF THE ALS PARAMEDIC RESPONSE

Although the phases of response are represented as a continuum, there are points at which a response phase can be terminated and readiness for the next call fast-tracked. During the dispatch phase a call may be cancelled or the ALS paramedic may be stood down as relevant information becomes available rapidly before the ALS paramedic has time to mobilise. The second point of the response involves the termination of the call while the ALS paramedic is driving to the scene. The third point involves the ALS paramedic arriving on scene only to find that, (1) the patient has already been transported by private vehicle or by another ambulance service, or (2) the patient does not require emergency care and refuses services, or (3) the patient's condition does not warrant ALS intervention and the patient can be handed over to a lower level of care for transportation, for which the paramedic does not need to accompany the patient to hospital, or (4) after treatment the condition of the patient is stable and the patient refuses transport to hospital, or (5) the patient is already deceased and requires mortuary services, or (6) the scene or patient cannot be located. A modification to response termination occurs when the ALS paramedic is using a vehicle with patient-transport capabilities in which case, for (3) the patient may be transported to a hospital and the phases completed.

The incidents that ALS paramedics respond to can be broadly categorised into three different types. Residential and office-type contexts reflect one type of scene that is indoors; there is a degree of control over environmental factors, such as temperature and lighting. A second type of scene occurs outside and it can include multiple contexts, such as motor-vehicle collisions, a patient collapsing at the side of the road, or a patient located in a remote wilderness environment. The third type, referred to as an inter-facility transfer, includes a patient transferred from a referring to a receiving medical facility. Each type of incident presents unique challenges and a different emphasis in approach to the patient with regard to aspects such as patient access, scene safety, information gathering, physical examination, equipment required and patient treatment and transport.

The general roles and responsibilities of ALS paramedics are represented as the clinician, the leader, communication(s), logistics and administration (Fig. 3.9). A brief discussion of each follows with reference to exit-level outcomes and assessment criteria in emergency-medical-care programme curriculum documents.

3.4.1.1 *The role as clinician*

The ALS paramedic takes clinical responsibility for the patient from arrival on scene until the patient is handed over to medical staff at the receiving hospital. Clinical responsibility includes physical examination, history taking, diagnosis and treatment of the patient. Clinical reasoning and clinical decision-making are essential to this role (cf. Section 3.4.1).

Examples of the role as clinician in the exit-level outcomes and assessment criteria of emergency care qualifications are presented as follows:

- “Provide clinical emergency care independently within an EMS environment” (SAQA 2012d:5 of 16);
- “Practice, supervise and facilitate the provision of emergency medical care to all sectors of the community” (SAQA 2012b:2 of 9); and

- "Logical, sound clinical decision-making is demonstrated. Clinical decisions are based on, informed by and validated through comprehensive history taking and appropriate clinical assessment" (SAQA 2012b:3 of 9).

3.4.1.2 *The role as leader*

The ALS paramedic is often the highest-qualified medical person at a scene. His/her responsibility is to lead the emergency-care team and be decisive and assertive in this role. This requires the ALS paramedic to exhibit confidence and manage on-scene confrontation and conflict in a professional manner. The leadership role includes aspects such as on-scene control, patient triage and allocation of emergency-care resources, delegation of tasks to appropriate levels of care, training of junior staff and acting as a role model.

Examples of the role as leader in the exit-level outcomes and assessment criteria of emergency care qualifications are presented as follows:

- "provide operational and clinical supervision within an emergency medical and rescue service" (SAQA 2012b:3 of 9);
- "Leadership skills are adequately demonstrated" (SAQA 2012c:3 of 5);
- "The principles of conflict management are correctly explained and/or demonstrated … Conflict is managed effectively" (SAQA 2012c:3-4 of 5).

3.4.1.3 *The function of communication(s)*

The ALS paramedic uses various types of communication technology, such as "radio, cell phone, satellite phone, paging systems, and telemetry devices" (SAQA 2012d:9 of 16). Communication occurs with the dispatch centre, emergency medical service (EMS) personnel on scene, the patient, family members, members of the public, other emergency service personnel and healthcare professionals at receiving facilities.
Examples of the communication function in the exit-level outcomes and assessment criteria of emergency care qualifications are presented as follows:

- "Professional relationships are characterised by mutual respect, cooperation, accountability, rapport and effective communication" (SAQA 2012d:7 of 16);
- "Professional communication between and cooperation with patients and stakeholders are correctly explained and/or demonstrated" (SAQA 2012b:5 of 9);

- "Communication is appropriate to the culture of the patient, members of the public and/or colleagues" (SAQA 2012c:4 of 5).

3.4.1.4 *The function of logistics*

Responsibility for logistics includes basic maintenance of vehicles, medical equipment and medical stock, and drug control. This includes cleaning, organising and configuring equipment for operational readiness. Logistics also includes the way equipment and personnel are utilised on scene. Logistics is informed by technological knowledge (cf. Section 3.4.2.6) and technological competence (cf. Section 3.5.1.4).

3.4.1.5 *The function of administration*

The ALS paramedic is responsible for writing up the patient-care records. Other administrative duties directly related to the response is keeping a log sheet of responses and controlling the drug register. Examples of the administration function in the exit-level outcomes and assessment criteria of emergency care qualifications are presented as follows:

- "Report writing and administration is comprehensive, comprehensible, accurate, relevant, up to date and compliant with organisational requirements. Language conventions, textual features and style of recording are appropriate for specific workplace purposes" (SAQA 2012d:6 of 16);
- "Records provide accurate details of the clinical assessment, decisions and treatment" (SAQA 2012d:9 of 16);
- "Medical records are constructed which provide sufficient accurate details of patient information and treatment" (SAQA 2012b:3 of 9).

3.4.1.6 *Integrating roles and functions of ALS paramedic practice into the clinical simulation event*

Integrated clinical simulation assessments should elicit roles and responsibilities associated with ALS paramedic practice. This requires explicit inclusion in assessment criteria for clinical simulation and an essential aspect of scenario design (cf. Section 3.3.2.4). Explicit attention to these roles adds to the conditions, context and complexity aspects of the integrated clinical simulation. The formative assessment process can include simulation events designed to focus on the development of each role, yet an integrated summative assessment should elicit displays of competence across the roles of ALS paramedic practice.

The following provides a descriptive example of how these roles could be integrated into pre-simulation activities, the simulation event and post-simulation activities:

- A rule is established in the formative phase, stating that the simulation event commences when the learner is dispatched to a call via a radio or cell phone (communications) (cf. Section 3.3.2.2). Post-event documentation would include information about the dispatch details.
- On-scene communication with the patient, family member (confederate in the simulation event) and EMS personnel is expected and graded. Ongoing use of communications in the scenario is expected. Requests for assistance, informing the receiving facility and communication with the control (dispatch) centre happens via radio or cell phone (thus enhancing the immersive dimension of psychological fidelity).
- Selection of medical equipment for use in the simulation event is the responsibility of the learner. Equipment is checked and configured prior to the simulation event. The consequence of lack of equipment or poor configuration is experienced in the simulation event and factored into the scenario. The post-event activity includes restocking and reconfiguring medical equipment for operational readiness.
- Clinical decision-making is the responsibility of the “ALS paramedic” (learner role). Tasks and procedures could be delegated to EMS personnel within their scope of practice. EMS role-players should perform procedures correctly and sustain activities where appropriate (placement of basic airway adjuncts, cardiopulmonary resuscitation (CPR), defibrillation, IV access as examples). This elicits the leader and clinical roles of ALS paramedic practice.
- Professional communication occurs in the context of handing the patient over to medical staff at the receiving facility and during communication with EMS personnel on scene.
- Post-event activities include completing a patient report form, where accurate and detailed reporting is assessed.
- A rule for disengaging from the event and conclusion of the assessment may occur with the submission of the patient report form and operational readiness of equipment. The formative assessment process would include immediate post-event debriefing to maximise learning (Cantrell 2008:e21).

3.4.2 The knowledge framework of Advanced Life Support paramedic practice

A brief overview of the knowledge framework of ALS practice is presented. This informs the "knowledge" element of assessment criteria (cf. Section 2.4.1.2) and serves to frame the case types relevant for use in clinical simulation and clinical simulation as an instrument for facilitation of learning and assessment. Figure 3.10 depicts the knowledge framework for ALS paramedic practice in South Africa.

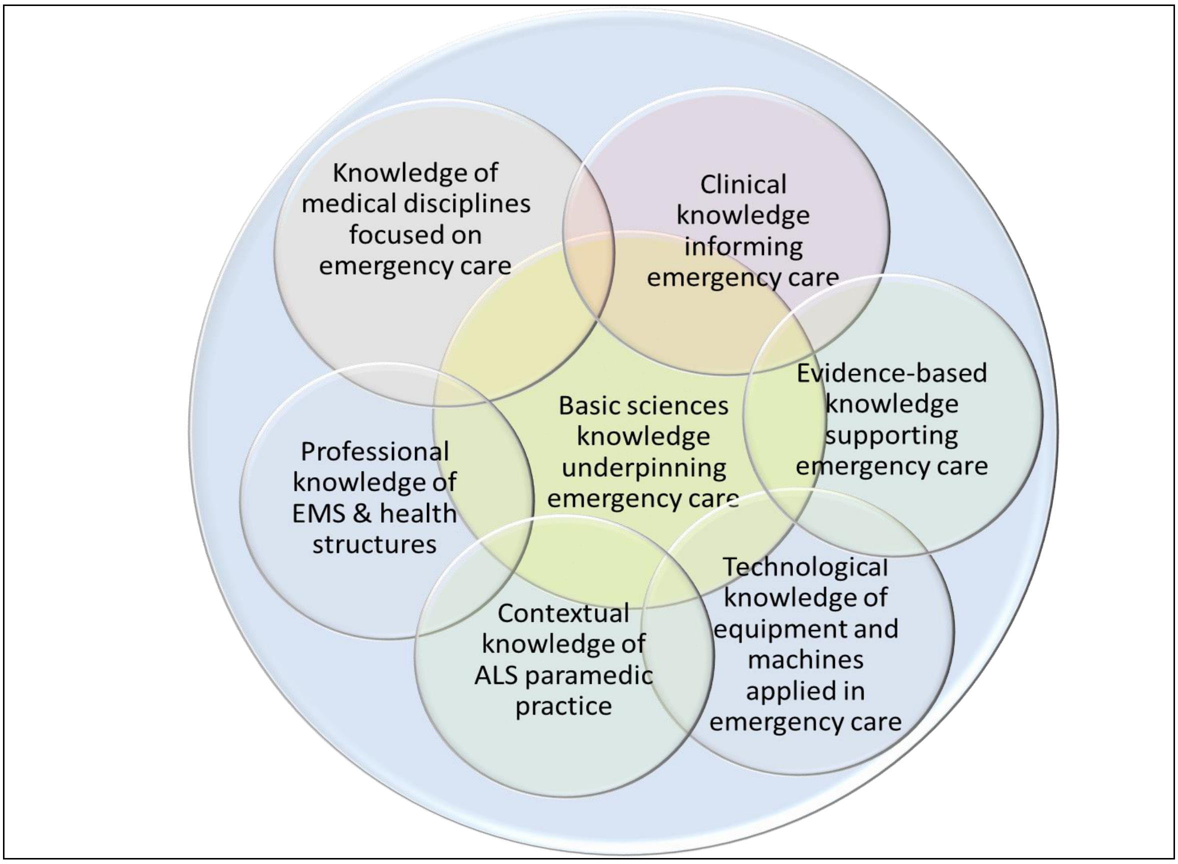

FIGURE 3.10: THE KNOWLEDGE FRAMEWORK OF ALS PARAMEDIC PRACTICE

3.4.2.1 *Basic sciences knowledge*

This is also referred to as "biomedical knowledge" (Schmidt & Rikers 2007:1135) and provides foundational knowledge upon which healthcare in general and emergency medical care specifically is based. This type of knowledge is the foundation for understanding causality and relationships connecting clinical, evidence-based and medical discipline knowledge (De Bruin, Schmidt & Rikers 2005:765). Examples of basic sciences knowledge in the exit-level outcomes of emergency-care qualifications are presented as follows:

- "Demonstrate knowledge and understanding of human and basic sciences underpinning emergency medical care" (SAQA 2012b:2 of 9);
- "Problem-based scenarios are correctly interpreted based on integration of anatomy, physiology and pathology" (SAQA 2012b:4 of 9);
- "key principles of chemistry … physics … microbiology … are explained and applied to emergency medical care contexts" (SAQA 2012d:8 of 16).

Basic sciences knowledge forms an important part of assessment in the early phase of ALS paramedic education, during which causal relationships of disease and injury are explained from this knowledge base (cf. Section 3.5.2.3). This knowledge is subsumed and embedded in the integrated clinical simulation and is not necessarily directly observed or assessed. Where opportunity for debriefing and reflection occur, aspects of basic science knowledge may be identified and assessed.

3.4.2.2 *Knowledge of medical disciplines*

Basic sciences knowledge, clinical knowledge and evidence-based knowledge are interconnected with discipline-specific knowledge. Medical disciplines are demarcated according to body systems and functions, age groups, special conditions and disease or injury. Examples of disciplines relating to body systems and functions include cardiology, pulmonology (respiratory), neurology, urology, gynaecology, immunology, gastroenterology, ophthalmology and dermatology. Age-group demarcations would include neonatology, paediatrics and geriatrics. Obstetrics is an example of a special condition (transitional period of pregnancy). Oncology, toxicology, psychiatry and traumatology are examples of discipline knowledge specific to disease and injury.

Emergency medicine is considered as a discipline on its own, with a clinical focus on disease, injury and its complications that cause immediate or emergent threat to life. Life-threatening emergencies may be isolated (as a cause) or span body systems (cause and effect) and span all the medical disciplines of knowledge. Emergencies stemming from disease processes are referred to as medical emergencies and those stemming from injury are referred to as trauma emergencies.

Examples of medical discipline knowledge in the exit-level outcomes and assessment criteria of emergency care qualifications are presented as follows:

- "The assessment and treatment of adult patients are explained and demonstrated within the scope of practice of the Emergency Care Technician with reference to the various body systems" (SAQA 2012d:9 of 16).
- "The assessment and treatment of obstetrics and paediatric patients are explained and demonstrated within the scope of practice of the Emergency Care Technician with reference to normal vaginal delivery, complicated deliveries and paediatric emergencies" (SAQA 2012d:9 of 16).

The idea of a single integrated clinical simulation as a standalone summative assessment warrants some reflection. Demonstrating competence in managing a life-threatening emergency in one specific medical discipline does not translate to generalising competence to other medical disciplines, age groups or special conditions. This suggests a range of integrated clinical simulation assessments, where competence in each medical discipline may be required before generalisation of competence for clinical practice can be declared.

Knowledge of medical disciplines is expressed in the "assessment and diagnostics" and "integration" competency areas of the NOCP for paramedic practitioners (Paramedic Association of Canada 2011:54-85;129-147). The NOCP requires that "the paramedic must demonstrate proficiency in a designated Performance Environment" for each "specific competency" within each "general competency" at the point of entry into practice as a qualified paramedic. The NOCP specifies high-fidelity simulation as an acceptable performance setting to assess these competencies (Paramedic Association of Canada 2011:13).

3.4.2.3 *Clinical knowledge*

Clinical knowledge refers to knowledge specific to the manifestation of disease and injury; and the focus of these in emergency care is on life-threatening emergencies. This knowledge allows for the development of diagnostic categories, pattern recognition and illness scripts for use in patient encounters (Schmidt & Rikers 2007:1134-1135). Clinical knowledge has its roots in basic sciences and driven by evidence-based knowledge (De Bruin *et al*. 2005:766). A detailed description of the development of clinical knowledge and relevance to clinical reasoning and decision-making is presented in Section 3.5.2.3.

Examples of clinical knowledge in the exit-level outcomes and assessment criteria of emergency care qualifications are presented as follows:

- "Clinical decision-making is appropriate to the presenting condition. Range: decision-making includes treatment, advice, referral and transportation. Treatment, where applicable, is in line with the clinical decision, and is applicable to the assessed condition" (SAQA 2012d:9 of 16).
- "Logical, sound clinical decision-making is demonstrated. Clinical decisions are based on, informed by and validated through comprehensive history taking and appropriate clinical assessment" (SAQA 2012b:3 of 9).

Clinical knowledge is demonstrated in the integrated clinical simulation through choices and actions in information gathering, assessment and treatment. This reflects clinical reasoning and clinical decision-making (cf. Section 3.5.2).

3.4.2.4 *Evidence-based knowledge*

The advent of the modern scientific method and technological advances has enabled more in-depth investigation of clinical phenomena. Making inferences about cause and effect based purely on basic sciences has proved insufficient and not conducive to clinical decision-making (Gerber, Lungen & Lauterbach 2005:1037). Evidence-based knowledge is derived from the summation of scientific research and based on the "best evidence available" (Brockopp, Schreiber, Hill, Altpeter, Moe & Merritt 2011:509). Evidence-based knowledge is encapsulated in position statements, guideline documents, policies and treatment algorithms and informs skill-based, rule-based and knowledge-based thinking underpinning clinical reasoning and decision-making (cf. Section 3.5.2.3).

Examples of evidence-based knowledge in the exit-level outcomes and assessment criteria of emergency-care qualifications are presented as follows:

- "Patients are correctly managed within the scope of practice of an Emergency Care Practitioner and with due consideration for evidence informed practice" (SAQA 2012b:3 of 9);
- "Patient management is correctly undertaken using insight and logical reason and consideration of current guidelines" (SAQA 2012c:2 of 5);

- “Basic life support interventions and emergency care for adults, children and neonates are explained and applied in line with accepted life support theory and principles and the acceptable code of practise and protocols as defined by the Professional Board for Emergency Care Practitioners (PBECP)” (SAQA 2012d:9 of 16).

Evidence-based knowledge is elicited in the integrated clinical simulation assessment through the clinical case, clinical setting and scenario, in which algorithms and treatment plans are used that reflect this knowledge (cf. Sections 3.3.2.4; 3.5.2.1).

3.4.2.5 *Professional knowledge*

Professional knowledge refers to knowledge about the profession. This includes aspects such as emergency-medical-care systems and emergency-medical-care qualifications with their scope of practice, dress code, code of conduct, law and ethical codes governing emergency-care practice, PBEC regulations, registration and accountability, amongst others. Examples of professional knowledge in the exit-level outcomes of emergency-care qualifications are presented as follows:

- “All clinical interactions and related practices are in line with the provisions and rules of the codes of ethics of the HPCSA and professional associations” (SAQA 2012d:7 of 16);
- “Demonstrate an understanding of the management, structure and function of Emergency Medical Service (EMS) systems in South Africa” (SAQA 2012b:3of 9).

In order for the integrated clinical simulation to serve as a reflection of the authentic situation, it must include elements that elicit professional knowledge. This may include ethical issues, delegation of tasks to appropriately qualified EMS personnel and decisions about the facility to which the patient should be transported.

3.4.2.6 *Technological knowledge*

This type of knowledge refers to knowledge of medical equipment, from simple disposable devices to complex machines used in the context of ALS paramedic practice. Use of technology spans all aspects of ALS paramedic responsibilities, including vehicles and communications (cf. Section 3.5.1.4).

Examples of technological knowledge in the exit-level outcomes and assessment criteria of emergency care qualifications are presented as follows:

- "Practice, supervise and facilitate the provision of emergency medical care to all sectors of the community utilising specialised strategies and technologies" (SAQA 2012b:2 of 9);
- "Appropriate equipment is correctly selected and utilised in the assessment, management and transport of patients." (SAQA 2012c:3 of 5)
- "Emergency medical care equipment is accurately described in terms of function, storage, maintenance and use" (SAQA 2012d:9 of 16);
- "Emergency equipment is checked with required regularity and is maintained in a clean, disinfected and ready state at all times as per local procedures. Troubleshooting of equipment failure is successful in identifying problems, and appropriate actions are taken to address identified problems according to local procedures" (SAQA 2012d:9 of 16);
- "The emergency vehicle is set up ergonomically and maintained in a state of constant readiness. Vehicle problems are identified and reported according to local operational procedures" (SAQA 2012d:9 of 16);
- "Communication devices are used according to established protocols to ensure effective communication. A variety of communication devices are compared to identify their fundamental components, principles of operation, advantages and disadvantages. Range: radio, cell phone, satellite phone, paging systems, and telemetry devices" (SAQA 2012d:9 of 16).

3.4.2.7 *Contextual knowledge*

The researcher defines this type of knowledge as knowledge developed from experience of emergency care in the varied contexts of ALS paramedic practice, and declares it unique to the profession. It includes the active influence of factors such as patient location, number of patients, hazardous situations, environmental elements, social dynamics, transport options and distance to a medical facility, amongst others (cf. Section 3.4.1). Contextual knowledge also supports the development of "scene scripts" advocated by the researcher (cf. Section 3.5.2.3). Examples of contextual knowledge in the exit-level outcomes and assessment criteria of emergency-care qualifications are presented as follows:

- “There must be evidence of the ability to apply and practice emergency medical care in an authentic environment” (SAQA 2012d:5 of 16);
- “Strategies for dealing with bystanders and crowds are appropriate to the situations” (SAQA 2012d:8 of 16);
- “Possible hazards within the emergency service environment are identified in terms of their sources, impact and means for preventing or minimising their negative impact. Scene hazard control is carried out in line with established procedures” (SAQA 2012b:3 of 9).

Contextual knowledge informs the “conditions”, “context” and “complexity” elements of assessment criteria and the design of the clinical setting of the simulation event (authentic situation) (cf. Sections 2.3.3.1; 3.3.2.4).

3.5 DIMENSIONS OF COMPETENCE IN ADVANCED LIFE SUPPORT PARAMEDIC PRACTICE

Dahl *et al.* (2010:446) describe the nature of clinical work as, “extensive mobility, rapid context shifts, changing work priorities, and close interaction between different actors”. Halliwell *et al*. (2012:online) claim that, “Pre-hospital care covers the ‘any patient, of any age with any condition, in any environment and location’”, and to which the researcher adds “at any time”. This reflects job characteristics of variety, uncertainty and unpredictability.

Zimmer *et al.* (2010:882) state that, “Emergency medical services (EMS) are classified as high-risk work environments as a consequence of the specific working conditions.” This researcher suggests representing the high-risk nature of the job as four interrelated dimensions of competence in which the ALS paramedic must function and which informs the “knowledge, understanding, action(s), roles, skills, values and attitudes” that are required (cf. Section 2.4.1.2). These dimensions underpin the four-stage learning model proposed by Binstadt *et al.* (2007:497) (cf. Section 3.3.1.2) and involve the physical dimension, the cognitive dimension, the emotional or affective dimension and the social-professional dimension (Figure 3.11).

The physical dimension includes physical fitness, psychomotor competence, sensory acuity, technological competence, and logistical competence. The cognitive dimension includes knowledge frameworks, illness and scene scripts and diagnostic codes relevant to emergency care, clinical reasoning and clinical decision-making strategies, critical thinking, reflexivity and metacognition. The emotional dimension includes self-worth, motivation, professional identity (status and esteem) and ethical frameworks (personal and professional). Finally, the social-professional dimension includes professionalism and the personality characteristics required for ALS paramedic practice.

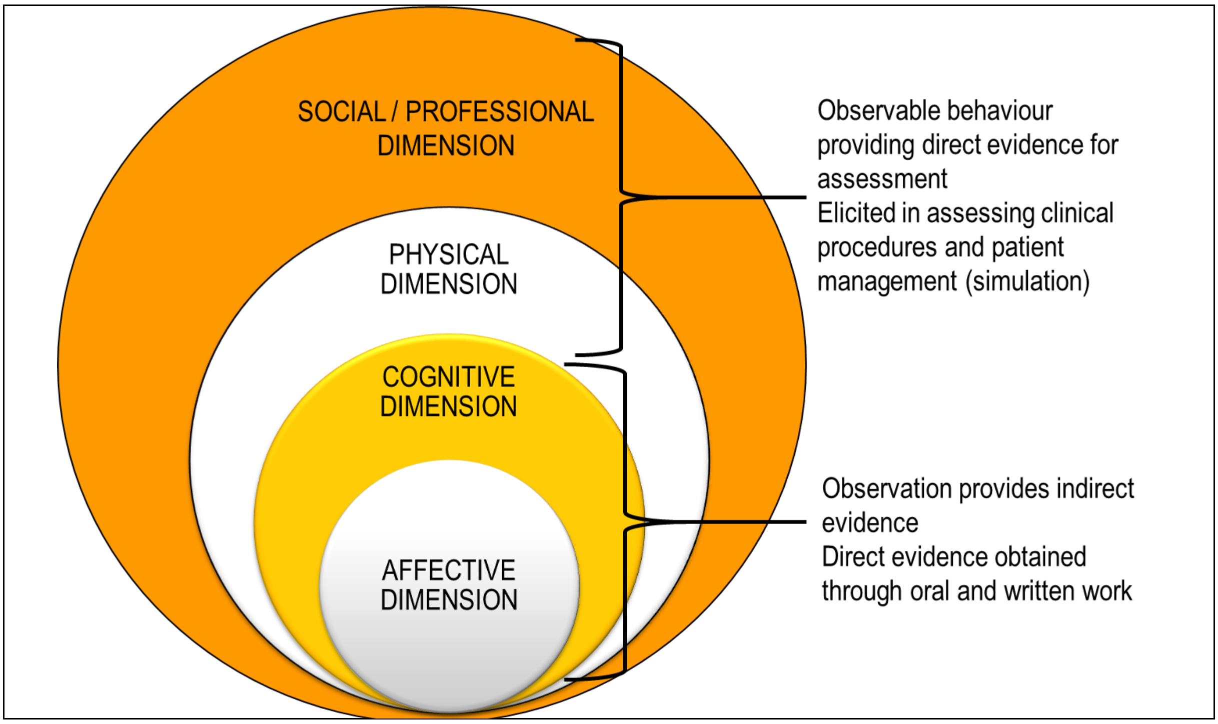

FIGURE 3.11: DIMENSIONS OF ALS PARAMEDIC COMPETENCE

Eight "areas" of competence covering the scope of paramedic practice are contained in the NOCP (cf. Section 3.3.1.2). These competency areas are professional responsibilities, communication, health and safety, assessment and diagnostics, therapeutics, integration, transportation, and health promotion and public safety. Simulation is the tool or "practice learning activity" used by JIBC to facilitate and assess the range of "specific" and "sub-competencies" expressed in the NOCP (Bowles 2009:1-2 of 8; Paramedic Association of Canada 2011:10-11). The NOCP specific competencies reflect performance tasks relevant to the dimensions of competence identified and discussed by this researcher (Paramedic Association of Canada 2011:25-155).

3.5.1 The physical dimension of ALS paramedic practice

The physical dimension includes physical fitness, psychomotor competence and dexterity, sensory acuity, and technological and logistical competence (Figure 3.12).

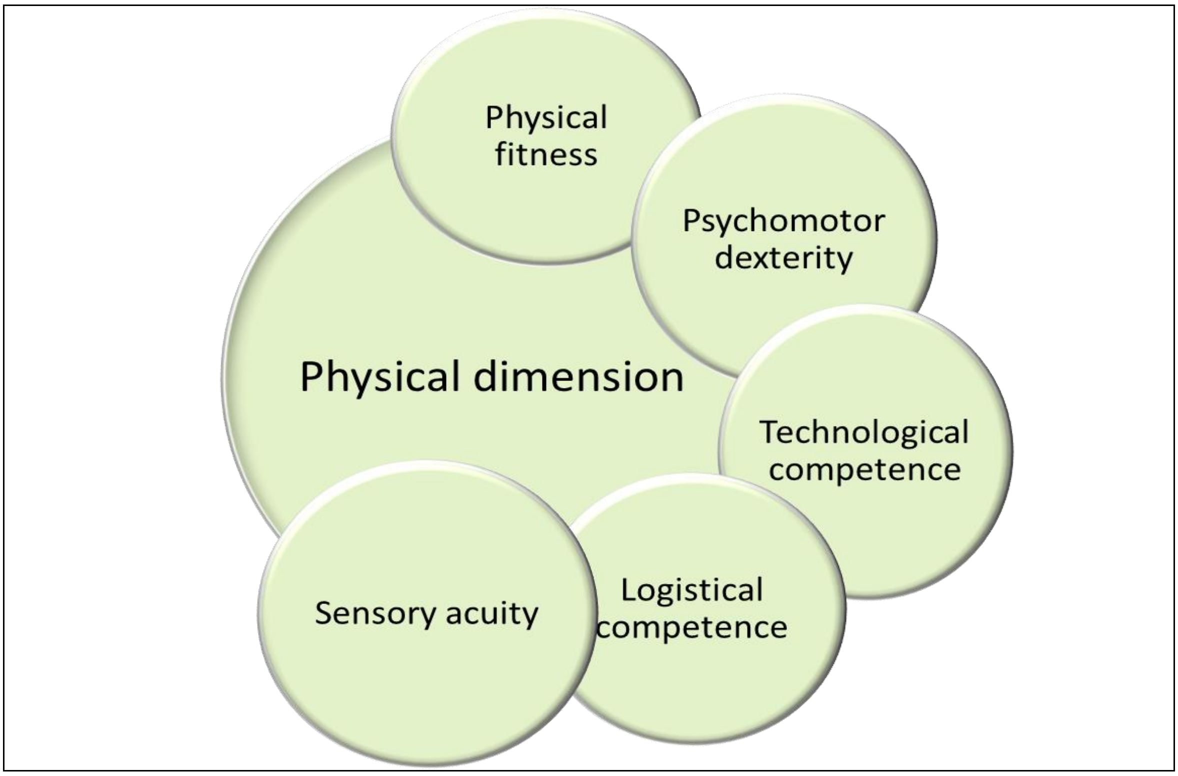

FIGURE 3.12: THE PHYSICAL DIMENSION OF PARAMEDIC PRACTICE

3.5.1.1 *Physical fitness*

The ALS paramedic is subjected to varying levels of physical activity in performing his/her duties. Thornton and Sayers (2014:201) summarise these activities to include "bending, twisting, lifting and carrying patients from awkward positions, and other similar tasks, some of which require considerable strength, cardiovascular fitness, and flexibility." Some activities require strenuous effort for prolonged periods of time, such as chest compressions during CPR, or carrying a patient up or down a flight of stairs. These activities may also be conducted in extreme environmental conditions (very cold and very hot), which affects performance. In a questionnaire-based study of 2 017 emergency medical technicians (EMT) in the Hyogo Prefecture in Japan, Okada, Ishii, Nakata and Nakayama (2005:abstract) identified the body regions that were most frequently subjected to physical stress in the line of duty as the neck, shoulders and lower back.

Occupational tasks are expected to be performed by ALS paramedics irrespective of age or gender (Thornton & Sayers 2014:204). In a study using a pre-employment fitness test, these researchers found a significant difference in physical fitness performance levels between male and female paramedics. They cite studies indicating a higher rate of occupational injuries among female EMS personnel than among their male counterparts (Thornton & Sayers 2014:204).

Poor or low fitness levels increase the risk of injury or illness when performing work-related activities, and impact directly on quality of patient care (Thornton & Sayers 2014:201). The level of fitness required to reduce risk of injury, illness and poor performance includes upper- and lower-body strength, flexibility and aerobic fitness (Thornton & Sayers 2014:201). Benefits of physical fitness extend to improving the paramedic's health in the cognitive and emotional dimension. Examples of assessment criteria for physical fitness reflected in emergency care qualifications are presented as follows:

- "Methods for obtaining and maintaining operational fitness are identified and described in terms of lifestyle, diet and exercise techniques, highlighting the impact on self and job effectiveness" (SAQA 2012b:3 of 9);
- "The physical demands of emergency care are described in terms of biokinetic principles, with particular reference to techniques for lifting and carrying heavy objects" (SAQA 2012d:7 of 16).

3.5.1.2 *Psychomotor competence*

ALS paramedics are expected to possess complex psychomotor skills and use advanced technology in multiple and varied environments. Where other healthcare professionals work in custom-built facilities designed for comfort and ease of access to patients, ALS paramedics access, assess and treat patients in varied positions and contexts – from the inside of crash-damaged vehicles to the inside of shacks. Procedures such as endotracheal intubation and intravenous access are complicated by conditions such as patient position, space limitation, freezing temperatures and poor lighting. What may be considered technically easy in one situation may become technically difficult in another (compare intubating a patient on a bed with easy access to the airway and intubating a seated patient entrapped inside a crash-damaged vehicle). Halliwell *et al. (*2012:online) argue that, without appropriate technical competence and supporting knowledge, the paramedic cannot succeed in providing effective holistic patient care.

Technically skilled performance by paramedics requires both precision and speed. Precision refers to the technical accuracy of the procedure (first-time success with minimal risk) and speed to the efficiency with which the procedure is performed (time to completion).

Halliwell *et al.* (2012:online) suggest that the manner in which technical procedures are taught should encourage both aspects until the procedure becomes "muscle memory". As stated by Halliwell *et al.* (2012:online), "In the world of paramedicine muscle memory is especially important because it's the combination of care and speed that make operators truly competent." The ALS paramedic should be comfortable performing procedures in different contexts and must make reasonable adjustments when performing them to maximise success. These aspects are captured by INASCL (2011:S6) in its definition of psychomotor skills, stated as,

The ability to carry out physical movements efficiently and effectively, with speed and accuracy. Psychomotor skill is more than the ability to perform; it includes the ability to perform proficiently, smoothly, and consistently under varying conditions and within appropriate time limits.

The NOCP defines "proficiency" as "the demonstration of skills, knowledge and abilities in accordance with the following principles":

- *Consistency (the ability to repeat practice techniques and outcomes; this requires performance more than once in the appropriate Performance Environment);*
- *Independence (the ability to practice without assistance from others);*
- *Timeliness (the ability to practice in a time frame that enhances patient safety);*
- *Accuracy (the ability to practice utilizing correct techniques and to achieve the intended outcomes); and*
- *Appropriateness (the ability to practice in accordance with clinical standards and protocols outlined within the practice jurisdiction)* (Paramedic Association of Canada 2011:12).

Croskerry (2003:111), in applying the 3-level model of cognition to the emergency department context, suggests that once clinical procedures are mastered, very little or no cognitive energy is required when performing them. Conversely, while a procedure is being learnt a significant amount of cognitive activity is required for this process. The risk in learning a procedure is the transfer of inaccurate or incorrect techniques, which become difficult to unlearn. The adage of "practice makes perfect" should be "perfect practice makes perfect" (Halliwell *et al.* 2012:online).

Examples of assessment criteria for psychomotor competence reflected in emergency care qualifications are presented as follows:

- "Integrated patient care and clinical skills/procedures are correctly demonstrated" (SAQA 2012b:3 of 9);
- "Clinical and intensive care procedures and practices are correctly applied" (SAQA 2012b:3 of 9).

3.5.1.3 *Sensory acuity*

The ALS paramedic has limited access to advanced diagnostic tools and relies heavily on information gathered through the senses (Lord 2003:online). Sensory information is obtained through sight (observation and inspection), smell, hearing (auscultation) and touch (palpation and percussion). Aids that augment sensory information include the stethoscope, which channels sound or, in some instances, can amplify sound using built-in electronic amplifiers.

Machines used in the context of emergency care have visual displays of information that can be adjusted to the light intensity of the environment and size of presentation. Visual information may also be colour-coded, with colour being associated with various functions. The ECG trace can be green, for example, and the capnograph waveform white. Equipment and medical supplies also have a colour-coding system. The hub of intravenous cannulas (and sometimes the package) is colour-coded and associated with a specific needle-bore diameter. Colour codes associated with the different age groups of children are used to cluster equipment and medical supplies relevant to each age group rapidly (e.g. the Broselow Tape).

Machines also generate sounds with different tones and transmission intervals, which provide specific meanings. The "R" wave on the ECG trace, for example, triggers a sound that can be used to detect changes in rate and rhythm without having to watch the screen. The defibrillator emits a particular sound while charging and a different tone when the charging process is complete. Machines also have visual signals and auditory warning sounds that are activated when a fault is detected or when the physiological parameter being monitored moves beyond the upper or lower normal limit.

The ALS paramedic must experience and learn the meaning of sensory information in the context of emergency care. Sensory information and interpretation is the foundation of clinical reasoning and decision-making in emergency care. Breath sounds, presence and quality of pulses, skin and mucous membrane colour, and ability to manually determine blood pressure are central aspects of sensory information upon which diagnosis and treatment are often based.

The varied environments in which emergency care is delivered are a source of conflicting and confounding sensory information, such as intense and low-light situations, which influence visual information, and noisy environments, which interfere with auditory information. The paramedic's uncertainty, stress and lack of experience may contribute to misinterpretation and confabulation of sensory information (sensory illusion). An example experienced by the researcher when conducting a part-mission clinical simulation involves a student claiming to hear wheezing on auscultation in a patient with a history of asthma whereas, in fact, the lung sounds were clear (confirmed on the simulator settings and a second opinion from another student not involved in the simulation). During debriefing the student confessed that he was confused about the diagnosis and wanted the patient to have asthma because he would then know what to do for the patient.

Examples of assessment criteria encapsulating sensory acuity reflected in emergency care qualifications are presented as follows:

- "[There] must be evidence that the learner can carry out the full range of assessments … Taking and recording of pulse, blood pressure and perfusion, breathing, skin condition (skin colour), level of consciousness (e.g. GCS, AVPU), blood glucose analysis, pupil assessment, revised trauma score, blood pressure, pulse oximetry, body temperature, capnography, APGAR assessment" (SAQA 2012d:5 of 16);
- "Clinical decisions are based on, informed by and validated through comprehensive history taking and appropriate clinical assessment" (SAQA 2012b:3 of 9).

3.5.1.4 ***Technological competence***

Specialised equipment and machines are integral to ALS paramedic practice and paramedics require psychomotor dexterity to use them. Paramedics employ complex machinery to measure physiological parameters, determine diagnoses and provide therapeutic interventions. Machines used for measuring physiological function include pulse oximeters, end-tidal carbon dioxide ($ETCO_2$) monitors, non-invasive blood pressure monitors, glucometers and electrocardiographic (ECG) monitors. These functions could be performed by a standalone machine (single-function) or be integrated into one machine (multifunctional).

A pulse oximeter can be used to diagnose respiratory failure and pathological haemoglobin states and can provide clues about peripheral blood flow (Hinkelbein, Genzwuerker & Fiedler 2005:315). $ETCO_2$ can be used to diagnose respiratory failure and effectiveness of respiratory support, determine the return of spontaneous circulation in cardiac arrest and confirm endotracheal tube and supraglottic airway device placement (Neumar, Otto, Link, Kronick, Shuster, Callaway, Kudenchuk, Ornato, McNally, Silvers, Passman, White, Hess, Tang, Davis, Sinz & Morrison 2010:S733; Wahlen, Bey & Wolke 2003:36). A 3-lead ECG is used to diagnose cardiac arrhythmias (rate and morphology) and a 12-lead ECG is used to diagnose and differentiate acute coronary syndromes (O'Connor, Brady, Brooks, Diercks, Egan, Ghaemmaghami, Menon, O'Neil, Travers & Yannopoulos 2010: S790).

Machines are also used for therapeutic interventions. Mechanical ventilators can provide various types of respiratory support. ECG machines have electrotherapy options, such as defibrillation (manual and automated), synchronised cardioversion and transcutaneous pacing (Link, Atkins, Passman, Halperin, Samson, White, Cudnik, Berg, Kudenchuk & Kerber 2010). Portable suction units provide a way to remove fluid rapidly from a patient's airway (Neumar *et al.* 2010:S735). Volume control and volume-limiting devices, such as volumetric pumps and syringe drivers, enable controlled and precise IV administration of drugs and fluids. An intraosseous drill provides an alternative rapid access route for drugs and fluids in an emergency (McCarthy, O'Donnell & O'Brien 2003:184).

In order to use these machines effectively, ALS paramedics must have a sound knowledge of how to use them (safely), be dextrous in their use, know the scope and limitations of equipment, troubleshoot problems associated with their use and have confidence in the machine. This requires applied competence with regard to specifications, configuration, range of application and sequence of equipment operation.

The demonstration of true competence in using a machine is the selection and appropriate use in a stressful situation. The researcher has noticed in the context of part-mission clinical simulation that, when a student lacks confidence in using a machine, he/she will select an alternative yet less effective option (e.g. physical injection of a drug over 10 minutes rather than using a syringe driver).

An essential component of fidelity in simulation and an important “reality cue” involves using real machines in the assessment and treatment of patients (Dieckmann, Manser *et al.* 2007:152). When the simulator can really be defibrillated, paced or cardioverted; when a saturation and $ETCO_2$ reading that fluctuates in response to the physiological state of the patient can be obtained, then an immersive experience can be created and real-world responses elicited (cf. Section 3.3.2). Examples of assessment criteria encapsulating technological competence reflected in emergency-care qualifications are presented in Section 3.4.2.6.

3.5.1.5 *Logistical competence*

Halliwell *et al.* (2012:online) present the concept of “logistical competence” to address what they suggest is a problem unique to the out-of-hospital clinical care context. Logistical competence involves controlling aspects of the physical dimension of a scene that could be construed as chaotic and uncontrollable, and can affect the quality of patient care negatively. Logistical competence refers to the skill of coordinating and controlling aspects such as patient access, working space, placement and movement of equipment, patient movement and patient transport. The intended purpose of logistical management is to establish conditions conducive to effective assessment and treatment of patients by bringing some degree of order and control to the scene. Although not mentioned by Halliwell *et al.* (2012:online), the researcher adds the coordination of EMS and other emergency service personnel, and task delegation as factors that influence physical control of a scene. Halliwell *et al.* (2012:online) encapsulate the core aspects of this competence in the following process, referred to as SMART:

- ***S****pace: Can more space be created?*
- ***M****ove: Can things be moved? Can the patient be moved?*
- ***A****ccess: How much of the patient do you need to access?*
- ***R****esources: Where are you going to place your equipment? Why?*
- ***T****ransport: What will your method of transport be? What are the clinical effects of moving the patient? How will movement affect the patient’s physiological status?*

In order for the integrated clinical simulation to represent the authentic situation, it must contain essential elements of the physical dimension of ALS paramedic practice and elicit displays of physical competence. These elements are also essential when selecting a clinical case, the clinical setting and the simulator technology with regard to the dimensions of fidelity (cf. Section 3.3.2).

3.5.2 The cognitive dimension of Advance Life Support paramedic practice

The historical emphasis on the role of the ALS paramedic in applying rules and performing skills is changing with the emergence of the field as a healthcare profession in its own right (cf. Section 2.5.3). O'Meara (2009:1) suggests that the "transition from strict protocol driven practice to procedures requiring the paramedic to use knowledge and experience to problem solve and provide solutions is creating a more complex practice for paramedics". It is recognised that, "sound and reliable thinking and decision-making skills are fundamental to prehospital practice", without which technical skills may be performed or withheld, based on erroneous or faulty logic (Lord 2003:online). Figure 3.13 represents the cognitive dimension of ALS paramedic practice.

In order for an ALS paramedic to decide on and implement treatment of a patient, he/she needs to determine the nature and severity of the condition for which the patient requires medical intervention. This requires engagement with cognitive strategies necessary for making a diagnosis. The cumulative cognitive processes required for this task in the clinical setting is referred to as "clinical reasoning" (Sandhu & Carpenter 2006:714). Kuhn (2002:740) claims that, "One of the most complex and challenging tasks facing physicians (sic) is the need to make a diagnosis." An incorrect diagnosis can result in wrong treatment, an incomplete clarification of the problem and/or delayed intervention, with consequent inadequate patient care.

Kuhn (2002:740) argues that the stable state of diagnostic errors in medicine over time, as reported through post-mortem studies, suggests that diagnostic difficulty is inherent to the human condition and independent of years of experience, training methods, improvements in diagnostic technology, hospital facilities, and across countries and historical eras of practice. Avoidable diagnostic error rates for medicine in general were found to range from 40% to 60%, where approximately 10% were associated with adverse patient outcomes (Kuhn 2002:241). Diagnostic error is primarily a problem of clinical reasoning, which resides in the cognitive domain (Croskerry 2003:111; Sandhu & Carpenter 2006:714).

Audetat, Dory, Nendaz, Vanpee, Pestiaux, Perron & Charlin (2012:2) suggest the reasons for errors in clinical reasoning,

are not linked to gross incompetence or lack of knowledge, but, rather, to the vulnerability of clinicians' thinking in the real-world of clinical practice, which is characterised by complexity, time pressures and various other contextual constraints.

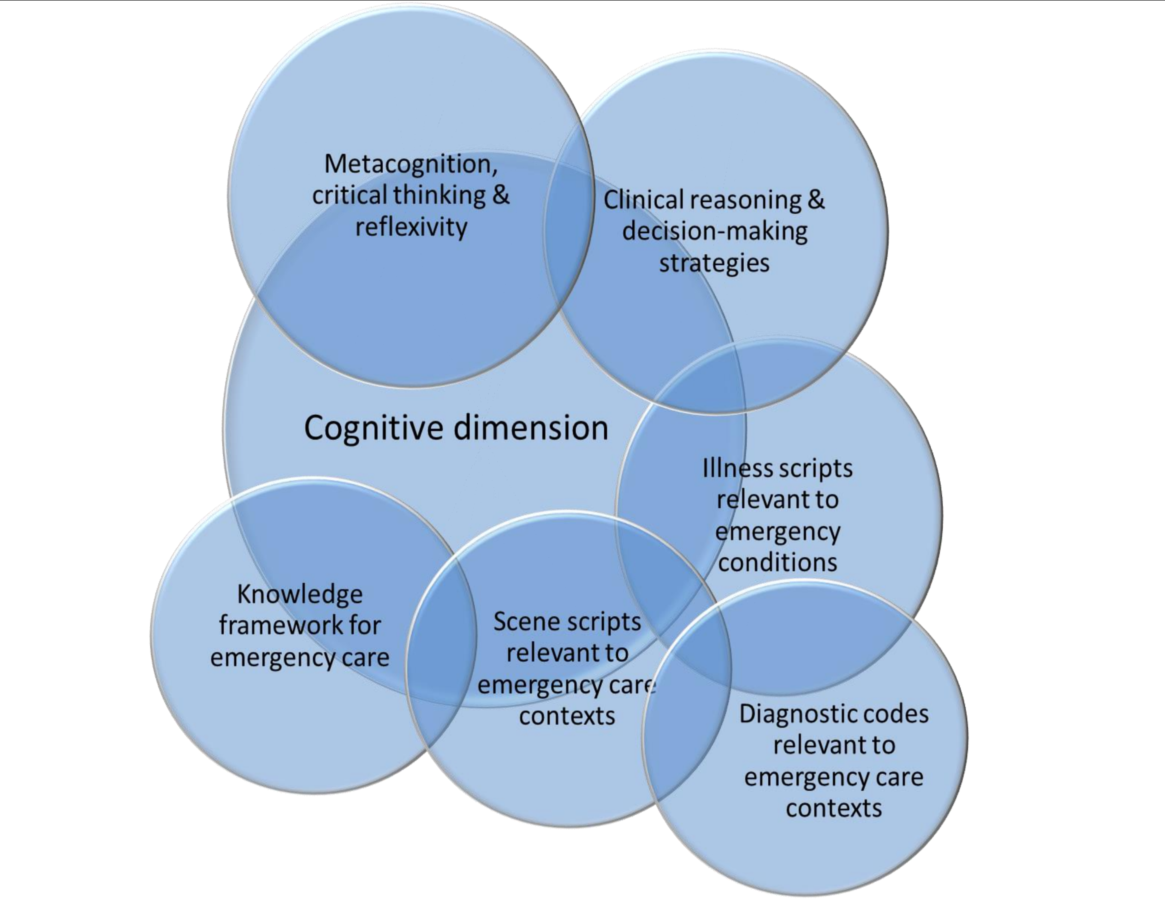

FIGURE 3.13: THE COGNITIVE DIMENSION OF ALS PARAMEDIC PRACTICE

The challenges to effective problem solving are determined by three factors: the knowledge structure of a field or discipline (Kuhn 2002:742), the context in which problems need to be solved (Croskerry 2006:720) and the process by which the human mind acquires and uses information (Kuhn 2002:741).

3.5.2.1 *The knowledge structure of a field or discipline*

The domains or fields of knowledge can either be well structured or ill structured (Kuhn 2002:742). A well-structured field of knowledge contains clear definitions of terms and concepts with well-defined rules and boundaries, which are generally accepted by those subscribing to this field. The process of problem solving that occurs within this field is generally agreed upon. Examples of such fields include mathematics and physics (Kuhn 2002:742).

Kuhn (2002:742) argues that medicine as a field of knowledge is ill structured. Clinical problems may be ambiguous, poorly defined and often attended with little agreement about what constitutes an appropriate solution. Clarifying problems is therefore an essential part of the problem-solving process. Ambiguous and ill-defined clinical problems first need to be deconstructed and reconstructed into a series of well-structured problems, which can then be resolved. As stated by Kuhn (2002:742),

In an ill-structured domain the field itself is not chaotic but the practitioners apply themselves to open-ended questions, for which agreed upon solution(s) and evaluation procedures do not exist. The basic rules that guide the processes an expert uses in analysing a problem have not been made explicit and are not accepted universally.

The length of time it takes experts in many fields to reach the expert level of function is said to be about 10 years (Croskerry 2003:113). There is significant effort in medicine to deconstruct and reconstruct the cognitive processes used by medical experts in an attempt to fast-track cognitive development through medical education (Kuhn 2002; Croskerry 2003; Sandhu & Carpenter 2006; Schmidt & Rikers 2007; Mamede, Schmidt & Rikers 2007; Audetat *et al.* 2012).

In an attempt to deconstruct the nature of paramedic practice in Canada, the JIBC conducted an all-inclusive task analysis by which medical and trauma calls were investigated (Bowles 2009:2 of 8). From this analysis about 18 call types in excess of 200 specific injuries and conditions were identified. Additional analysis of tasks, such as “assessment, decision-making, and management of these conditions led to a comprehensive list of knowledge, skills, judgment, and attitude ‘bits’ that constituted paramedic practice.” (Bowles 2009:2 of 8). The outcome of this in-depth task analysis, according to Bowles (2009: 2 of 8), was the emergence of a “simple-to-complex curriculum model” deemed necessary for paramedics students to achieve clinical practice competence.

A critical observation by the researcher, particularly with regard to the emergency setting, is the emergence of an evidence-based consensus movement in and between medical disciplines in a concerted and collaborative effort to structure the field of medicine where it counts most – the patient encounter. The evidence-based consensus movement seeks to define terms, establish boundaries, and create end-user guidelines for practice and frameworks for solving problems, while subscribing to a generally-agreed upon "best practice" methodology in achieving this goal. This is reflected in position papers, guideline documents, treatment algorithms, standards of practice, hospital and EMS policy and protocol. Structuring knowledge for use in emergency medical contexts is necessary to address routines, while giving space for the novel and ambiguous aspects of a clinical encounter, which still requires effective clinical reasoning strategies (Mamede *et al.* 2007:136).

3.5.2.2 ***The context in which problems need to be solved***

As a general rule, patient care in the hospital context involves an environment that is reasonably controlled (lighting and temperature) and decisions can be supported by consultation, where there is access to patient records and where additional and advanced diagnostic tests are available (Lord 2003:online). In contrast, patient care in the out-of-hospital context typically requires "independent, time critical decision-making in an environment where similar support is unavailable or incomplete" (Lord 2003:online). In the context of patient encounters in emergency medicine, Croskerry (2006:720) claims that,

In few other domains of medicine, indeed in few other domains of human endeavour (sic), is there such variety, novelty, distraction, and chaos, all juxtaposed to a need for expeditious and judicious thinking.

In support of this claim Shaban, Wyatt Smith and Cumming (2004:3 of 12) state that the out-of-hospital context of paramedic practice occurs "inside ill-defined, dynamic, uncertain environments with shifting and competing high-stakes goals." Kuhn (2002:742) suggests that factors that contribute to the poorly defined and ambiguous nature of clinical problems in medicine include the following:

- Not all the information required to solve the patient's problem is immediately available, but is gathered over a period of time;
- Clinical problems are inherently dynamic in nature – the clinical presentation of a patient may change during the problem-solving process and it requires a repetitive process of problem (re)interpretation;

- Each clinical situation has components of uniqueness that require specific approaches to problem solving that makes generalisation to other situations difficult; and
- The uncertainty of reaching a solution may force a decision to abandon the search in favour of taking action while still in a state of uncertainty.

The unique characteristics of patient encounters in the emergency setting (out-of-hospital and emergency-centre context) exacerbate the poorly-structured nature of medicine. Patients present with life-threatening conditions that require time-critical interventions even before information becomes available (ACEP 2004:688). The cause of cardiac arrest, for example, cannot be determined before resuscitation measures are implemented; if not, the chances of success reduce rapidly.

Information may be incomplete or unavailable due to the seriousness of the patient's condition and this lack is compounded by delays in accessing records and lack of prior relationship with the patient. In the out-of-hospital context the ALS paramedic may be dispatched to a location without any information about the complaint (Shaban *et al.* 2004:2 of 12). The total time spent with patients in these contexts is relatively short, so that at the point when the patient is delivered at the hospital by the ALS paramedic or admitted or discharged from the emergency centre there may not be a confirmed diagnosis. Added to this, multiple patients are seen within an unpredictable time frame (ACEP 2004:688; Kuhn 2002:742-743).

These characteristic features of patient encounters compound the patient-practitioner relationship (ethical framework). The time-pressure demand for intervention makes the safety net of consultation difficult or unachievable. There is no time to earn trust, which is seen as fundamental to the patient-practitioner relationship (HPCSA 2008a:I; ACEP 2004:688). The trust component in the context of emergency care is defined by the sporadic nature and urgency of need where, "the patient's willingness to seek emergency care and to trust the physician (sic) is based on institutional and professional assurances rather than on a personal acquaintanceship" (ACEP 2004:688).

Patient autonomy may be undermined by minimising or bypassing patient participation in decisions about their own care. Central to the principle of autonomy is the ethical and legal requirement to obtain informed consent for treatment (HPCSA 2008a:1-3; White & Seery 2008). A patient, however, may be taken to an emergency centre against his/her will (ACEP 2004:688). Patients may refuse emergency services and may not have made the request for EMS help in the first place (Palmer & Iserson 1997:730). Questions about state of mind and decision-making capacity at a time of acute exposure to physical and psychological trauma or inability to participate due to the nature of their illness or injury lend uncertainty to the meaning of autonomy in the emergency-care context (Palmer & Iserson 1997:731). This may set up ethical conflict situations, where "duty", "best-interest" and "do no harm" conflict with the patient's right to self-determination (autonomy) (ACEP 2004:688-690).

The care of a patient may also rapidly transition between different types of healthcare providers, including EMS personnel, doctors and nurses in the emergency centre and personnel from specialist disciplines. This may contribute to ambiguity and conflict; differences of focus, competency structures and options for treatment that exist and seem incongruent, yet pragmatism and the need of the patient necessitates a team effort.

3.5.2.3 *The process by which the human mind acquires and uses information in emergency-care situations*

The time-pressure demands and nature of life-threatening emergencies presenting to ALS paramedics in the out-of-hospital environment necessitate a particular type of thinking that requires problem identification, decision-making and action sequence to occur in a relatively short space of time and with a reasonable degree of accuracy and care.

Memory: learning, storing, retrieving and using information

Memory is believed to play a crucial role in the ability to solve problems (Kuhn 2002:741). The retrieval and use of information is dependent on the interaction between short-term and long-term memory. Short-term memory has a limited information-holding capacity, whereas long-term-memory capacity for information storage is unlimited. Although short-term memory is employed during study and in present experiences, the system of storing information in long-term memory determines how rapidly and accurately that information can be imported into short-term memory when required to solve a problem (Kuhn 2002:741). Short-term or "working memory" only holds information necessary for engagement in the present situation (Bourne & Yaroush 2003:11-12). Fraser *et al.* (2012:1056) suggest that, when the cognitive load of a given task exceeds the capacity of working memory, then learning is inhibited. Cognitive load is exacerbated by the intrinsic difficulty of the task, the degree of interaction imposed on the learner to engage in the task and how much working memory is required for the task (Fraser *et al*. 2012:1056).

Knowledge stored in long-term memory is packaged into ‘‘mental schema’’ or “clusters of related information” that expand with addition of new information (Kuhn 2002:741; Schmidt & Rikers 2007:1134). In order for medical information to be useful, relationships need to be established in what Schmidt and Rikers (2007:1134) refer to as “rich, elaborate causal networks that explain the causes and consequences of disease in terms of general underlying biological or pathophysiological processes.” At this stage of knowledge acquisition, detailed reference to the knowledge base of basic sciences (cf. Section 3.4.1.1) is used to interpret clinical information; at this stage pattern recognition of disease is not yet possible. An example is an explanation of tachycardia being given in terms of its physiological basis and pathophysiological process, but it may not yet be associated with diagnostic categories (Schmidt & Rikers 2007:1134).

Knowledge expansion and modification: transition from biological knowledge to clinical knowledge

Over time, with progressive exposure to clinical experiences and repetitive application of knowledge enhanced by confrontation with clinical problems, knowledge structures are modified. Knowledge “networks of detailed, causal, pathophysiological knowledge” become packaged or “encapsulated” into “diagnostic labels” or “high-level, simplified causal models” that rationalise the clinical presentation of a patient (Schmidt & Rikers 2007:1134). Examples of diagnostic labels include “diabetic keto-acidosis (DKA)”, “Grade III haemorrhagic shock” and “stroke”. By drawing on a diagnostic label, the practitioner has access to the detailed content subsumed under that label.

The next stage of knowledge development emerges primarily in the context of extensive clinical experience. It is influenced minimally by education, and represents the modification and reorganising continuum of medical knowledge. Where biological knowledge is the basis for understanding causation of clinical problems in the early and novice stages of medical education and practice, clinical knowledge emerges as a preference for clinical practice by the experienced practitioner and has been mastered by the expert (Schmidt & Rikers 2007:1135).

The JIBC paramedic curriculum design described and illustrated by Bowles (2009:3 of 8) demonstrates a progressive knowledge development from basic sciences through to clinical knowledge. Simulation is one of the instruments used by JIBC to facilitate and assess competencies using “increasingly complex patient encounters [clinical simulation] before being assessed in a field practicum” (Bowles 2009:1 of 8).

“Illness scripts” and “scene scripts”

Clinical knowledge structures include pattern recognition, where signs and symptoms are grouped and clinical syndromes can be recognised. These signs and symptoms are built into “mental schema” referred to as “illness scripts” (Kuhn 2002 741; Schmidt & Rikers 2007:1135). Bokken, Rethans, Scherpbier, & Van der Vleuten (2008:161) describe illness scripts as “cognitive structures containing features of prototypical or real patients together with clinically relevant information about diseases.”

In the context of a clinical encounter, patients present with various signs and symptoms together with an underlying story. As this information becomes available, the practitioner links cues derived from general observation, signs and symptoms and aspects of the patient story to illness scripts. Since illness scripts are not condition-specific, a number of illness scripts may be accessed in the process of reaching a diagnosis, and more than one clinical condition may contain features of the same illness script (Kuhn 2002:742).

In the out-of-hospital context, additional mental schema also include what the researcher refers to as “scene scripts”, which are developed from aspects of the physical environment in which patients are encountered and which are linked to cause and type of emergencies faced. An example of a scene script is collision damage to vehicles, vehicle location and orientation, which inform injury pattern and severity. In many situations scene scripts are activated before any clinical information becomes available yet can trigger illness scripts. An example at the scene of a motor-vehicle collision is that front-end damage with compression of the crumple zone, a star smash on the windscreen and a bent steering wheel can be rapidly linked to the scene script of “frontal impact collision with an unrestrained driver”, which connects to illness scripts linked to injury pattern associated with “unrestrained driver” and “frontal impact collision” These illness scripts would include “traumatic brain injury”, “spinal column injury” and “thoraco-abdominal injuries” and are triggered without the ALS paramedic touching the patient to confirm whether these injuries are present, yet provides a focus of what to look for.

The proposition of “scene scripts” made by this researcher is supported in the competency domain of “assessment and diagnostics” by the “Obtain information regarding incident through accurate and complete scene assessment” specific competence category in the NOCP (Paramedic Association of Canada 2011:57).

As knowledge and experience develops, the ALS paramedic also develops a hierarchy in the mental schema that enables prioritisation of clinical problems based on the urgency of threat to life, time-critical nature of intervention, range and sequence of available interventions and transport considerations. Using the above example, the illness script for "traumatic brain injury" encapsulates knowledge about severity categories, presentation of raised intracranial pressure and associated complications of brain injury. Interventions are concentrated on supporting life-system functions (airway, respiratory and cardiovascular support) with specific focus on factors affecting brain function and measures to control these. Examples include measures to treat, monitor and avoid hypoxic, hypercarbic and hypotensive episodes; the mandate for rapid-sequence induction prior to intubation to prevent aggravation of intracranial pressure, and neutral orientation of the neck with avoidance of a rigid cervical collar for the same reason. Transport considerations would include patient packaging and position, effect of acceleration and deceleration on the patient's condition, the distance-time relationship and the facility that would be best suited to deal with patient injuries and complications.

Levels of cognitive difficulty and clinical reasoning strategies

Croskerry (2003:111), using the 3-level model of cognition, presents the levels of cognitive complexity relevant to emergency medicine (Figure 3.13). The first level is referred to as skill-based or "procedural" thinking, which relates to the psychomotor component of clinical practice. With continuous application and experience, these become automated responses requiring little cognitive engagement. The researcher suggests that this level then resides in the physical dimension of practice, where performance of clinical procedures becomes a "muscle memory" process (Halliwell et al. 2012:online).

The next level of cognitive complexity is what is referred to as rule-based thinking. This level of complexity is based on the rules, guidelines, algorithms and standards that inform decisions and actions for particular emergency conditions. These typically include decision rules, treatment options and action sequences. Examples include guidelines and algorithms for cardiac arrest, pathological tachy- and bradyarrythmias and treatment of acute coronary syndromes (Neumar *et al.* 2010; O'Connor *et al*. 2010).

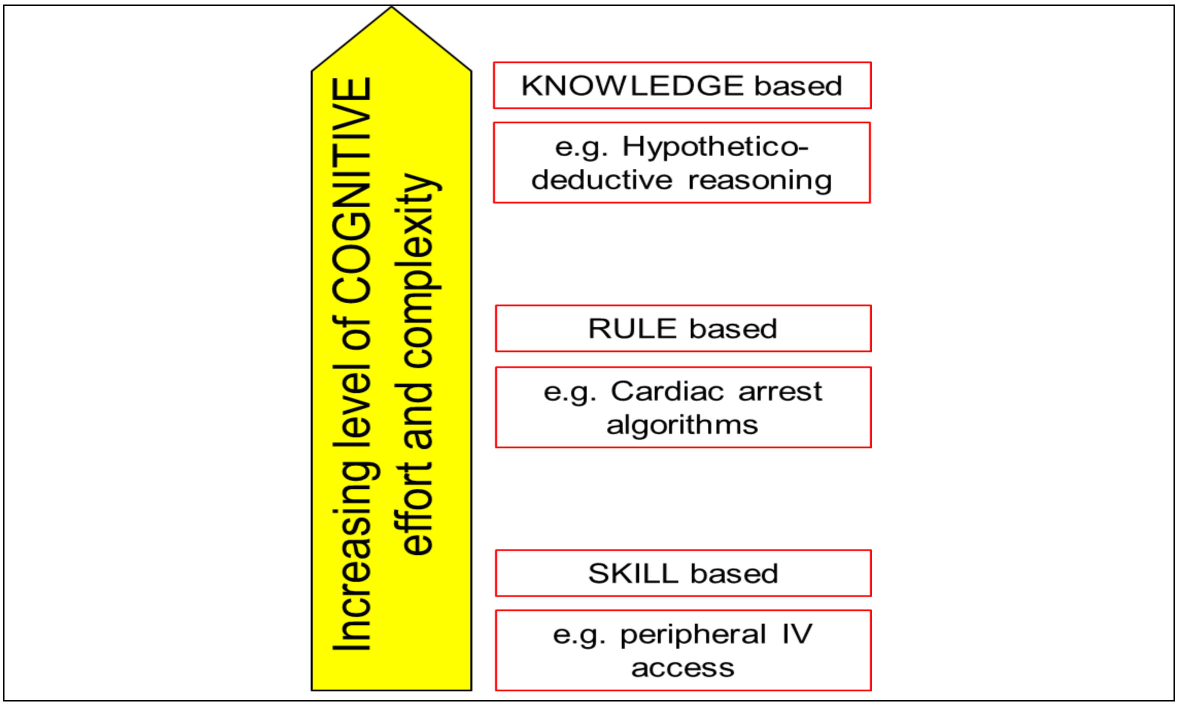

FIGURE 3.13: 3-LEVEL MODEL OF COGNITIVE COMPLEXITY (adapted by the researcher from Croskerry 2003:111)

Once the “elaborate causal networks”, “encapsulation” and illness scripts underpinning these rules and guidelines are in place, and the decision and behavioural sequences have been mastered, then the cognitive energy requirement is minimised when applying these in practice (Croskerry 2003:111). The researcher suggests that these rules, guidelines and algorithms provide a necessary framework for addressing routines in emergency-care conditions and contexts, which enable control of a situation and reduction of uncertainty. The mastery of these rules, guidelines and algorithms are critical for effective emergency-care practice in time-constrained contexts.

The third level of cognitive complexity is referred to as knowledge-based thinking (Croskerry 2003:111). In order to arrive at a diagnosis and decide what interventions to use, patient-specific information needs to be obtained, interpreted and applied against the background of relevant knowledge of the field. This requires integration of aspects such as chief complaint, medical history, physical assessment and technology-derived information, such as oxygen saturation, blood-sugar levels and ECG trace, to make a diagnosis and decide on a course of action. Croskerry (2003:111) presents “Clinical decision-making, management decisions, diagnostic reasoning (sic)” as part of the knowledge-based level of thinking. The need to use knowledge-based thinking is particularly prevalent in the novel clinical situation, which predominates in emergency-care contexts. As stated by Sandhu and Carpenter (2006:713), “Emergency medicine has one of the highest decision densities and diagnostic uncertainties of all medical fields.”

On initial contact with the patient in the out-of hospital context, the ALS paramedic is presented with information cues that are rapidly formulated into a “working diagnosis” (Sandhu & Carpenter 2006:716). Information cues from the environment, initial observation of the patient, the chief complaint, medical history, clinical examination, and cues may trigger scene and illness scripts linked to a number of diagnostic labels. This rapid phase of interpretation is referred to by Hicks, Merritt and Elstein (2003:170) as the intuitive phase of reasoning.

Kuhn (2002:242) suggests that the number of working diagnoses that can be held in short-term memory range from two to six. Kuhn (2002:242) suggests that, from exposure to “both verbal and nonverbal cues from the patient” and through “an unconscious act of memory association”, a working diagnosis can be generated as quickly as 28 seconds from the start of the encounter. A correct diagnosis may be generated in as little as between 1 and 7 minutes (Kuhn 2002:242). In the time-critical emergency context this speedy arrival at a working diagnosis is necessary to “dictate a therapeutic action” (Sandhu & Carpenter 2006:716).

Sandhu and Carpenter (2006:715-718) present six strategies of clinical reasoning and decision-making relevant to the emergency care context (Figure 3.14). These clinical reasoning strategies may be used interchangeably and depend on the thought processes of the practitioner (information storage, access and retrieval) and the demands of the patient encounter.

Hypothetico-deductive reasoning: This is a knowledge-based strategy starting with the intuitive phase of reasoning and progressing to the analytical phase, where initial working diagnoses are subjected to refinement and testing for best fit in novel situations. Sandhu and Carpenter (2006:716) argue that, in the emergency-care context, the focus of reasoning is to eliminate the urgent and most life-threatening ones rather than to “confirm competing diagnoses”. The risk of error is associated with faulty processes of generating working diagnoses and prematurely finalising the diagnosis (Sandhu & Carpenter 2006:715-716).

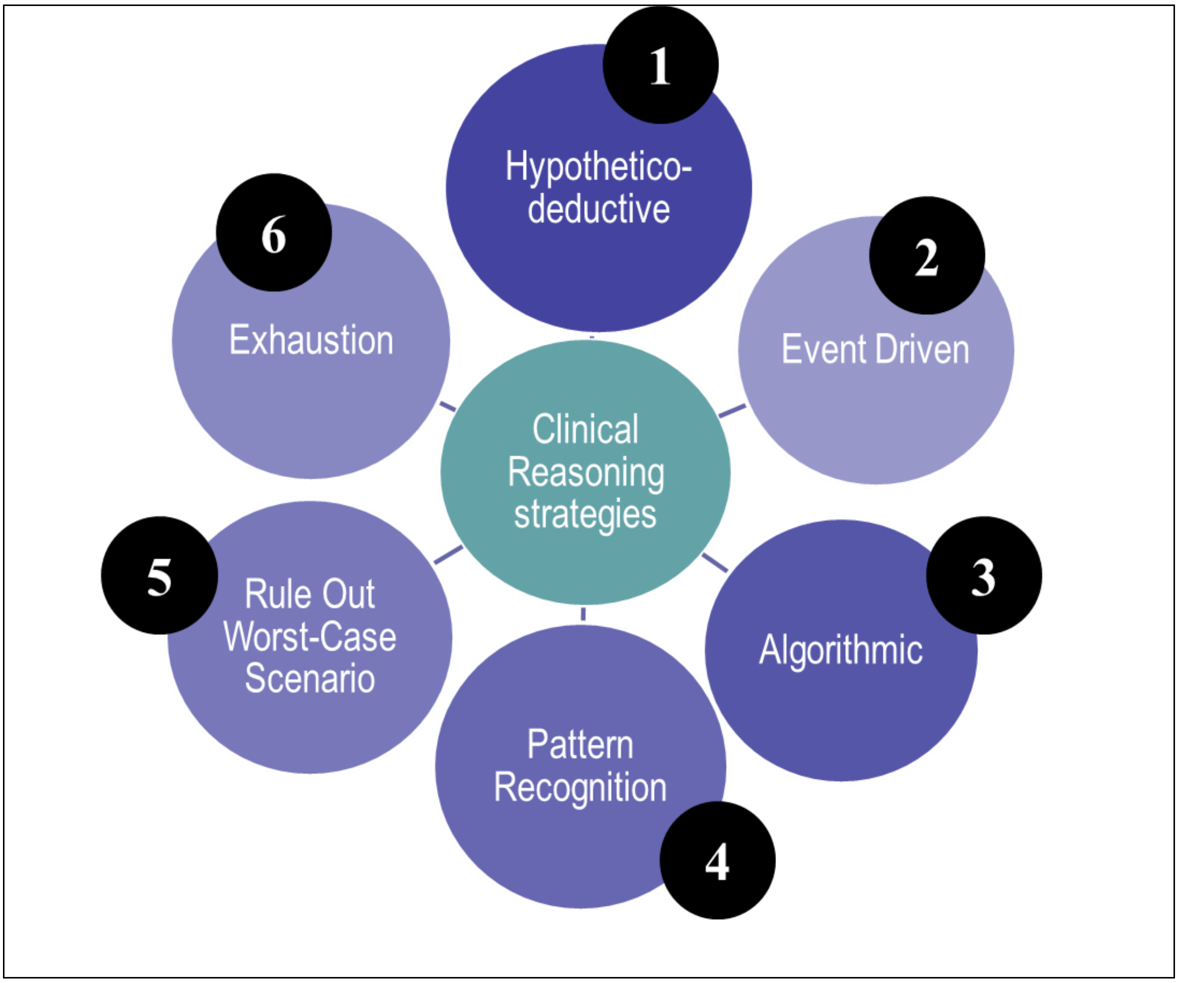

FIGURE 3.14: CLINICAL REASONING STRATEGIES IN EMERGENCY CARE (adapted by researcher from Sandhu & Carpenter 2006)

Event driven: The urgency of the situation in emergency care often dictates life-support interventions such as establishing an airway, stopping bleeding and initiating fluid resuscitation before sufficient information is available to establish a diagnosis. In the course of treating the patient, the ALS paramedic may not have arrived at a diagnosis before the patient is delivered to the hospital (Sandhu & Carpenter 2006:716).

Algorithmic method: This is a rule-based cognitive strategy involving the ALS paramedic subscribing to algorithms or decision-trees that provide a simplified, stepwise approach to decision-making for commonly occurring emergencies (Sandhu & Carpenter 2006:716). There is a risk of error if an inappropriate rule is allocated or if generalisation results in subsets of patients sustaining harm. An example of inappropriate rule allocation would be an elderly patient presenting with wheezing and being allocated prematurely to a diagnostic label of COPD or asthma. *The Treatment of Acute Asthma Protocol: adult and child*

(HPCSA 2006a:102) may be used for decision-making while, in fact, the patient may be presenting with acute cardiogenic pulmonary oedema (Jorge, Becquemin, Delerme, Bennaceur, Isnard, Achkar, Riou, Boddaert & Ray 2007). An example of rule generalisation would be a patient presenting with cardiac chest pain, and in the absence of a 12-Lead ECG analysis, being given glyceryl trinitrate to relieve ischaemic chest pain in accordance with the *Treatment of Acute Coronary Syndromes* algorithm (HPCSA 2006a:107) and *Acute Coronary Syndromes* algorithm (O'Connor *et al.* 2010:S788). The patient may, in fact, have a right ventricular infarction for which this drug may be harmful and for which it is contra-indicated (HPCSA 2006a:63; O'Connor *et al*. 2010:S790).

Pattern recognition: This strategy of reasoning is employed when the clinical presentation of the patient provides obvious visual clues to the problem, and which are rapidly linked to a diagnostic label (Sandhu & Carpenter 2006:716). The risk of error arises when the diagnosis is finalised prematurely. New and emerging information about the patient's clinical condition that refutes the initial diagnosis may be ignored. The example used earlier relates to visual clues of the elderly patient sitting in a tripod position, using accessory muscles of the neck and abdomen and presenting with wheezing on auscultation of the lung fields, which is a pattern commonly associated with chronic obstructive pulmonary disease (COPD) and asthma (Mattison & Christensen 2006:330-331). Despite fatigue, lung sounds changing to crackles and ongoing complaints of dyspnea, the patient may continue to be managed for asthma or COPD.

Rule out worst-case scenario method: In the process of learning about life-threatening emergencies, a paramedic student may develop a list of life-threatening conditions related to various aspects of clinical presentation (Sandhu & Carpenter 2006:716). For the ALS paramedic, the relevance of items on the list is based on threat to life and the nature of the intervention required. It stands to reason that an ALS paramedic may have a shorter list than the emergency medicine physician, due to diagnostic options, facilities and scope of intervention. The paramedic list may rely on criteria relevant to life-support options rather than diagnosis of cause expected from specialists at the top end of emergency and intensive care. An example would be a patient involved in a frontal impact motor-vehicle collision who is diagnosed with a "severe traumatic brain injury". At the hospital, after a CT scan, the patient is diagnosed with a "subdural haematoma".

This list provides a reference guide to high-mortality emergencies or causes where rapid intervention necessitates early identification or elimination. An example of this situation is one in which reversible causes of cardiac arrest should be identified and treated within the period of resuscitation. These causes are presented as a list simplified as the “H’s and T’s” that provide rapid guidance regarding what to look for and treat during the resuscitation effort (Neumar *et al.* 2010:S736).

Exhaustion method: This laborious and time-consuming strategy is associated with knowledge-based reasoning and involves a disproportionate amount of information gathering followed by careful scrutiny of information to obtain a likely diagnosis. Sandhu and Carpenter (2006:716) suggest that this approach is used frequently by medical students. In the context of clinical practice, this approach is also observed when experienced physicians are presented with a more obscure diagnosis, and in the context of fatigue and sleep deprivation.

More than one clinical reasoning strategy may be employed during a patient encounter in ALS paramedic practice. A classic example is the case of cardiac arrest. When the ALS paramedic is confronted with a patient in cardiac arrest, the urgency of intervention activates event-driven reasoning that leads to immediate initiation of CPR before the cause can be determined. The algorithmic strategy is activated and the sequence of cardiac arrest management is followed. As the situation comes under control and the routines of CPR are being managed, the ALS paramedic may have the opportunity to step back and use the rule-out-worst-case-scenario strategy to identify the possible reversible causes of cardiac arrest (the H’s and T’s) (O’Connor *et al.* 2010:S788). The hypothetico-deductive strategy is employed in the process of inferring, testing and refining the cause of arrest and modifying of actions.

Metacognition, critical thinking and reflection

Croskerry (2003:112) describes metacognition as “an individual’s ability to stand apart from his or her own thinking, to observe it, and to recognize opportunities for using interventional thinking strategies”, and it is essentially defined as “thinking about thinking.” Metacognition is the type of thinking particular to adulthood and used extensively by experts. Croskerry (2003:114-119) proposes a number of “cognitive forcing strategies” in attempts to avoid diagnostic and clinical decision-making errors. The application of cognitive forcing strategies relies on the effective use of metacognition to select the appropriate strategy (Croskerry 2003:114). Characteristics of metacognition are summarised in Table 3.1.

TABLE 3.1: CHARACTERISTICS OF METACOGNITION (adapted by researcher, Campbell 2014)

1. Awareness of what is required in the learning process	Knowledge is evaluated for relevance and packaged for appropriate retrieval Decision making strategies relevant to the clinical context are developed Effective decision-making can be demonstrated in real-world conditions
2. Recognition of limitations of own memory and senses	Ability to recognise limitation of memory Appropriate memory aids to reduce cognitive overload are identified and learned Awareness of ambiguity, distractions and atypical presentations is acquired Factors affecting senses and perception are explored and understood Awareness of various types of biases in thinking and the situations in which they prevail is fostered
3. Capacity for self-critique	Capacity to reflect on decisions and actions is developed Willingness to re-examine these when new information or input from others is given
4. Ability to select strategies	Responsive to a wide range of clinical problems and scenarios Shows ability to select different and innovative strategies to deal with these situations Strategies for reducing biases in thinking are developed and used

Facione (2013:10) argues that, because critical thinking is a “form of thoughtful judgment or reflective decision-making”, it pervades all aspects of thinking of the person who possesses the disposition and skills associated with critical thinking (Table 3.2). Critical thinking is thus the milieu of thinking in which clinical reasoning and clinical decision-making are fashioned.

Croskerry (2006:720), in listing the criteria for critical thinking in the context of emergency medicine, includes,

being able to recognize distracting stimuli, bias, irrelevance, and propaganda; identify, analyze, and challenge assumptions in arguments; recognize deception, deliberate and in its other forms; assess the credibility of information; monitor and control own thought processes; and imagine and explore alternatives.

TABLE 3.2: DISPOSITION OF A CRITICAL THINKER (modified from Facione 2013:11)

	DISPOSITION	DESCRIPTIVE FEATURES
SYSTEMATIC & ANALYTICAL APPROACH	INQUISITIVE	inquisitiveness with regard to a wide range of issues alertness to opportunities to use critical thinking
	TRUTHSEEKING	concern to become and remain well-informed honesty in facing one's own biases, prejudices, stereotypes, or egocentric tendencies willingness to reconsider and revise views where honest reflection suggests that change is warranted
	OPEN MINDED & JUDICIOUS	open-mindedness regarding divergent world views prudence in suspending, making or altering judgments flexibility in considering alternatives and opinions fair-mindedness in appraising reasoning
	CONFIDENCE IN REASONING	trust in the processes of reasoned inquiry, self-confidence in one's own abilities to reason

In comparing the disposition and descriptive features of critical thinking and metacognition the overlapping features are obvious. Metacognition is essential for critical thinking and the disposition of critical thinking for developing metacognition.

Jones and Cookson (2000:150) define reflective practice as, "an approach to learning from experience through conscious review, analysis and integration of thought and action." Reflective practice is presented as a deliberate approach of moving from the experience back into theory in order to "examine, learn, and develop practice in a more structured way" (Jones & Cookson 2000:150). The reflective process engages both the cognitive and affective domains (Husebø, Dieckmann, Rystedt, Søreide & Friberg 2013:135). This exploration of experience promotes experiential learning and transformational learning (cf. Section 3.3.1.2).

3.5.3 The affective dimension of Advanced Life Support paramedic practice

Despite the argument that diagnostic error and errors in decision-making lie in the cognitive domain, the role of the affective domain in errors has recently been studied. Croskerry (2003:112) suggests that, "Affective errors result from a complex interplay of emotions and cognition and would be expected at higher, knowledge-based levels of function."

Tallentire, Smith, Skinner and Cameron (2011) conducted a qualitative study to conceptualise the behaviour of newly qualified doctors in the emergency-care setting. This study identified the influence of affective aspects, such as professional identity, role confusion and professional hierarchy in increasing the complexity of the clinical setting and creating stressors affecting clinical decision-making in practice (Tallentire *et al*. 2011:998-1000). They recommend that, "simulation as an educational strategy may be improved by finding ways to recreate the hierarchical and stressful environment in which junior doctors (sic) practise" (p. 995).

Fraser *et al.* (2012:) observed that up to 30% of students failed to identify a cardiac murmur after simulation training despite evidence that shows that simulation improves skill acquisition. They found that the instructional design and expected engagement in simulation elicited both positive and negative emotional responses associated with increased cognitive load, with consequent impaired learning through occupation of short-term memory space by this increased cognitive load (cf. Section 3.5.2.3). An increased cognitive load was also associated with a decrease in performance, which has relevance to both assessment and clinical practice.

Ten Cate and De Haes (2000:40) suggest that the affective domain includes a complex array of interpersonal skills and attitudes reflected by the healthcare professional. They also claim that both cognition and affection direct behaviour.

Ten Cate and De Haes (2000:40) suggest that healthcare professionals must develop affective competence and have this assessed deliberately in medical education, for the following reasons:

- The requirement to "cope with higher demands, with an increased working speed and with expanding evidence and technological options";
- Concomitantly, the expectation of "knowing how to deal with ethical matters and more complex practice organizations and interprofessional relations is also necessary"; and
- Because patients (and society) are better educated and expect higher-quality care, are less tolerant of errors in patient treatment, are more aware and forceful of their rights, and expect predictable outcomes of individual care.

Ten Cate and De Haes (2000:40) suggest that behavioural competence (soft skills related to the affective domain) is only one component of student assessment, whereas the willingness to apply this competence in practice is an essential component reflecting the affective domain of competence. They suggest this willingness can be observed through "behaviour-in-daily-practice", which can include simulation events (Ten Cate & De Haes 2000:41). In considering Miller's pyramid of clinical competence, Ten Cate and De Haes (2000:41) propose an additional level, namely, "the effect of behaviour on patients and patient care."

In motivating for summative assessment (at a point close to exiting into practice) of affective competence and willingness, Ten Cate and De Haes (2000:41) present the following arguments:

- Students only value outcomes that receive attention through assessment;
- Students pay attention only to the aspects demanded through assessment (level and complexity);
- Academics and practitioners are acutely aware of those who meet the psychomotor and cognitive outcomes and who qualify, yet have poor attitudes towards and are not suited for practice; and
- The range of observations and observers required to make judgements about affective competence and willingness have an influence on the observers, who are then forced to evaluate their own affective skills.

Facets of the affective dimension are encapsulated in professionalism and include ethical values, communication and teamwork. Factors influencing the affective dimension include self-worth, professional identity (status and esteem) and stress (Figure 3.15)

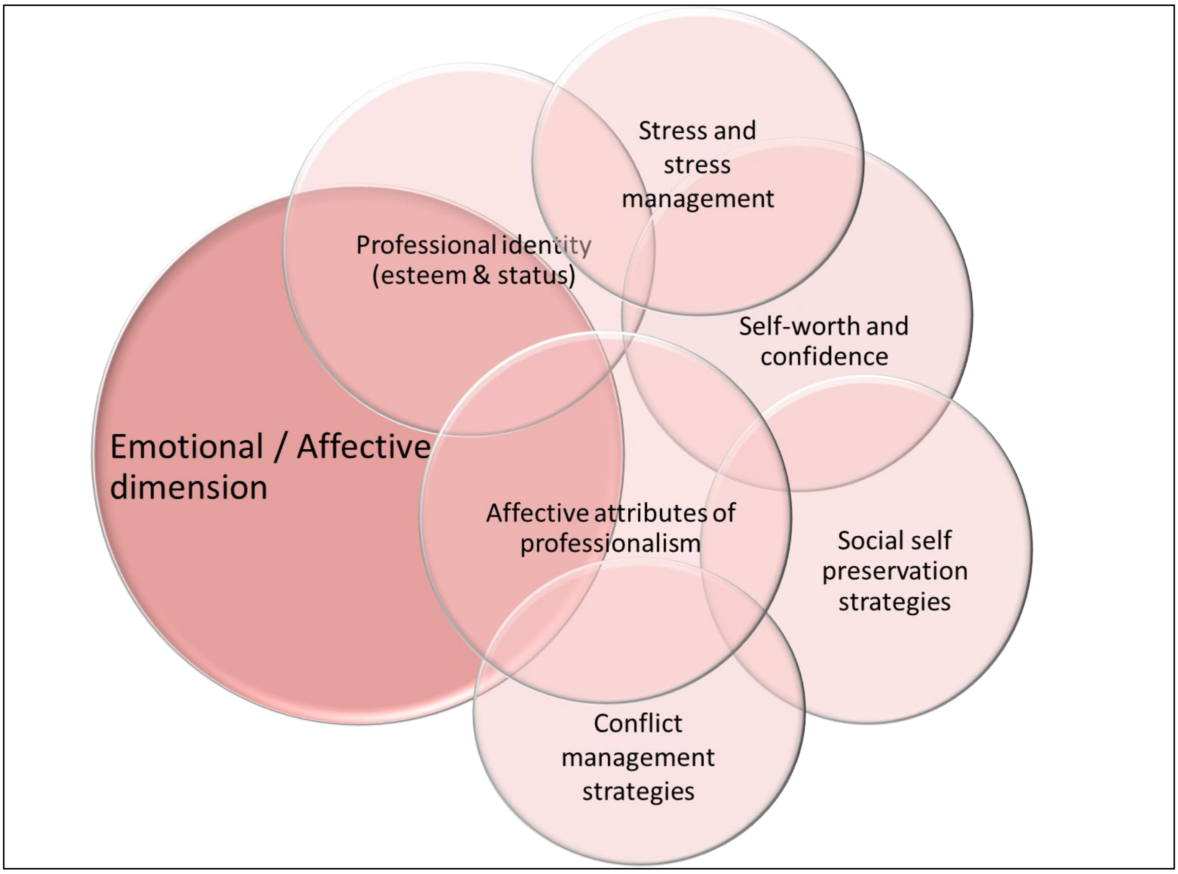

FIGURE 3.15: THE AFFECTIVE DIMENSION OF PARAMEDIC PRACTICE

3.5.3.1 ***Professionalism: The expectation framework of Advanced Life Support paramedic practice***

Barry, Cyran and Anderson (2000:136) define medical professionalism to be "a set of values, attitudes, and behaviors that results in serving the interests of patients and society before one's own." They suggest that the position of trust and respect society affords to a healthcare professional is based on expected high standards of professionalism. In their study exploring issues of professionalism, Barry *et al.* (200:139) found that 40% of respondents indicated they were unprepared (or underprepared) by their medical education to deal with scenarios presented. The authors suggest this may be because of an unresponsive education system combined with the complex nature of professionalism issues involving "moral, legal, economic, public policy, and philosophical principles" (Barry *et al.* 2000:139).

The evolving concept of professionalism in healthcare is linked to changes in society (Van Mook, De Grave, Wass, O'Sullivan, Zwavelinge, Schuwirth & Van der Vleuten 2009:e81). Forces in society have led to changes in healthcare delivery that threaten the foundational purpose of and original beliefs about medicine as an altruistic and selfless service of human need.

Fundamentally a profession serves the interests and welfare of society by applying its expertise (body of knowledge and skills) in a morally sound manner (HPCSA 2008a:2). Professions are given autonomy of practice linked to a specific and unique body of knowledge and skills, with a societal expectation of self-regulation within the framework of the profession (Bowles 2009:5 of 8). This is observed in statutory processes and regulation of healthcare education, licensing of practices and registration of practitioners, together with provision of ethical and practice codes (Van Mook *et al.* 2009:e82).

Lloyd-Jones (2015:3-13) provides an overview of professionalism applied to paramedic practice in the context of the health system in the United Kingdom. As a point of departure, Lloyd-Jones (2015:4) suggests that the behaviour expected from the professional regulatory body forms the basis of professionalism for a paramedic. This expectation of professionalism is affirmed by the HPCSA (2008a:i) in their statement that, "To be a good health care practitioner, requires a life-long commitment to sound professional and ethical practices and an overriding dedication to the interests of one's fellow human beings and society". The process of socialisation within a profession is considered central to developing professionalism. This includes understanding the hierarchy in emergency medical services, different qualifications, each with their scope of practice, and prescribed rules and codes of conduct (Lloyd-Jones 2015:4).

The idea of professionalism is strongly linked to special capabilities rooted in domains of knowledge, skills and attitudes within a defined ethical framework and set of behaviours necessary for effective engagement. There is a strong association with a set of norms and practices within a healthcare profession that distinguishes it from other healthcare professions. Emergency medical care is strongly associated with a code of discipline, which is often displayed in terms of appearance (uniform and neatness), public identification and a protocol-driven approach to medical care in the varied environment of the out-of-hospital context.

In the context of paramedic education in British Columbia, Canada, Bowles (2009:1 of 8) defines professionalism “as a set of competencies that are embedded as a set of skills and knowledge to be mastered, then applied in simulations and a field practicum.” Paramedic students in the Canadian context are subjected to “increasingly complex patient encounters before being assessed in a field practicum” to demonstrate competence from the domain of “professional responsibilities” (Bowles 2009:3 of 8).

Challenges in the evolution of professionalism amongst ALS paramedics in South Africa include limited engagement in research and contributions to the emerging body of knowledge, a lack of trust of emergency-care personnel by employers and other healthcare professionals, poor educational background of emergency-care personnel (cf. Section 2.5.2), outdated, unresponsive teaching methodologies and an autocratic, top-down reactive approach of regulation by the PBEC (O’Meara 2009:1). New and promising developments include the advent of postgraduate research qualifications, alignment of emergency-care qualifications with the NQF, and a move by the PBEC to becoming more collaborative and responsive in its approach to regulation.

<u>Ethical values and ethical reasoning:</u>

The HPCSA (2015:online) has published a series of ethical rules and guidelines that inform healthcare professionals in South Africa of the principles and standards of ethical conduct expected in healthcare practice. Thirteen core ethical values are indicated by the HPCSA (2008a: 2-3), which “express the most honourable ideals to which members of the health care profession should subscribe in terms of their conduct” (HPCSA 2008a:2) (Table 3.3). The researcher has categorised the listed core ethical values into three broad themes. The values under “human decency” are subsumed for the themes of “professional character” and “healthcare practice”. The values under “professional character” are subsumed for the theme of “healthcare practice”.

The HPCSA (2008a:3) acknowledges that, “In concrete cases, the demands of these core values and standards may clash, thus making competing demands on health care practitioners.” Consequently, they describe an ethical reasoning process for use when such conflict arises (HPCSA 2008a:3).

Edwards, Braunack-Mayer and Jones (2005:229) propose a “model of clinical reasoning which demonstrates how ethical reasoning can be considered in a wider clinical-reasoning framework without reducing the complex, moral dimensions of ethical reasoning to merely logical and rational processes of clinical decision-making" (cf. Section 3.5.2.2; 3.5.2.3). Edwards *et al.* (2005:232-233) discuss the relationship between "pattern recognition" and "case-based ethical reasoning", and the ethical principles associated with hypothetico-deductive reasoning (cf. Section 2.5.2.3). Bowles (2009:4 of 8) affirms the difficulty of assessing ethical values and other aspects of professionalism using a competency-based system. The argument by Bowles (2009:4 of 8) supports a case-specific application of ethical values in clinical practice where such competencies "imply a sense of adaptability and prudence to meet the requirements of a particular situation rather than the application of a common principle in any situation."

TABLE 3.3: CHARACTERISATION BY RESEARCHER OF THE 13 CORE ETHIC VALUES IDENTIFIED AND DEFINED BY THE HPCSA (2008A:2-3)

Human decency	Professional character	Healthcare practice
Respect for persons	Integrity	Best interests or well-being: Non-maleficence
Human rights	Truthfulness	Best interest or well-being: Beneficence
Confidentiality	Tolerance	Autonomy
Compassion	Professional competence and self-improvement	Justice
	Community	

The plethora of conflict situations in ALS paramedic practice comes as no surprise given the knowledge structure of emergency care (cf. Section 3.5.2.1), the expectations of professional conduct (cf. Section 3.5.3.1), the challenges of self-determination and human interaction (cf. Section 3.5.3.2-3.5.3.3; 3.5.4.2), the rich social context of ALS paramedic practice (cf. Section 3.5.4.2), and time constraints in practice (cf. Section 3.5.3.4).

<u>Teamwork and communication</u>

Beaubien and Baker (2004:i51-i52), in the context of team development, suggest that working in a team requires both individual competencies and teamwork skills. Individual competence includes knowledge about teamwork, such as the purpose of the team and roles and responsibilities of team members. Individual skills include the clinical tasks and communication skills. Affective skills include knowing the value of teamwork and being willing to engage in a team as a preferred option. Individual competence and the way the team works together are collectively referred to as teamwork behaviours. Although team tasks may differ, five teamwork behaviours have been identified as themes occurring regularly in research and "have been observed in virtually all types of teams" (Beaubien & Baker 2004:i51). The teamwork behaviours are "team leadership, team orientation, mutual performance monitoring, back up behaviours, and adaptability" (Beaubien & Baker 2004:i51).

3.5.3.2 *Self-worth, esteem and professional identity*

ALS paramedics develop a sense of self-worth, self-esteem and status in what Kneebone (2005:551) refers to as the "community of practice". This self-perception (worth and esteem) evolves over time, from the formative phase of professional identity, to participation and contribution, to professional identity in the broader community of practice.

Paramedic students develop a professional identity through "apprenticeship based on communities of practice and of learning" (Kneebone 2005:550). Paramedic students are exposed to multiple perspectives and relationships that influence formation of their identity within the profession (Tallentire *et al.* 2011:999). Professional self-identity is formed as students' progress through the learning process, developing a sense of their own competence (knowledge, skills and attitudes) and subsequently raising confidence levels. This professional self-identity is tested and reinforced continuously as they move backward and forward between the "classroom" and work-based clinical contexts. As they interact with lecturers, other students, EMS personnel in general and qualified ALS paramedics specifically students pick up social cues about their progress and acceptance in this community of practice. Assessment and feedback (formal and informal) play a critical role in students' perceptions of competence and confidence through learning (Cantrell 2008:e20; Shinnick, Woo, Horwich & Steadman 2011:e109).

Paramedic students also develop a sense of the worth and esteem of the profession in society. Sources that ascribe value to the profession include employers, EMS personnel, other healthcare professionals and the public. A key cue for the value of the profession is the way personnel are treated by employers – by remuneration, working conditions, facilities, and staff support, amongst others (Naudé & Rothmann 2003:98; Govender 2012:63-64). What EMS personnel say about the profession and the way they behave speak volumes about the perceived status of the profession. The status and value of the profession are also experienced in the way EMS personnel are treated and perceived by other healthcare professionals. The way EMS personnel and service providers are represented in the media is an important reflection to EMS personnel of their worth in society at large.

What is particularly significant to the researcher is the subdivision of professional identity within the EMS community and the qualification hierarchy within the profession. Historically there has been conflict between the short-course ALS paramedic (CCA) and the tertiary-qualified ALS paramedic (N.Dip:EMC). A contributory factor is that both paramedics function within the same scope of practice and register in the same category with the HPCSA. Having a Technikon or University-conferred qualification is perceived to afford a higher status in society and affords the opportunity to access further higher-education qualifications. Additional drivers of this status are evidence of preferential treatment by qualification type (such as selection for employment and proficiency to teach and assess in emergency-medical-care programmes).

Professional identity has been complicated further by the recent restructuring of emergency-medical-care education, among which closure of short-course training programmes and promulgation of the two-year ECT diploma and four-year ECP professional degree. Perceptions of being sidelined and displaced in the new dispensation in an effort to professionalise EMS impact deeply on the "social self" of those affected. Unintended yet perceived messages may include, "you are no longer good enough for the profession," and "without a tertiary qualification you are not a professional".

This identity crisis has extended into the tertiary-qualified cohort of ALS paramedics holding the N.Dip:EMC qualification. The window of opportunity to obtain the B.Tech:EMC closed rapidly, making a previously uncomplicated route for progression to the highest scope of practice complicated and tortuous. The BHS:EMC is now an entry-level, full-time undergraduate qualification, whereas the B.Tech:EMC was a postgraduate, part-time qualification. Translation from an undergraduate N.Dip:EMC qualification to an undergraduate BHS:EMC qualification may require return to studying full time for a lengthy period, which is difficult for those already in the workforce. An additional aspect of perceived displacement of the N.Dip:EMC qualified paramedic is the change from being the highest qualification on-scene (implying responsibility and authority) to being subjected to the instructions and authority of a B.Tech/BHS:EMC qualified paramedic, thus reflecting a shift in the power position in clinical practice.

This complex identity framework creates unique challenges for paramedic students as emerging professionals in the community of practice where they are navigating and forming their professional identity and contributing to their “social self-preservation system” (Dickerson & Kemeny 2004:357). This identity framework informs relationships and interactions, which contribute to the “social primary frames” developed by paramedic students, and contribute to stressors in practice (Naudé & Rothmann 2003:98; Dieckmann, Gaba *et al.* 2007:185; cf. 2.4.1.5).

3.5.3.3 *Physical and psychological stress and stressors in Advanced Life Support paramedic practice*

It is necessary to understand the context of ALS paramedic practice in South Africa in order to recognise stressors and the effect stress has on the dimensions of practice (cf. Section 2.5). ALS paramedics are expected to make clinical decisions in a short amount of time and in the context of novel, unpredictable and chaotic situations. An ALS paramedic may work in isolation with a patient or be surrounded by colleagues, other healthcare professionals, family and members of the public while attending to one or more patients in a public or private setting. This combination of contexts and conditions of clinical practice provides a rich milieu of stressors for the ALS paramedic.

Stressors are events that have the potential to cause a stress response and are categorised as physical or absolute, and psychological or relative (Lupien, Maheu, Tu, Fiocco & Schramek 2007:209). Physical stressors are situations or events that impose a threat to someone’s physical well-being, such as being involved in a motor vehicle collision, being mugged or attacked by a dog. Response to these stressors is seen as adaptive and necessary for self-preservation (Lupien *et al.* 2007:210). Physical stressors in the EMS context would include threats from a hostile and aggressive person, mob action, gang violence, secondary vehicle collisions at a motor-vehicle-collision scene, and personal violence (Naudé & Rothmann 2003:98).

Psychological stressors are seen as relative and depend on an individual’s interpretation of a situation (Naudé & Rothmann 2003:92). The psychological determinants in any given situation “to induce a stress response by the body … [have] to be interpreted as being novel, and/or unpredictable, and/or the individual must have the feeling that he/she does not have control over the situation” (Lupien *et al.* 2007:210).

Dickerson & Kemeny (2004:356) suggest a central concept influencing psychological stressors is the “social evaluative conditions”, and they propose that “uncontrollable threats to the goal of maintaining the ‘social self’ … would trigger reliable and substantial cortisol changes”. The “social self” incorporates one’s perception of worth in a social context, linked to esteem, status and social value (cf. Section 3.5.3.1). These perceptions are constructed predominantly from the opinions of others (Dickerson & Kemeny 2004:357). Dickerson and Kemeny (2004:357) refer to this psychological system, which “monitors the environment for threats to one’s social esteem or social status and coordinates psychological, physiological, and behavioral responses to cope with such threats”, as the “social self-preservation system”.

Self-determination theory suggests that the willingness to learn is an important human condition required if a person is to grow and thrive (Crocker & Park 2004:398-399). Crocker and Park (2004:399) argue that the pursuit of self-esteem impedes learning and mastery. When goals of self-justification dominate the maintenance of a sense of worth and esteem, then the conflict areas essential for learning, such as criticism, negative feedback, mistakes and failures, are perceived as personal threats rather than learning opportunities. When performance is focused on validating oneself though obtaining good results or competing with others for a position in the class, then the objective of learning is lost.

A study by Crocker (2003, cited in Crocker & Park 2004:399) demonstrated that students who were academically motivated as a means of validating self-esteem chose obtaining good results over learning. Kharasch *et al.* (2011:701-702) found a 23% increase in perceived stress in a high-fidelity simulation event accompanied by awareness of being evaluated, compared to perceived stress encountered in the real clinical setting. This elevation in perceived stress may be linked to a threat of failure associated with assessment as inherent in the self-preservation system.

Unhealthy patterns of pursuing self-esteem can result in anxiety and stress that undermines learning and performance (Crocker & Park 2004:400-401). Increased cortisol levels in response to stress inhibit cognitive and affective function (Lupien *et al.* 2007:211). Stress inhibits information recall (memory) and decision-making (Crocker & Park 2004:401). Under stress performance is reduced, particularly when the task is difficult, complex or challenges the limit of the person’s ability, “as in high-stakes testing situations” (Crocker & Park 2004:401).

The researcher extends this phenomenon to the socially rich context of ALS paramedic practice. In this context, the risk of making mistakes and receiving criticism from peers, other EMS personnel and healthcare professionals, compounded by a vulnerable state of professional identity, creates conditions where the self-preservation system inhibits or represses acknowledgment of and learning from mistakes, and where safe patient care may be affected.

3.5.3.4 *Time pressure as a stressor in Advanced Life Support paramedic practice*

Time pressures imposed on ALS paramedics stem from a number of sources. Many life-threatening emergency conditions have time-dependent interventions linked to successful outcomes. The patient with an ST elevation myocardial infarction (STEMI) requires percutaneous coronary intervention (PCI) or thrombolysis within a certain time to maximise benefit from such interventions (time is muscle) (O'Connor *et al*. 2010:S790). The acute thrombotic stroke patient may benefit from thrombolytic therapy initiated within three hours of onset of symptoms (time is brain) (Jauch, Cucchiara, Adeoye, Meurer, Brice, Chan, Gentile & Hazinski 2010:S819, S823). Time pressure for the trauma patient is encapsulated in the principles of the "platinum 10 minutes" and the "golden hour" (Rogers & Rittenhouse 2014:11). Debates about the benefits of ALS paramedic treatment on patient outcomes have been balanced by concerns about delays in getting patients to hospital ("stay and play" vs. "swoop and scoop") (McNicholl 1994; Anon 2003:S15-S16; Vlesa, Steyerberg, Meeuwisa & Leenen 2004).

Other time-pressure issues relate to urgency or speed of recognition and intervention. Rapid intervention to relieve an airway obstruction is critical for survival of the patient. Cardiac arrest is a time-critical event, where delays in appropriate action, from seconds to minutes, exponentially reduce resuscitation success. For every minute delay in defibrillating ventricular fibrillation (VF) there is a 7% to 10% reduction in success in converting the rhythm without CPR, and 3% to 4% when CPR is performed (Link *et al*. 2010:S706).

Time considerations are important for determining priority of actions. Immediate defibrillation of VF is recommended if cardiac arrest is witnessed whereas, in the case of a non-witnessed arrest or delay of more than 4 minutes to intervention, 1½ to 3 minutes of CPR is recommended before a shock is delivered (Link *et al.* 2010:S706).

Time sequencing is considered critical in performance of procedures: A maximum of 10 seconds is recommended when assessing for signs of life; a 2-minute rotation between persons performing chest compressions is recommended to maximise effectiveness of performance and limit the effects of fatigue; a minimum of 100 compressions per minute is required to achieve a minimum coronary perfusion pressure of 15 mmHg associated with return of spontaneous circulation; minimising the hands-off time (compressions) when delivering shocks or reassessing the patient (Travers, Rea, Bobrow, Edelson, Berg, Sayre, Berg, Chameides, O'Connor & Swor 2010:S678). Specific time intervals between interventions such as shock delivery and drug administration are indicated (Neumar *et al*. 2010:S736).

Time pressures are also extrinsically imposed: Response times are a benchmark used to determine efficiency of EMS (time as a performance measure). Medical aids place pressure on EMS personnel to limit on-scene time (time is money).

Lupien *et al*. (2007:209) suggest that, although time pressure is one component of stress, not everyone experiences time pressure as stressful. They argue that stress "is a highly individual experience that does not depend on a particular event such as time pressure, but rather, it depends on specific psychological determinants that trigger a stress response". This suggests that the presence of a stressor does not translate to a stress response. A stress response is defined as a physiological response caused by release of stress hormones (Lupien *et al*. 2007:211).

3.5.3.5 *The good, the bad and the ugly of stress in Advanced Life Support paramedic practice*

Emotional stress and trauma are highly associated with the nature of the work ALS paramedics need to perform. The reason for this is stated by Regehr, Goldberg, Glancy and Knott (2002:953) as the "consequences of exposure to tragic and gruesome events in emergency-service work". Specific patient-related traumatic events include death of a child, murders, suicide, multi-casualty situations and death of a patient while in the care of the paramedic (Regehr *et al.* 2002:955; Bentley, Crawford, Wilkins III, Fernandez & Studnek 2013:330). Paramedics are also at risk of exposure to personal injury and violence in the context of their duties, which adds to the emotional burden of the job (cf. Section 2.5.4). ALS paramedics are exposed to more critical patients and have a higher level of responsibility of patient care than other cohorts of EMS personnel (Bentley *et al*. 2013:335).

A study cited by Bentley *et al*. (2013:330) claims that 69% of EMS professionals have insufficient recovery time between traumatic experiences. Regehr *et al*. (2002:953-954) cited consequences of emotional trauma amongst ALS paramedics to include memory impairment, loss of concentration, irritation and anger, emotional numbness and substance abuse (drugs and alcohol). Long-term consequences of unresolved emotional trauma include decreased productivity, absenteeism, depression and early retirement due to physical and mental illness (Bentley *et al*. 2013:330). MacFarlane *et al*. (2005:147) suggest that high exposure to trauma is a significant cause of burnout amongst ALS paramedics in South Africa.

Stassen, Van Nugteren and Stein (2012:2 of 3) report a 30% complete burnout rate and 63% partial burnout rate amongst ALS paramedics in the Johannesburg area. Contributing factors include working conditions (38%), patient-care factors (23%) and personal-domain factors (53%).

Despite these stressors, ALS paramedics can develop resistance and provide a meaningful level of safe practice. Once the response to a stressor manifests as stress leading to the physiological stress response, the effectiveness of a paramedic is at risk. In particular, cognitive function in terms of clinical reasoning and clinical decision-making is negatively affected.

Kharasch, Aitcheson, Pettineo *et al.* (2011:704) highlight the paradoxical influence of stress on cognitive function. Some of the benefits of psychological stress include improvement in "decision-making, memory retrieval, and focus". Crocker and Park (2004:401) suggest that, although stress may improve performance; it only does so when tasks are familiar and well-learned.

Conversely, psychological stress can notably interfere with cognitive function. This suggests that a sufficient amount of stress can enhance cognitive function but too much stress can inhibit performance (Arora, Sevdalis, Aggarwal, Sirimanna, Darzi & Kneebone 2010:2588). In the clinical setting, an overload of stress can therefore increase risk to patients (Kharasch, Aitcheson, Pettineo *et al.* 2011:704). Stress can result in negative attitudes toward patients, which manifest as "trivializing patient's complaints and making inaccurate diagnoses" (Bentley *et al*. 2013:331).

The challenges to effective clinical decision-making are compounded by complex interaction of variables, such as the physical environment (noise, poor lighting, temperature, space availability) and time pressure, lack of transparency, interdependence, limited diagnostic tools and high reliance on sensory information (auscultation, percussion, inspection [observation] and palpation) (Zimmer *et al*. 2010:882). Resistance to stress amongst paramedics is related to length of service, together with development of effective coping strategies, health status and lifestyle, personality traits and social support structures (Regehr *et al.* 2002:956; Bentley *et al*. 2013:335). Paramedics who have healthier lifestyles and maintain physical exercise have lower levels of stress, anxiety and depression than those who do not (Bentley *et al*. 2013:335).

Given the stressors of emergency medical care – the critical and urgent needs of patients, complicated environments, resource deficiencies, high expectations of performance and short-duration short-course training programmes or limited time in tertiary programmes, the concern about using simulation primarily for summative assessment places enormous strain on instructors and students and may contribute to an unintended learning environment that is inherently unsafe and obstructs learning (Kneebone 2005:551; cf. Section 2.5).

Kharasch, Aitcheson, Pettineo *et al*. (2011:704) suggest that, together with the need to learn how to function competently in stressful situations, "Triggering genuine internal stress is likely a significant factor in creating authenticity in a simulation laboratory". The design of integrated clinical simulation for summative assessment requires engagement of the advanced levels of cognitive and affective function despite the stress of the situation.

3.5.4 The social-professional dimension of Advanced Life Support paramedic practice

3.5.4.1 *The "rescue personality" of the Advanced Life Support paramedic*

Mitchell and Bray (1990 in Wagner 2005:online) postulate the theory of a "rescue personality", and describe it as someone who is "inner-directed, action oriented, obsessed with high standards of performance, traditional, socially conservative, easily bored, and highly dedicated". Emergency workers were furthermore described as, "people who like control, both of the situation and themselves, and enjoy being needed" (Wagner 2005:online). However, no evidence in support of these characteristics was demonstrated empirically. Wagner (2005:online) concludes after a literature review that little evidence was available to inform a "distinct personality type that is reflective of emergency service workers as a whole".

Wagner (2005:online) suggests the possibility that EMS personnel possess characteristics distinct from other emergency workers, such as police and firefighters, based on the "unique nature of their organizational and response tasks". Two hypotheses are presented as possible explanations of the characteristics associated with EMS personnel: the first is the socialisation model, which hypothesises that the individual acquires characteristics consistent with effective performance in the job, and the second, the predispositional model, which suggests that those who choose to join EMS have similar pre-employment characteristics.

So what are the "ideal" paramedic traits?

1. Honesty
2. Integrity
3. Desire to help people
4. Confidence
5. Strength in oneself (whatever that means)

What are the actual paramedic traits that most paramedics who appear to last in the job have?

1. Risk taking personalities (most Ambos will either ride motor bikes, climb mountains, or do some other form of high risk taking activity on their days off).
2. Enjoy excitement and easily bored (I know, it seems to go against most of our work-load that is very mundane and routine, but most paramedics have a tendency to search for excitement, and find that they get bored easily if they do too many similar things in a day).
3. A genuine desire (or at least willingness) to help others and do what is best for their patients.
4. Ability to fake confidence (you don't have to be confident, so long as you can appear confident, that will do fine).
5. Discipline and ability to get up at all hours and do the job (irrespective of how much you want to roll over and go back to bed in winter).

FIGURE 3.16: EXAMPLE OF "POPULAR" PROPAGANDA EXPRESSING PARAMEDIC TRAITS (http://www.emergencymedicalparamedic.com/paramedic-personality-traits/ [retrieved 17 April 2015])

The non-technical skills in clinical simulation are observed by assessors through the professional expectation of personality characteristics that are deemed essential for good ALS paramedic practice. This includes aspects such as taking control, assertiveness and confidence (cf. Section 5.3.5).

3.5.4.2 *The social context of Advanced Life Support paramedic practice*

ALS paramedics conduct their practice in the community. The public nature of paramedic practice is one of the unique aspects of the profession. Duties are performed under observation of other EMS personnel (private and public sector), other emergency service personnel, family members and the public. The actions of ALS paramedics are subject to scrutiny by other healthcare practitioners from various disciplines and specialities, such as nurses, midwives, general practitioners, emergency medicine specialists, gynaecologists, paediatricians, cardiologists, neurosurgeons and internists. This “spotlight” context of practice impacts on patient privacy and magnifies the “social evaluative conditions” of EMS practice (Dickerson & Kemeny 2004:356; cf. Section 3.5.3.1).

3.6 CONCLUSION

In this chapter, a review of the literature to obtain broader perspectives on the use of clinical simulation as an integrated assessment instrument was explored. In order to achieve this, a conceptual understanding of healthcare simulation was deliberated. An in-depth discussion on the elements of assessment criteria relevant to ALS paramedic practice was provided. Factors relevant to case types and classification were considered in the framework of ALS paramedic practice and assessment criteria.

In Chapter 4, entitled **Research design and methodology**, the research design, methodology and methods will be deliberated. To achieve this, theoretical perspectives on research design and methodology employed in this study will be presented. The research methods will then be elucidated, followed by a discussion on the trustworthiness and ethical considerations of the study.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

In Chapters 2 and 3 the theoretical perspectives gained from document analysis and review of the literature were explored. The purpose of this analysis was to establish justification for researching the problem and to contextualise the research problem and its elements within relevant documents and scholarly work (literature). This process is essential for the research approach utilised in the study and it serves as a framework within which to interpret data and generate a theory that can be used to address the research problem and compare this with theories presented in existing literature.

In this chapter, the research design, methodology and methods will be deliberated. Theoretical perspectives on research design and methodology employed in this study will be presented. The research methods will then be elucidated, which will be followed by a discussion on the trustworthiness and ethical considerations of the study.

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4.2 THEORETICAL PERSPECTIVES ON THE RESEARCH DESIGN

4.2.1 Theory building

Mouton (2001:177) defines theory as *“*a set of statements that makes explanatory or causal claims about reality”. Gay and Weaver (2011:24) argue that the definition of “theory” depends on the interpretive framework or worldview of the researcher, and the paradigms informing the research methodology. They state that,

Consequently, issues such as definition, criteria, and purpose reflect an a priori commitment to certain pre-suppositional assumptions about what constitutes knowledge (epistemology), reality (metaphysics), the nature of being or existence (ontology), values (axiology), and other basic philosophical issues” (Gay & Weaver 2011: 24)*.*

Since a qualitative research approach is utilised in this study, the following three meanings of theory as outlined by Creswell (2014: 64-65) apply in the context of this research approach:

- Theory as “a broad explanation for behaviour and attitudes”;
- Theory as a “lens or perspective” that influences the research problem, data collection and data analysis; and
- Theory as an intended outcome of the study in its contribution to informing perspectives about the problem through emerging “patterns, theories, or generalizations that are then compared with personal experience or with existing literature on the topic”.

These meanings provide the theoretical framework that contextualises and justifies the research study within a qualitative research approach. From these meanings, it can be deduced that three interconnected sources inform theory-building in this study:

- The contextual experiences and perspectives of the researcher;
- That which is currently known and understood by the broader community connected to the research problem and derived from documents and literature; and
- That which is derived from the empirical phase of this study and how this links back into the broader understanding of the problem.

4.2.2 Strategy of inquiry and research approach

Creswell (2014:3) defines a research approach as “plans and procedures for research that span the steps from broad assumptions to detailed methods of data collection, analysis and interpretation.” Morrow (2007:11) argues that the nature of the research problem determines the research approach (also referred to as a strategy) to be used to discover answers to the problem. Together with the research problem, other conditions for selecting a research approach are contingent on factors identified by Creswell (2014:6; 20-21) as involving the personal experience of the researcher, the end-users of the reported research, the worldview (also known as paradigm or epistemology and ontology), the design, and methods.

The three major research approaches are quantitative, qualitative and mixed-methods research (Creswell 2014:3-4). This study utilises a qualitative approach to address the research problem. Creswell (2013:44) defines qualitative research as a process that,

begins with assumptions and the use of interpretive/theoretical frameworks that inform the study of research problems addressing the meaning individuals or groups ascribe to a social or human problem. To study the problem, qualitative researchers use an emerging qualitative approach to enquiry, the collection of data in a natural setting sensitive to the people and places under study, and data analysis that is both inductive and deductive and establishes patterns or themes. The final written report or presentation includes the voices of participants, the reflexivity of the researcher, a complex description and interpretation of the problem, and its contribution to the literature or a call for change.

Simulation assessment and case typology represent a context of emergency medical care combining educational methodology and clinical practice. Human interaction with a simulated clinical environment is observed and interpreted by assessors (cf. Section 3.3.2.2). This context of human interaction places the research problem in a professional social context. Human participants are thus a significant source of data, making a qualitative research approach the best fit for addressing this problem.

The research problem is identified as originating from a "real-life problem" (Creswell 2014:20) experienced by the researcher in his work context and background. The research problem originated from the experience of the researcher when he was a student, being assessed by means of integrated clinical simulation, and subsequently, as an educator who uses simulation extensively as a summative assessment instrument in various emergency-medical-care programmes. The researcher has also reflected on his own perspectives and those of colleagues who share the same imposed mandate for using this instrument and who have expressed discomfort and uncertainty about how best to go about it (cf. Section 2.3.3).

A paradigm is defined by Guba and Lincoln (1994:105) as "the basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways". Kinash (n.d.:1) refers to a paradigm as a "matrix of beliefs and perspectives" about what research is and what methodologies and methods are appropriate for addressing the research problem. The term paradigm is used synonymously with the terms philosophy or worldview (Creswell 2014:5). Carter and Little (2007:1320-1323) refer to the intimate relationship between epistemology, methodology and methods in the context of qualitative research. They argue that, “Methodologies justify methods, and methods produce knowledge, so methodologies have epistemic content” (2007:1321) and, “Objectives, research questions, and design shape the choice of methodology, and methodology shapes the objectives, research questions, and design” (2007:1323). The methodology, in turn, determines the prescribed actions that are required to complete the research cycle (Carter & Little 2007:1323-1324).

The paradigm of the researcher underlies the research being presented and underpins the choice of the research topic, the design and methodology of research (cf. Section 1.5; Creswell 2013:15). The researcher possesses a set of experiences, interpretations and biases regarding the phenomena in question (cf. Section 1.5). As stated by Creswell (2013:15), “A close tie does exist between the philosophy that one brings to the research act and how one proceeds to use a framework to shroud his or her inquiry”. In the context of this qualitative research study, the researcher participates as a co-contributor or instrument in the research process through inductive analysis of data and construction of meaning, and through deductive interpretation of results through the lens of personal experience, analysis of documents and the body of scholarship (Creswell 2013:45; Erlingsson & Brysiewicz 2013:94).

Not only does the researcher possess these assumptions and beliefs, but by virtue of his professional experience and standing in the emergency-medical-care community, he is connected to participants and in consequence may have influenced participants’ perspectives and opinions related to the research problem through previous interactions. This possibility is raised by Morrow (2007: 215), who states that,

Identifying the researcher’s social positioning in relation to the participants in the study provides the reader with an understanding of the relative privilege and power held by the investigator and participants, as well as shedding light on the worldview of the researcher or the lens through which she or he views the participants and the phenomenon of interest.

This study is situated in the constructive-interpretivist paradigm, in which the ontological premise recognises the complex nature of human interaction, where multiple realities are possible (Morrow 2007:213). Knowledge is derived (epistemology) from understanding these realities, which emerge from the opinions and perspectives of the participants (Creswell 2013:16). The participants in the research process all contribute their meanings and interpretations to the research problem. Participants in this study include the focus-group interviewees, the researcher and study leaders (Creswell 2013:16; Morrow 2007:213).

A “strategy of inquiry” or “research design” is referred to by Creswell (2014:12) as “types of inquiry within qualitative, quantitative, and mixed-methods approaches that provide specific direction for procedures in a research design”. Carter and Little (2007:1318) equate “strategy of inquiry” to “methodology”, which serves to enhance understanding of the research process and justify the methods used. Methodology is construed by Guba and Lincoln (1994:108) as the way one goes about finding this knowledge.

A number of methodologies have been identified within the qualitative research approach. These include narrative research, phenomenology, grounded theory, ethnography, case studies and action research (Creswell 2014:13-14; Carter & Little 2007:1318).

A grounded theory design was initially considered, but due to a need to standardise the focus-group interviews (cf. Section 4.3.3.2) and limit the discussion to predefined topics, the case-study methodology was deemed more appropriate for the study. As stated by Kidd and Parchall (2000: 296) concerning the use of focus groups,

Constraining discussion to a focal situation or experience may run counter to some of the assumptions underlying grounded theory. In addition, the interview guide in a focus group study may or may not evolve over a series of groups, whereas such evolution is intrinsic to the constant comparative method of grounded theory.”

In this study there was no evolution of the interview guide because questions remained the same for all the focus groups (cf. Section 5.2.4.2).

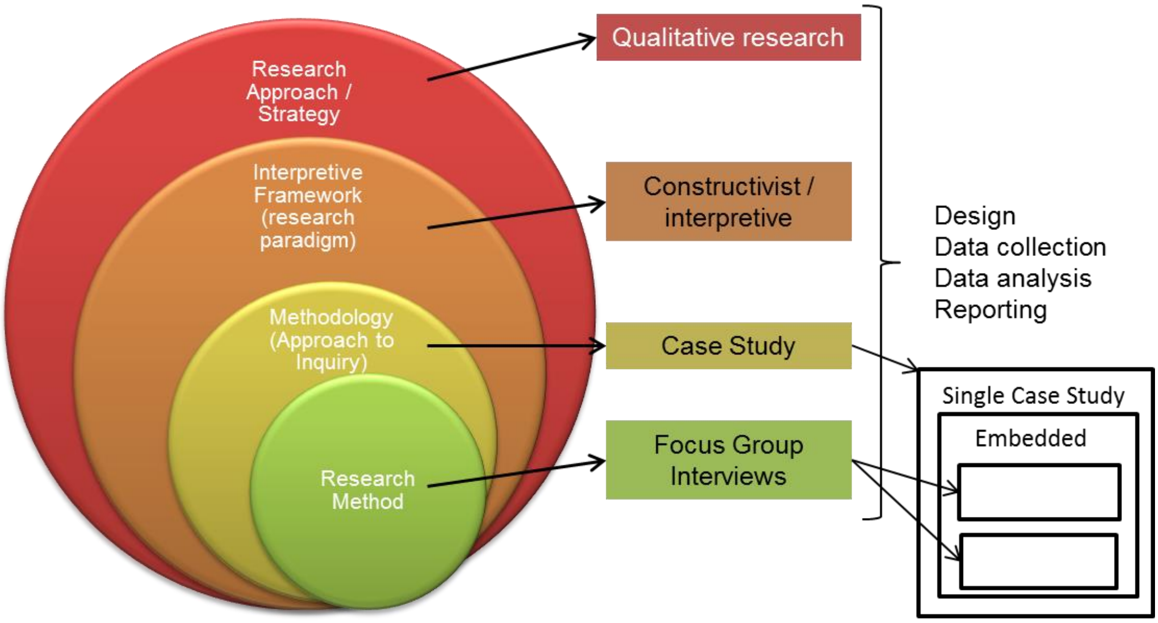


FIGURE 4.1: CONTEXTUAL FRAMEWORK ILLUSTRATING THE RESEARCH DESIGN OF THIS STUDY (adapted from Creswell 2014:3-6; Morrow 2007; Haverkamp & Young 2007; Yin 2012:7-9)

In this study, the researcher uses an embedded, single-case study design (Yin 2012:7). A case in the context of this methodology is defined by Yin (2012:6) as,

the main unit of analysis in a case study ... generally a bounded entity (a person, organization, behavioural condition, event, or other social phenomenon), but the boundary between the case and its contextual conditions — in both spatial and temporal dimensions — may be blurred.

The "main unit of analysis" in this study is integrated clinical simulation as a summative assessment instrument, for which there are two embedded subcases; "assessment criteria" and "clinical case types or scenarios" (Figure 4.2).

The epistemic and ontological features of the case-study methodology are that knowledge is discoverable from a real-world context in which multiple realities are possible, and interpretations made from these realities provide thick descriptions and insightful explanations of the phenomena under study (Yin 2012:5). A systematic, rigorous process enables the researcher to cover the scope of exploration, description and explanation (Yin 2012:6). Generalisation is possible through analytical rather than statistical processes (Yin 2012:6, 18).

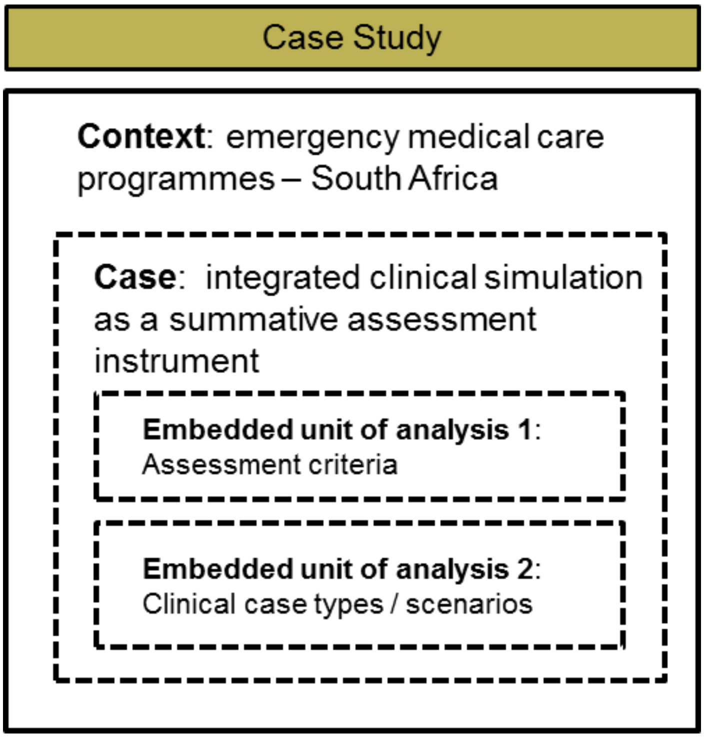


FIGURE 4.2: SCHEMATIC DIAGRAM OF AN EMBEDDED SINGLE CASE STUDY DESIGN (adapted from Yin 2012:7-9)

Ponterotto (2006:546) argues that "thick description" can be applied to a wide range of qualitative research approaches, including the case study. From analysing the origin and evolution of the concept thick description, Ponterotto (2006:538-543) suggests the following rich definition of the concept:

Thick description refers to the researcher's task of both describing and interpreting observed social action (or behavior) within its particular context … Thick description accurately describes observed social actions and assigns purpose and intentionality to these actions, by way of the researcher's understanding and clear description of the context under which the social actions took place. Thick description captures the thoughts and feelings of participants as well as the often complex web of relationships among them. Thick description leads to thick interpretation, which in turn leads to thick meaning of the research findings for the researchers and participants themselves, and for the report's intended readership. Thick meaning of findings leads readers to a sense of verisimilitude, wherein they can cognitively and emotively "place" themselves within the research context. (p. 543)

4.2.3 The research design of this study

Contextualising the research problem is essential to establish the legitimacy of the problem (Mouton 2001:86-87). The problem is situated in education as it relates to emergency-medical-care programmes in South Africa. The relevance of the problem is understood by establishing the mandate of patient simulation as a summative assessment instrument and the power position of regulating bodies that enforce this mandate. This contextualisation of the research problem was achieved by analysing relevant documents that refer to these premises (cf. Section 2.3.1). The importance of the study was emphasised by the influence these documents have by virtue of the powers vested in the regulatory bodies generating these documents (context analysis) (Miller & Alvarado 2005:351-352). The research problem was formulated in response to a lack of guidance from the bodies regulating emergency-medical-care programmes in South Africa in the form of published criteria and assessment methods for using patient simulation as an assessment instrument.

Specific clinical conditions and emergencies that ALS personnel are expected to manage were identified in the various curriculum documents and examples cited in the content of Emergency Medical Care Programme documents of the Central University of Technology. The next step was to position the research problem in the broader framework of the "body of accumulated scholarship" (Mouton 2001:6) in order to conceptualise the relevant facets informing the problem, and to identify theories developed from related studies (Mouton 2001:87). The theoretical perspectives derived from the literature argue the suitability of simulation for emergency-medical-care-education and its validity as an instrument for authentic assessment. The relationship between simulator characteristics, simulation design and the real clinical setting was deliberated. It was also argued that simulation has significant elements of social construction that rely on negotiated engagement to achieve its stated purpose. It was also reasoned that the success of medical simulation relies on its acceptance by faculty and learners, who should recognise its meaningful connections with the real world of clinical practice and therefore its strategic role in facilitation and assessment of learning (cf. Chapter 3).

This understanding of the suitability of healthcare simulation for assessment led the researcher to ask questions about what should be assessed, as a first step on the continuum of how it should be assessed. Two answers to the question, "what is important?", were identified: (1) the criteria; and (2) the case types or scenarios that will elicit these criteria. Although the criteria should be identified in order to create an assessment method to grade simulation events, the development of an assessment method was not included in the scope of this study, but is suggested as a subject for future studies.

The next step was determining the kind of data that should be obtained, and identifying appropriate sources of this data. The kinds of data and sources of data, in turn, informed the research methods that were best suited to obtaining this data. It was reasoned that a significant source of data would be people with experience relating to the phenomena being investigated (cf. Section 5.2.2). This conclusion meant that a qualitative research strategy or approach was necessary, due to the method of data collection, analysis and reporting that was required. The research method was contextualised within a methodology and research paradigm.

The researcher, as a novice researcher in the process of conducting research with the aim of obtaining a Master's qualification, engaged with the discourse on research approaches, methodologies and methods in an attempt to position and contextualise the problem and to engage with established processes, and to ensure rigor in the study.

In the context of this study, the focus-group interview was selected as a suitable method for data collection. The focus-group interview is defined by Morgan (1996:130) as "a research technique that collects data through group interaction on a topic determined by the researcher" and that can either be used as the sole method of data collection, or be combined with other methods (Morgan 1996:130). This method of data collection relies on group collaboration to generate meaning about the topic under discussion, in contrast to in-depth interviews and the Delphi process, where the anonymity of participants is a prerequisite (Sim & Snell 1996:190; Skulmoski, Hartman & Krahn 2007:3-4; Landeta 2006:468-469)

After exploring perspectives on the use of focus groups as contained in the literature, the researcher concluded that it was an appropriate method of data collection for this study, for the following reasons:

- The benefit of group dynamics through interaction could enhance the depth and scope of the discussion beyond that provided by individual discussions, and would provide meaningful contributions through reflections about attitude toward the problem (Hyde, Howlett, Brady & Drennan 2005:2589).

- Providing opportunity for ALS paramedics to voice their opinions, perspectives and attitudes may provide additional data that challenge underlying assumptions imposed by regulating bodies, as well as reveal meaning and interpretations relating to the problem, which are either supported or refuted by the literature (Hyde *et al*. 2005:2594; Jayasekara 2012:412).
- The target population of qualified ALS paramedics is considered by the researcher to possess the background experience relevant the research problem, and they could thus contribute meaningful opinions and perspectives by virtue of the fact that they possess the clinical experience required for inclusion in the study, as well as educational experience as students.
- There are sufficient participants available in the Bloemfontein area who meet the criteria for inclusion, to conduct an adequate number of focus-group discussions, and to achieve theoretical saturation (the point at which no new ideas would be generated across the groups).

It was reasoned that the experience gained by ALS paramedics in clinical practice, and their experiences as students who were subjected to summative patient simulation assessments, positioned them as an important source of data that could inform the problem. Since the two experiences (clinical experience in the out-of-hospital context and being assessed by means of patient simulation) are shared experiences, the use of a collaborative method such as group discussions is appropriate for obtaining data to inform the research problem. Furthermore, some of the ALS paramedics involved in the study also possess experience in designing, conducting and assessing patient simulations in an emergency-medical-care programme, though this was not an inclusion criterion for participating in the focus-group discussions (cf. Section 5.2.2). The advantages of using focus groups to address the research problem are as follows.

- A focus group is suitable for identifying areas of both consensus and contention amongst participants within a group and between groups;
- In the process of discussion and interaction, participants can express a shared understanding of the problem, which can lead to further development of perspectives arising from focus-group discussion; and
- Emerging issues not directly addressed by questions but originating in the context of group discussion and relevant to understanding the problem in a broader context, can be identified.

The limitations of the focus group in the context of this study include the following.

- The influence of a dominant or imposed view (that of regulating bodies) may inhibit discussion that contradicts this view or that suggests alternative and conflicting opinions;
- Giving participants the opportunity to voice opinions and perspectives may result in the focus of discussions shifting to unrelated topics, which may detract from eliciting perspectives and opinions central to the problem;
- In a group context, participants are not always willing to share their vulnerabilities or uncertainties, and may simply agree with views of others without contributing their own opinions and perspectives (Jayasekara 2012:414); and
- One or more participants may dominate the discussion, which may suppress the views of more reserved participant(s) (Jayasekara 2012:414).

These limitations can be mitigated by managing the physical setting of focus-group discussions, the role of the facilitator and the procedure for conducting the discussion (cf. Section 5.2.4). The physical setting in which focus-group discussions are conducted should be a safe and comfortable and present a non-threatening environment (Stewart, Shamdasani & Rook 2007:2 of 22; Sim & Snell 1996:191).

A recommendation for encouraging interaction while maintaining a non-threatening environment is to seat participants around a table so that they can see each other and the moderator. As argued by Stewart *et al. (*2007: 3-4 of 22),

A table provides something of a protective barrier between respondents that gives less secure or more reserved members of the group a sense of security. It also helps establish a sense of territoriality and personal space that makes participants more comfortable. In groups consisting of both men and women, a table provides a shield for the legs, eliminating a source of distraction. Finally, a table provides a place for resting one's arms and hands and when food is served, may eliminate gymnastics associated with handling plates and cups in one's lap.

The role of the facilitator is to encourage as much participation and interaction as possible, to elicit as much information relevant to the topic as possible, and to keep the discussion focused on the topic. An essential part of achieving this is for the facilitator to create a safe and non-judgemental environment in which participants are free to express themselves openly – especially when conflicting opinions are offered (Stewart *et al*. 2007:2 of 22)

Openness and trust are encouraged by establishing clear ground rules for the discussion, and reassuring participants of the confidential nature of discussion and the value of their opinions (Stewart *et al*. 2007:9-10 of 22).

4.3 RESEARCH METHODS

4.3.1 Analysis of documents

An analysis of documents was used in this study to establish the contextual relevance of the problem. Documents identified for analysis included those establishing the HPCSA: PBEC as a legislated authority for matters relating to emergency-medical-care education in South Africa. Documents generated by the HPCSA: PBEC and informing assessment practices for these emergency-medical-care programmes were analysed and discussed in relation to the research problem.

Other documents included emergency-medical-care programme curricula published by SAQA, HEQC programme-accreditation criteria, and examples of simulation assessment practices included in the emergency-medical-care programme promulgated by PBEC. The information contained in these documents served to contextualise the research problem by clarifying the mandate imposed by the regulating bodies for utilising simulation as a summative assessment instrument, and to inform the framework for identifying case types relevant to this assessment instrument.

Using documents as data source contributes to triangulation, by presenting a theoretical "lens" (Hussein 2009: 3) through which the relationship between the opinions and perspectives of participants and the mandate for using patient simulation as an assessment instrument can be viewed and contribute to the interpretation of the data obtained from participants.

4.3.2 Literature overview

Mouton (2001:87) refers to literature as the "body of accumulated scholarship", and thus refers to the literature review as a "scholarship review". The focus of reviewing literature is to explore "the most recent, credible and relevant scholarship in your area of interest"

(Mouton 2001:87). Mouton (2001:87) and Creswell (2014:27-28) suggest the following reasons for such a review:

- To justify the research by clarifying the gap in the area of study and its relevance (cf. Section 1.2);
- To clarify terminology relevant to the study by determining widely accepted terms and their meanings;
- To identify and understand current and authoritative theories and models that inform the research problem and which provide a conceptual framework within which to interpret data from this study (cf. Chapters 2 and 3); and
- To explore methodology and outcomes of studies similar to the research being conducted.

The literature review also serves to identify and clarify well-developed presuppositions underpinning the phenomena under investigation, which include principles of assessment, simulation events as an assessment instrument and case types reflected in acute-care and emergency-care settings. Furthermore, exploring similar studies that have been conducted and that contribute to the theories that inform the research problem provides a lens through which the opinions and perspectives of the participants in this study can be analysed.

The researcher used the academic search platforms provided by the University of the Free State and Central University of Technology. Journals dedicated to publishing scholarly research into medical simulation, such as *Simulation in Healthcare, Clinical Simulation in Nursing* and *The Internet Journal of Medical Simulation,* were consulted. General search engines, such as Google and Google Scholar, were used for general searches, which identified sources that could be accessed through the one of the universities' platforms. Journals relating to emergency medicine and emergency medical care were also consulted for articles concerning case scenarios and the use of simulation for assessment. Journal databases such as Science Direct and Ebscohost were utilised.

Search terms included "simulation assessment", "high-stakes tests using medical simulation" and "assessment criteria". The researcher also used the snowball effect by obtaining additional sources from reference lists in relevant articles addressing aspects of the research problem.

4.3.3 Focus-group interviews

4.3.3.1 *Theoretical aspects*

The focus-group interview is an appropriate and common qualitative research method used to obtain in-depth information about perceptions and experiences of a select group of people in order to answer a research question (Jayasekara 2012:413; Moretti, Van Vliet, Bensing, Deledda, Mazz, Rimondini, Zimmermann & Fletcher 2011:426). It is a method that supports the social constructivist (Creswell 2013:25) and interpretivist paradigms (Jayasekara 2012:412), according to which meaning is derived from subjective interpretation of experiences. In the context of the focus-group discussion, the researcher relies on the perspectives of participants and participant interaction for negotiating new meaning – Jayasekara (2012:11) identifies this as the key characteristic of focus-group interviews.

For the purpose of this study, the clinical experience of ALS paramedics as it relates to dealing with life-threatening emergencies, as well as the experience and perceptions of ALS paramedics regarding assessment using integrated clinical simulation, is a valuable source of knowledge for establishing assessment criteria and case types appropriate for use in simulation assessment. As stated by Jayasekara (2012:412), "the focus group provides a means of listening to the perspective of key stakeholders and learning from their experiences of the phenomenon". By using focus-group interviews instead of other qualitative methods the researcher expected to achieve the enhancement of information through group interaction (Bender & Ewbank 1994:64; Hyde *et al*. 2005:2588-9).

4.3.3.2 *Focus-group questionnaire*

Focus-group-interview questions were constructed to elicit perspectives relevant to the elements of assessment criteria and associated case types or scenarios that relate to the authentic situation. These elements of assessment criteria and case types are perceived by the researcher to be explicitly and intuitively linked to the real-world requirements of the job and performance of ALS paramedics. The construction of the focus-group questions was thus influenced by the experience of the researcher as a clinician and educator.

A total of four questions relevant to the research problem were formulated to elicit responses from the participants (Appendix C). In order to determine assessment criteria when using patient simulation as a summative assessment instrument, the questions focused on the following areas:

- The behaviours and attitudes required of an ALS paramedic if he/she is to manage a critical patient in the out-of-hospital context effectively; and
- Competencies that should be assessed when using integrated clinical simulation as an assessment instrument for emergency medical care in South Africa.

In order to address case types or scenarios that should be used as simulation events for summative assessment, the questions focused on the following areas:

- Case types or scenarios that present the best opportunity to determine the ability of an ALS paramedic to deal with a life-threatening condition effectively and which are essential for simulations; and
- Factors that should be included in the design of integrated clinical simulations for the purpose of summative assessment.

The questionnaire was standardised for all four groups to enable comparison of responses across the different groups (Morgan 1996:142-143). No modifications or changes were made to the questionnaire during the data-gathering process.

4.3.3.3 *Sample selection*

Onwuegbuzie and Leech (2007:239) refer to sampling methods as “sampling schemes” and define them as “specific techniques that are utilized to select units”. In this study, the specific “units” are members of the ALS paramedic population who meet the inclusion criteria. Methods for sampling in qualitative research include random and non-random sampling. Since the phenomena under study are best understood by persons with a background of and experience with these phenomena, the sampling scheme required a non-random sampling method (Onwuegbuzie & Leech 2007:242). Non-random sampling methods include convenience sampling, purposive sampling and theoretical sampling (Marshall 1996:523; Poggenpoel & Myburgh 2011:12).

In this study a combination of purposive and convenience sampling methods was used. Purposive sampling was used in this study in two ways: the first involved recruiting participants who met the inclusion criteria of qualification and experience relevant to the phenomena being investigated (Marshall 1996:523), and the second involved allocating participants to a particular focus group based on type of ALS qualification. The convenience sampling method was based on ease of access to participants (Marshall 1996:523; Saumure & Given 2008:online). For the purpose of this study a sufficient number of ALS paramedics were able to participate in focus-group discussions in Bloemfontein. The researcher used a single-stage sampling procedure, because he had direct access to participants as a result of prior professional interactions and networking within the ALS paramedic community identified for inclusion in the study (Creswell 2014:158).

The recommended number of participants in a focus group ranges from four to 12 members (Bender & Ewbank 1994:65; Jayasekara 2012:413; Tong, Sainsbury & Craig 2007:351). The ideal group size and composition depends on the nature of the problem being investigated – whether broad or narrow, the complexity of the issue and the sensitivity of the topic (Bender & Ewbank 1994:65; Morgan 1996:144; Jayasekara 2012:413). The objective is to obtain sufficient variation regarding perspectives without fragmentation and loss of control of the discussion, especially where a narrow focus is required (Rabiee 2004:656). Because the topic under investigation in this study was well defined and focused, smaller groups were appropriate for eliciting maximum engagement with the topic by participants.

The number of focus-group discussions required to generate sufficient data is suggested by Jayasekara (2012:413) to be between four and six groups. The number depends on the point at which theoretical saturation is reached, which is determined by emergence of clear patterns, or where repetition of ideas occurs across groups in aspects of agreement and disagreement (Rabiee 2004:656; Hyde *et al*. 2005:2591).

Although the groups are considered to be homogenous in the sense that participants are in the same profession and have similar professional backgrounds, there are aspects that contributed to diversity among participants in a group. These aspects include differences in scope of practice and whether their training took place at a University of Technology or an Ambulance Training College. In some cases, participants obtained their educational experience at both types of institutions, and/or their qualifications from two different Universities of Technology (cf. Section 5.2.2). The purpose of the study did not include comparing perspectives based on type of ALS qualification attained nor the type of institution through which this qualification was obtained. The researcher anticipated that these differences would contribute to the depth and breadth of the discussion.

The researcher’s intention was also to conduct two focus-group interviews with medical doctors with at least two years clinical experience in emergency centres or trauma units in and around Bloemfontein. On conclusion of the fourth focus-group interview with ALS paramedics, there was agreement between the researcher and focus-group-interview facilitator that saturation had been achieved and that it was unnecessary to conduct focus groups with medical doctors.

4.3.3.4 *Target population*

The target population included all ALS paramedics who had obtained their qualifications in South Africa and who had a minimum of two years clinical experience at the time the focus-group interviews were conducted. The following ALS qualifications were appropriate for inclusion in the study: Emergency Care Technician (ECT), Critical Care Assistant (CCA), National Diploma: Emergency Medical Care (N.Dip:EMC), Bachelor of Technology: Emergency Medical Care and Bachelor of Health Sciences: Emergency Medical Care.

The level of qualification and clinical experience would provide sufficient background to inform phenomena under investigation. All ALS paramedics were assessed by means of integrated clinical simulations when they were students, and some have been involved in assessing students by means of integrated clinical simulation.

4.3.3.5 *Survey population*

The survey population consisted of all ALS paramedics available to participate in a focus-group discussion on the specific dates at the arranged venue in Bloemfontein. The consequence of conducting focus-group discussions only in Bloemfontein meant the survey population was restricted to ALS paramedics in Bloemfontein, or those who could travel to Bloemfontein to participate in a focus-group discussion. Despite this restriction, not all the participants had obtained their paramedical education at institutions in the Free State – some had qualified at institutions in Gauteng, KwaZulu-Natal and the Western Cape (cf. Section 5.2.2). Furthermore, many of the participants had a varied background regarding clinical experience in the private and public sectors and in different provinces.

A detailed analysis of focus-group participants is presented in Chapter 5 to clarify demographic profiles, qualifications and experience relevant to the study.

A total of 42 ALS paramedics who met the inclusion criteria were identified by the researcher. A list of names with contact numbers and email addresses was generated for all eligible ALS paramedics. An opportunity arose for the researcher to canvass for participants among ALS paramedics attending a course hosted by the emergency medical care programme at the Central University of Technology in January 2014, which attracted additional participants who were not initially identified for the study. At the time when the focus groups were conducted, there were no ALS paramedics in the survey population who possessed Emergency Care Technician or Bachelor of Health Sciences: Emergency Medical Care qualifications.

4.3.3.6 *Sample size*

Of the 42 ALS paramedics identified, seven did not respond to SMS or email, six were not available to attend on any of the dates arranged for focus-group discussions, and one sent apologies on the day he was scheduled to attend a focus-group discussion. Canvassing of participants was undertaken by the researcher with no outside assistance solicited for this purpose. The researcher used word-of-mouth, group and personal SMS, WhatsApp and email communication with prospective participants. An information document was printed and handed out or attached to an email to prospective participants (cf. Appendix B). The document provided information about the research project, the terms and conditions of involvement in the focus-group discussion and topics that would be discussed. Practical aspects, such as date, time and venue, were also provided in this document, as was a request for consent to participate.

The focus-group discussions were arranged according to the date and time that suited the facilitator and the participants best. The participants provided their work schedules and they were allocated to groups on predetermined dates that coincided with them being off duty or where arrangements with supervisors could be made. The sessions were scheduled to last a maximum of 120 minutes (cf. Appendix A). The researcher attempted to achieve an equivalent representation of the various ALS qualifications within each focus group (cf. Chapter 5.2.2).

Of the prospective participants invited to attend focus-group interviews, 28 ALS paramedics participated in the study. A total of four focus-group interviews were conducted from 15 January to 26 February 2014. Focus-group size ranged from a minimum of five to a maximum of 10 participants per group (cf. Section 5.2.1). The first focus group consisted of 10 participants, the second of 7 participants, the third of 5 participants and the last group of 6 participants. It was determined in consultation with the focus-group facilitator that that theoretical saturation had been achieved by the conclusion of the fourth focus-group discussion.

4.3.3.7 *Description of sample*

A detailed analysis of focus-group participants is presented in Chapter 5 (Section 5.2) to clarify demographic profile, qualification and experience relevant to the study. This contributes to the "thick description" in this study, by enabling the reader to "visualize the sample including their relevant demographic and psychological characteristics." (Ponterotto 2006:546).

4.3.3.8 *Exploratory interview*

Two independent persons with experience of conducting focus-group interviews were requested to review the focus-group-interview questions for clarity and fitness for purpose, and to scrutinise the procedure for conducting the interviews. Feedback was used to modify questions and the process as required.

4.3.3.9 *Data gathering*

An independent focus-group facilitator was appointed to facilitate the focus-group discussions. The facilitator was selected on the basis of his prior experience of facilitating focus groups; he had used this method extensively in his own research. The same facilitator was used for all four focus-group discussions.

Qualities required of a facilitator include the ability to encourage interaction amongst participants while engaging them in discussion relevant to the phenomena in question, while remaining impartial and respectful of opinions and perspectives voiced by participants (Sim & Snell 1996:191). This is echoed by Bender and Ewbank (1994:85), who state that,

Except for posing guiding questions, and occasionally probing, asking an additional question or making a refocusing statement in order to sustain the group's interaction, the focus-group facilitator should be a listener and a learner.

The researcher presented the facilitator with a focus-group guide (cf. Appendix C), which included a set of ground rules for the focus group, questions to ask the group, with associated prompts to stimulate discussion when necessary (Tong, Sainsbury & Craig 2007:356). The researcher also ensured the facilitator was comfortable with the guidelines and questions before the start of the first focus-group session.

The focus-group discussions were conducted in the emergency-medical-care simulation laboratory at the Central University of Technology (cf. Appendix G). The venue is carpeted, well-lit and is air-conditioned. A separate room was available, in which the researcher and independent observer could sit; it was separated from the simulation area by a one-way mirror. Having the researcher and independent observer in a separate venue may have contributed to removing the influence of their presence on participants, especially because the participants and researcher were known to each other. A sufficient number of chairs were set out around a table before the start of each focus-group session. Each place was allocated a number written on a polystyrene cup. Each participant could see the other participants and easily identify their numbers for ease of reference during the discussion (cf. Section 5.2.4).

An independent observer was arranged for each focus-group session, with the exception of the fourth session, for which a video recording was used to capture the visual interaction of the group during discussions. The purpose of having an independent observer was to detect and make notes on participant interaction and to capture the key points of discussion as a supplement to the audio recordings. Non-verbal interactions between participants, and group dynamics, which are not readily captured in the transcription of verbal information, are considered important for a more complete interpretation of data (Rabiee 2004:656).

To achieve accurate information, the focus-group discussions were voice-recorded using Dictaphones (Tong *et al*. 2007:356). Two Dictaphones were used; they served as a backup in case of technical failure. It was discovered that, despite central placement of the Dictaphone, particularly with the larger group, some of the responses were difficult to hear. Using two Dictaphones and placing them apart assisted greatly with clarity during the transcription process.

Focus-group discussions were the only method of data collection used in this study. There were no follow-up interviews with participants involved in the study.

4.3.3.10 *Data analysis*

A descriptive, systematic and inductive process of analysis was employed by the researcher and it involved the following steps (Figure 4.3):

- Analysing and reporting the demographic profiles, qualifications and experiences of focus-group participants and the researcher, as considered relevant to the research problem;
- Familiarisation with descriptive data for analysis by taking notes during the focus-group-discussion sessions, and by transcribing the voice recordings of the discussions;
- Determining the point of theoretical saturation;
- Coding, using open, axial and selective coding for categorising information relevant to the research problem;
- Allocating themes deduced from the research questions and identifying additional themes that are relevant to the problem as they emerged from the discussions; and
- Allocating coded information to relevant themes.

Babbie (2013:21) describes inductive reasoning as a process that “moves from the particular to the general, from a set of specific observations to the discovery of a pattern that represents some degree of order among all the given events”.

The data was analysed by the researcher himself. The transcriptions from each of the focus-group interviews were analysed to identify concepts for summary and categorisation into themes. Themes were derived from the research questions, and others emerged from the focus-group discussions.

In order to achieve “thick description” in reporting the results, the researcher ensured that the “voice” of participants was sufficiently represented (Ponterotto 2006:547). This was achieved by providing extensive quotes of statements by the participants. Care was taken to avoid changing the meaning of statements and ideas presented by participants. The researcher compared the data from different focus-group interviews to find similarities and differences that inform themes. This data was used, together with the theories garnered from the literature review, to suggest case types and assessment criteria for using integrated clinical simulation as a summative assessment instrument.

Finally, the data collected was integrated, summarised and displayed in tabulated form. The study leader and co-study leader, both familiar with coding qualitative data, verified themes and categories of information used by the researcher, thus contributing to triangulation of results. No software package was used to analyse the data – the data was hand-coded. The inductive and deductive process is presented in Figure 4.3.

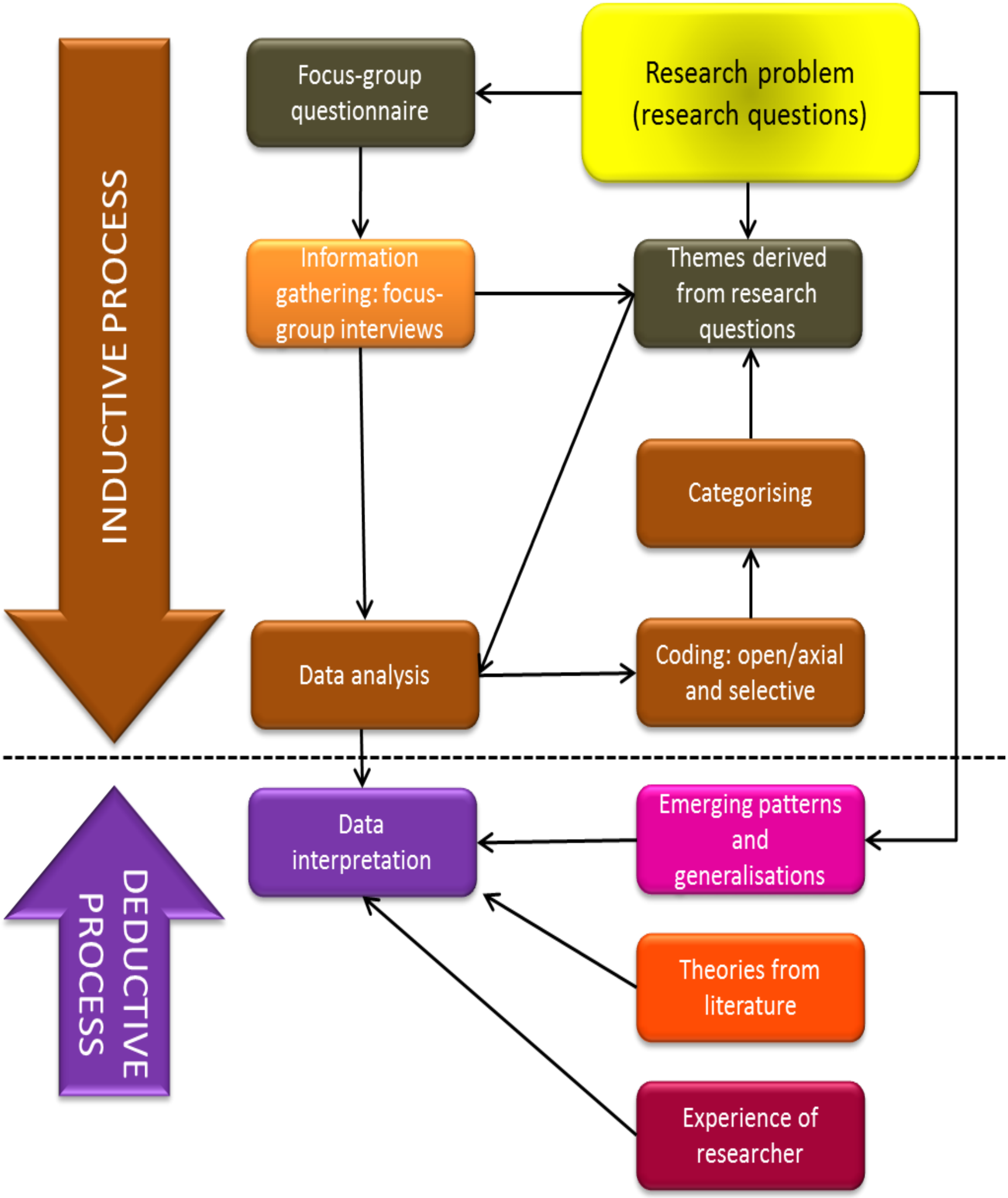


FIGURE 4.3: INDUCTIVE AND DEDUCTIVE PROCESS OF FOCUS-GROUP DATA ANALYSIS (adapted from Creswell 2014:66; 197)

4.3.3.11 *Data interpretation*

Through the repetitive and inductive process of coding, categorising and thematic construction of participants' responses and interaction, the researcher was able to extract relevant information that informed the research questions. The researcher used a deductive process to interpret information, using logical connections, past experience and theoretical perspectives derived from literature (Creswell 2014:186).

4.4 TRUSTWORTHINESS: CREDIBILITY, DEPENDABILITY, CONFIRMABILITY AND TRANSFERABILITY

4.4.1 Credibility

Credibility as a measure of trustworthiness refers to evidence that the data provided by participants is being reporting accurately (Poggenpoel & Myburgh 2011:13; Appendix D). The credibility of the study was ensured by verifying the correctness and accuracy of the transcriptions. This was achieved by careful transcription of voice recordings (word-for-word) and then asking the facilitator and focus-group members of each specific focus group to verify accuracy (Appendix H). Jayasekara (2012:414) states that "the capacity of group members to monitor and invigilate the authenticity of what is being revealed has the potential to reinforce the trustworthiness of focus groups."

The validity of any research is enhanced through triangulation (Mathison 1988:13). Triangulation is defined as,

a process of verification that increases validity by incorporating several viewpoints and methods. In the social sciences, it refers to the combination of two or more theories, data sources, methods or investigators in one study of a single phenomenon to converge on a single construct, and can be employed in both quantitative (validation) and qualitative (inquiry) studies (Yeasmin & Rahman 2012:156).

In order to achieve triangulation, at least two sources are required; they serve to establish concurrence and substantiation of the research problem and phenomena under study (Bowen 2009:28-29; Hussein 2009:3). Since only one method of data collection was used in this study, the researcher achieved triangulation by employing the study leader and co-study leader, both experienced with inductive processes of data analysis, to verify the coding of data.

The background, experience of the researcher, together with perspectives gained through the literature review, enabled the researcher to analyse, classify and report the data. Relevant quotations from focus-group participants were included as evidence of the accurate reporting of results.

4.4.2 Dependability

Dependability refers to ensuring a detailed and rigorous application and description of the research method (Poggenpoel &.Myburgh 2011:13). Dependability was ensured by using the same venue and facilitator for each of the focus-group interviews. The same interview questions were used for each focus group to engage participants in discussion and interaction regarding the research problem (Tong *et al*. 2007:351).

The venue provided a safe, comfortable and non-threatening environment for participants (cf. Section 5.2.4). The emergency-medical-care simulation laboratory (005) at the Central University of Technology was used for this purpose. The focus-group-interview sessions were recorded using a Dictaphone. Transcripts were made from the recordings and the transcripts were analysed to extract relevant information to address the research objectives and question, with evidence provided in the form of direct quotes from participants.

4.4.3 Confirmability

Confirmability refers to a transparent process, where the chain of evidence of the research process allows for review (Poggenpoel & Myburgh 2011:13). Confirmability was achieved by including a detailed description of the researcher, the participants, the process of data collection, data analysis and interpretation, which permits other researchers to compare results or design similar studies (Morettia *et al*. 2011:426). Transparency in this process was also ensured by the researcher subjecting the process for peer review and scrutiny by the supervisory team throughout the duration of the study.

4.4.4 Transferability

Transferability or applicability (Jayasekara 2012:414) refers to the ability to use the research in a similar context (Poggenpoel & Myburgh 2011: 13). In order to ensure transferability, the demographics of the focus-group members were recorded carefully. In particular, the qualification, where it had been obtained, and years of clinical practice were recorded and reported by the researcher as part of the detailed description of the research methodology, so that similar research in similar contexts can be compared.

4.5 ETHICAL CONSIDERATIONS

4.5.1 Approval

Approval for the research project was obtained from the Ethics Committee of the Faculty of Health Sciences at the University of the Free State on 26 November 2013; the ethics approval number is ECUFS 204/2013. The ethics approval number was published on documents relevant to the study.

Participation in focus groups was entirely voluntary, focus-group participants were independent practitioners registered with the HPCSA and were required to participate in their own time or make necessary arrangements to participate, thus no additional permission was required. No patients were involved in this study, therefore no permission was required in this regard. Permission to use of the venue was requested from the dean of the Faculty of Health and Environmental Sciences at the Central University of Technology, Free State (Appendix F).

4.5.2 Informed consent

Participants were provided with a brief written overview of the study and its purpose and an explanation of what is required of them, including details about the focus-group-interview process. Specific details regarding the date, time, venue and expected duration were also included. This document was only provided in English as the language used during focus-group discussions was English. Willingness to participate was confirmed by the submission of a signed consent form by participants. Contact details of the researcher, the study leader and the secretary of the Ethics Committee were provided, together with the ethics approval number.

4.5.3 Right to privacy and confidentiality

Participants were informed of the voluntary nature of participation and were given the freedom to withdraw from participation at any point in the discussion. A written assurance of the confidential nature of the content of discussions was given prior to focus-group discussions as part of obtaining informed consent.

In order to promote confidentiality during focus-group discussions, a number was allocated to each participant at the start of the focus-group session. Participants were requested to identify themselves or fellow participants by their respective numbers. Where names were mentioned in the course of discussion, these were excluded from transcriptions. Participants in a focus group were known to each other and were specifically requested to hold the discussion in confidence after the session. No documents reporting the content and results of the study contain the names of participants.

4.5.4 Minimising potential misinterpretation of results

By following a rigorous process guided by high ethical standards, procedural guidelines, scholarly application and effective supervision the researcher believes he has done everything necessary to minimise misinterpretation of the results of this study.

4.6 CONCLUSION

In this chapter, the research design, methodology and methods were deliberated. Theoretical perspectives on research design and methodology employed in this study were presented. The research methods were then elucidated, followed by a discussion on the trustworthiness and ethical considerations of the study.

In Chapter 5, entitled **Results and discussion of the findings of the focus-group interviews**, the results and a discussion of the findings of the focus-group interviews will be presented. The contextual setting of the focus groups will be discussed, including the demographic profile of participants and the researcher. This will be followed by a thematic presentation of qualitative data in the form of relevant responses of participants in support of themes and categories. A discussion of results will then be presented.

CHAPTER 5

RESULTS AND DISCUSSION OF THE FINDINGS OF THE FOCUS-GROUP INTERVIEWS

5.1 INTRODUCTION

In Chapter 4, the research design, methodology and methods were deliberated. This was achieved by discussing theoretical perspectives relating to the research design and methodology employed in this study. The research methods were then elucidated, followed by a discussion on the trustworthiness and ethical considerations of the study.

In this chapter, the results and discussion of findings from the focus-group interviews will be presented. The contextual setting of the focus groups will be discussed, including the demographic profile of participants and the researcher. This will be followed by a thematic presentation of qualitative data containing relevant responses of participants linked to the theoretical framework presented in Chapters 2 and 3. A discussion of results will then be presented.

5.2 CONTEXTUAL SETTING OF THE FOCUS-GROUP INTERVIEWS

A detailed analysis of focus-group participants is presented to clarify demographic positioning, qualifications and experience relevant to the study. Factors influencing perspectives of participants are highlighted, with evidence provided from participant responses and interactions as well as inferences made by the researcher based on his knowledge of the participant(s) and experience in the profession.

5.2.1 Demographic profile of focus-group participants

The purpose of presenting a demographic profile of focus-group participants is to determine the position of participants within the ALS paramedic population in South Africa (target population) (cf. Section 2.5.2). Any representativeness of the sample population to the target population with regard to demographic profile is coincidental rather than purposive (cf. Section 4.3.3.3; 4.3.3.11).

Although age, gender and ethnic grouping may influence perspectives of focus-group participants, the sample size does not permit statistical analysis of age, gender, or ethnic background on participant responses. The research problem is focused in the professional domain of emergency medical care, and reporting on the qualifications and clinical experience of focus-group participants supports the credibility of focus-group participant responses and provides background to the voice of participants.

5.2.1.1 *Age and gender of focus-group participants*

Of the 28 participants, only three were female and the rest were male. There were only four women in the survey population (10%) (cf. Section 2.5.2; 4.3.3.5). This female-to-male ratio corresponds with a national trend of a majority of men in the ALS paramedic cohort, specifically regarding the "paramedic" and "ECP" categories. All three female participants were in the first focus group. There were no female participants in the last three focus groups.

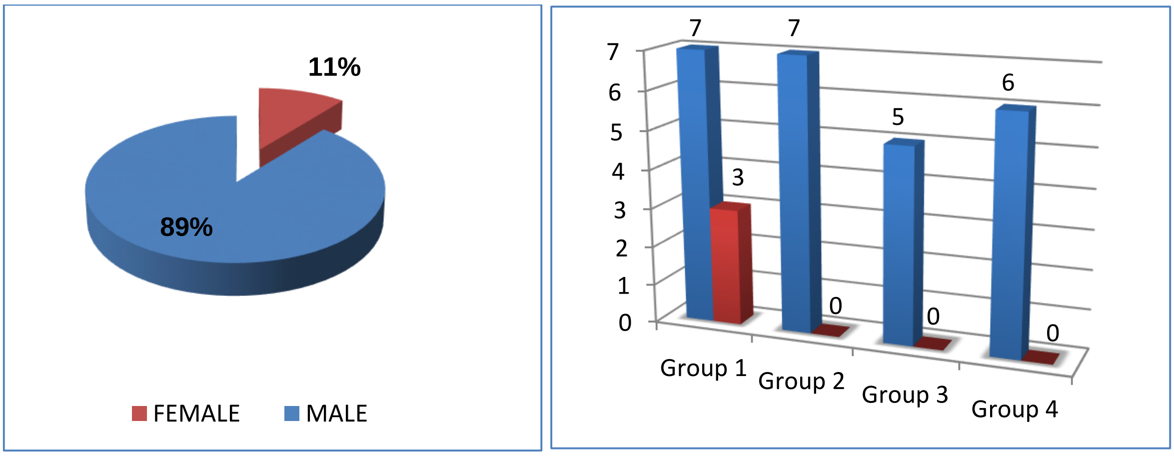


FIGURE 5.1: GENDER DISTRIBUTION OF FOCUS-GROUP PARTICIPANTS (n=28) (assistance with graphics: Mr J Botes)

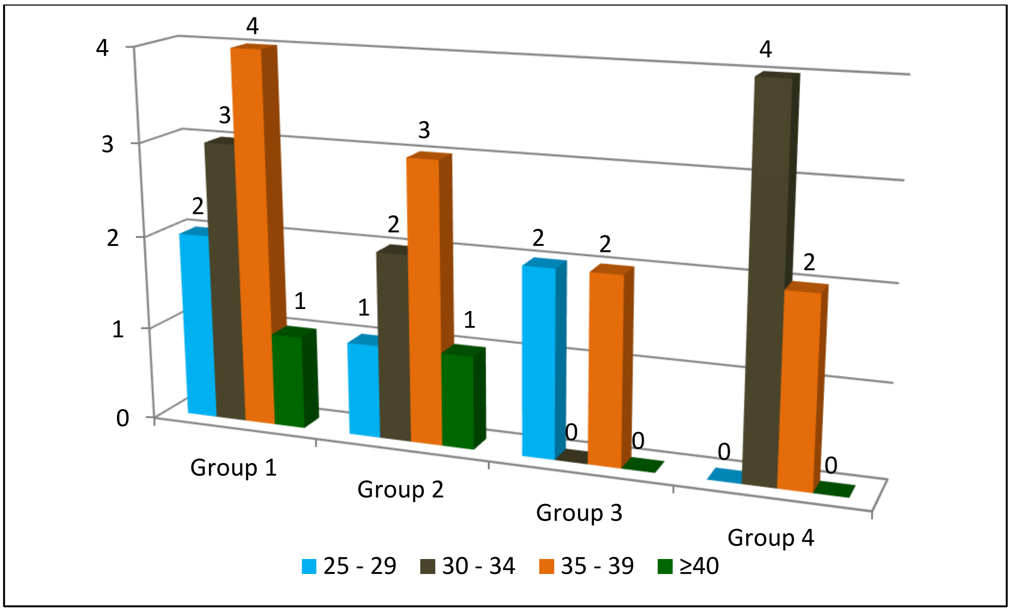


FIGURE 5.2: AGE DISTRIBUTION OF FOCUS GROUP PARTICIPANTS (n=27, missing data=1) (assistance with graphics: Mr J Botes)

The age distribution of participants is similar to that of the national age distribution (cf. Section 2.5.2), that is, 22 (79%) of the participants were 30 years and older.

5.2.1.2 *Ethnic background of focus-group participants*

The ethnic distribution in the national ALS population is summarised in Chapter 2 (Section 2.5.2, Table 2.9). The ethnic distribution amongst the survey population is as follows: 5 coloured (12%), 6 black (14.3%), 4 Indian (9.5%), 27 white (64.2%) (cf. Section 4.3.3.5). The ethnic distribution of focus-group participants and across focus groups is summarised in Figure 5.3.

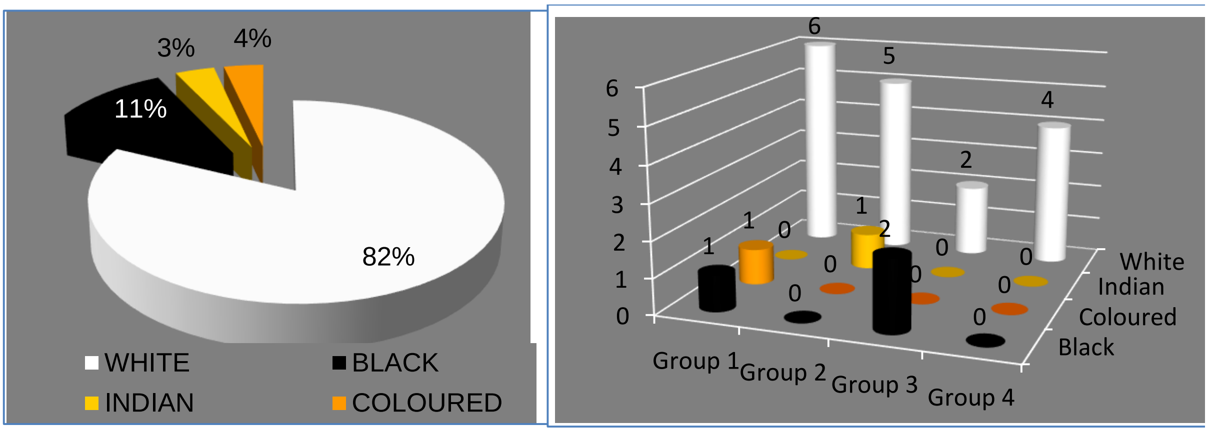


FIGURE 5.3: ETHNIC PROFILE OF FOCUS-GROUP PARTICIPANTS (n=28) (assistance with graphics: Mr J Botes)

5.2.2 Professional background of focus-group participants

Figure 5.4 summarises the number of years' clinical experience at ALS level of focus-group participants. At least two years clinical experience at ALS level was required for participant inclusion in this study (cf. Section 4.2.3; 4.3.3.2-4.3.3.5). The average clinical experience of focus-group participants was 6.1 years (range: 2-18) with only four out of 28 participants having the minimum of two years clinical experience required for inclusion in the study. The majority (68%) of focus-group participants had from 3 to 8 years clinical experience at ALS level.

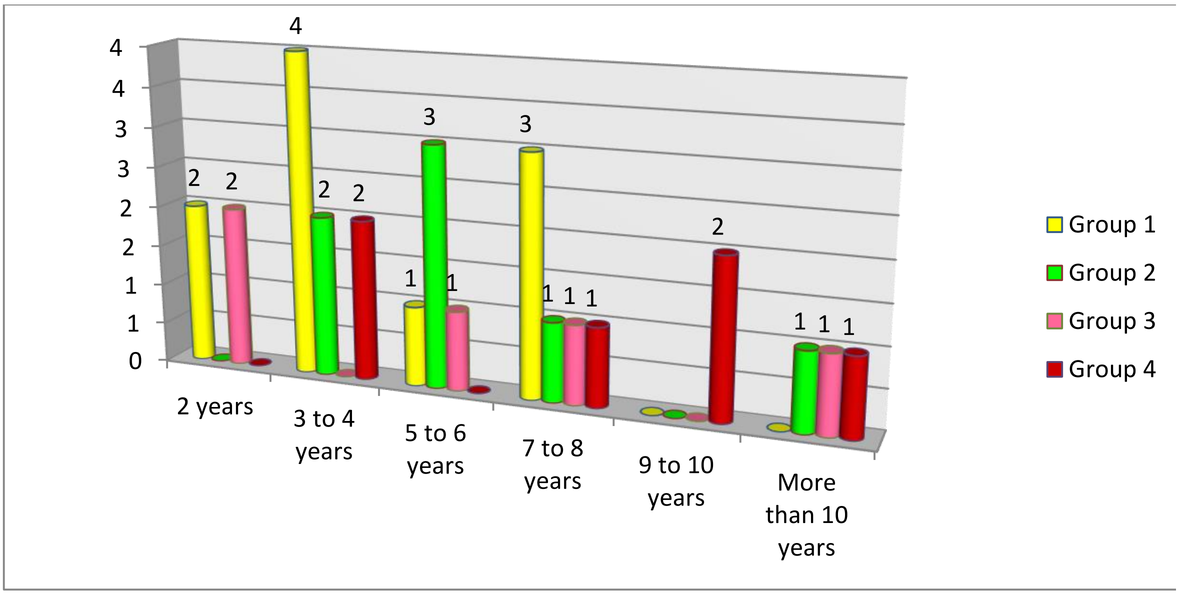
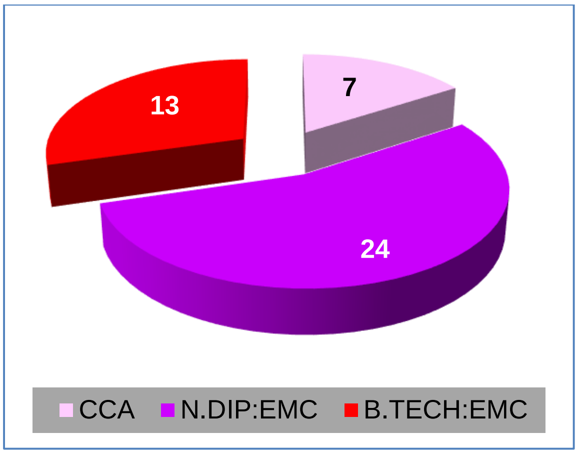


FIGURE 5.4: YEARS OF CLINICAL EXPERIENCE OF FOCUS-GROUP PARTICIPANTS (n=28) (assistance with graphics: Mr J Botes)

Figure 5.5 presents a synopsis of the ALS qualification profile of participants and focus groups.



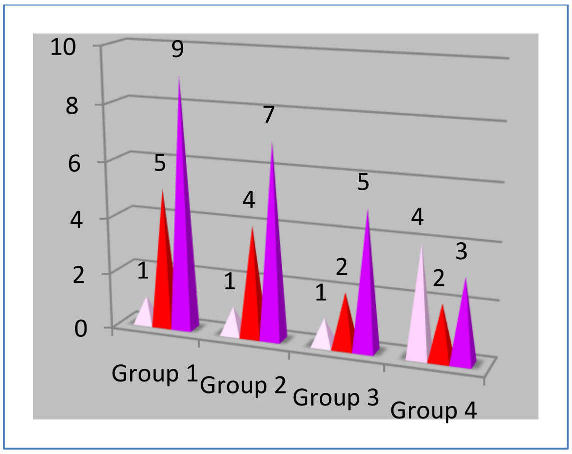


FIGURE 5.5: ALS QUALIFICATION PROFILE OF FOCUS-GROUP PARTICIPANTS (assistance with graphics: Mr J Botes)

The total number of qualifications indicated in Figure 5.5 (n=42) compared to total number of participants (n=28) indicates the educational journey of individual participants obtaining more than one ALS qualification. A participant, for example, may have first obtained the CCA qualification, then completed the N.Dip:EMC followed by the B.Tech:EMC qualification. The qualification(s) obtained by focus-group participants subsumes an educational experience informing participant perspectives valuable to the study. Figures 5.6 to 5.8 indicate at which institutions participants obtained their ALS qualification. The range of institutions infers differences in the formative educational experience of focus-group participants.

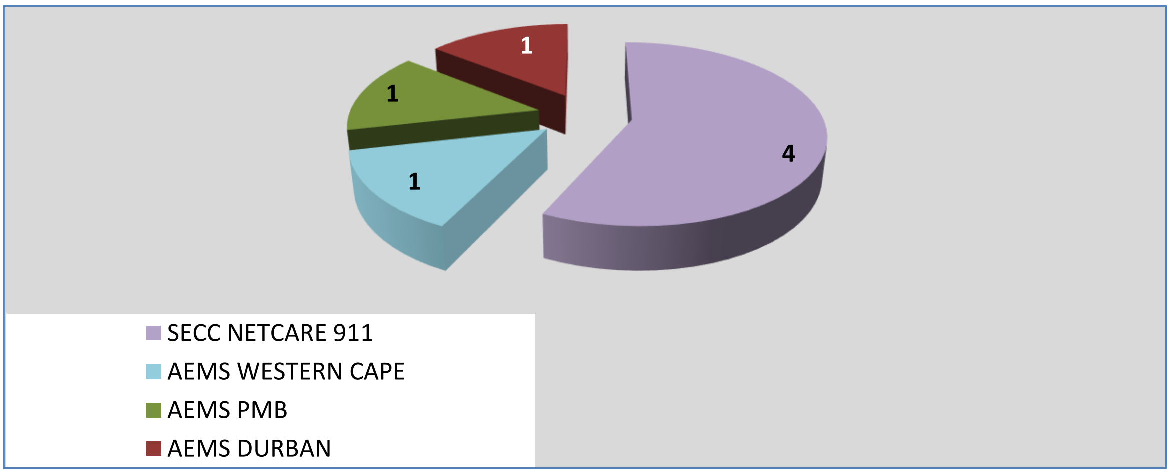


FIGURE 5.6: CCA PLACE OF QUALIFCATION (n=7)

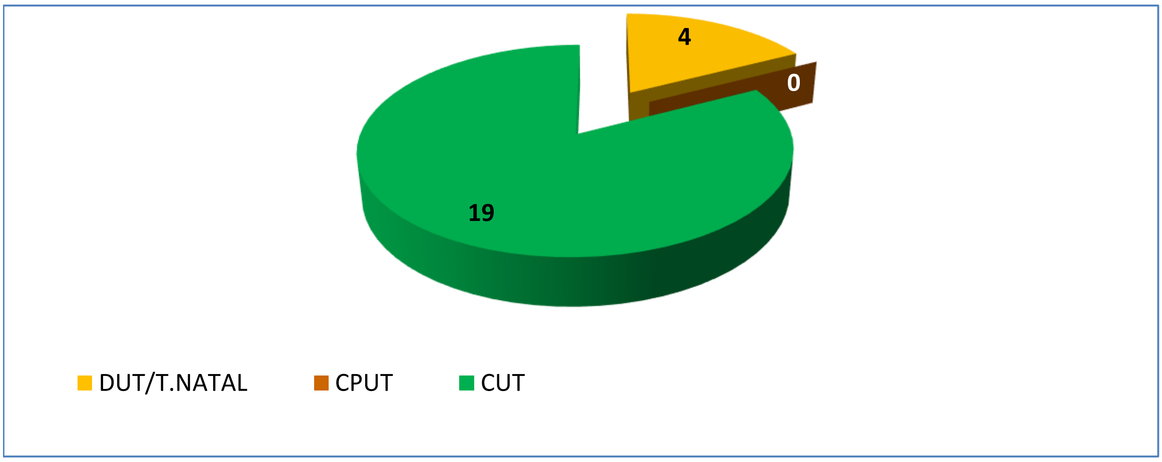


FIGURE 5.7: N.DIP:EMC PLACE OF QUALIFCATION (n=23)

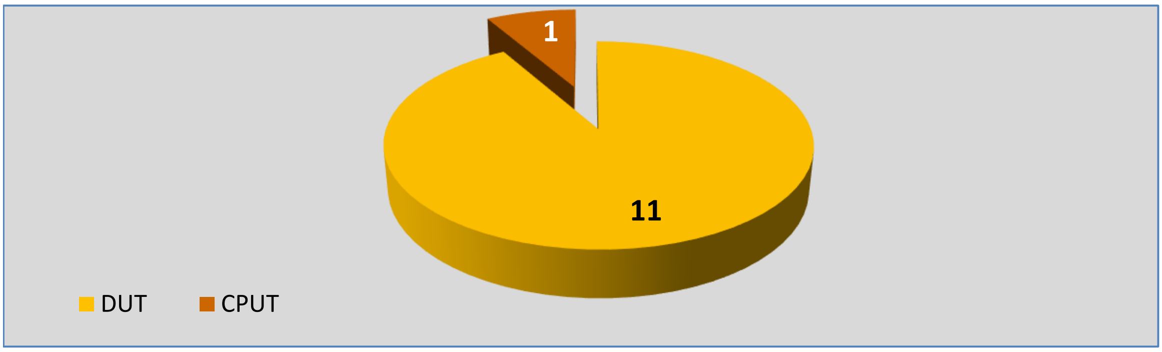


FIGURE 5.8: B.TECH:EMC PLACE OF QUALIFCATION (n=12)

(assistance with graphics for Fig. 5.6-5.8: Mr J Botes)

KEY (FIGURE 5.6-5.8)

DUT	Durban University of Technology	**SECC**	School of Emergency and Critical Care (now the FECC: Faculty of Emergency and Critical Care)
CUT	Central University of Technology	**AEMS**	Ambulance and Emergency Medical Services
CPUT	Cape Peninsula University of Technology	**T/NATAL**	Technikon Natal (now DUT)

Additional to years of clinical experience, Table 5.1 summarises the number of participants with prior experience at the different levels in emergency-care-education programmes and involvement as instructors in clinical simulation. The number in each row of the table refers to the number of participants who are/have been engaged in each category represented. A participant could be or could have been involved in more than one level of training and/or more than one aspect of clinical simulation.

TABLE 5.1: NUMBER OF FOCUS-GROUP PARTICIPANTS WITH EXPERIENCE IN EMERGENCY-CARE EDUCATION, QUALIFICATION LEVELS AND CLINICAL SIMULATION

	Group 1	Group 2	Group 3	Group 4	TOTAL
Teaching in emergency care education programmes:					
BLS	2	2	0	1	**5 (18%)**
ILS	2	2	3	2	**9 (32%)**
ALS	7	5	3	2	**17 (61%)**
Involvement in clinical simulation in emergency care education programmes:					
Designing	8	5	3	2	**18 (64%)**
Presenting	9	6	4	2	**21 (75%)**
Assessing	9	6	4	2	**21 (75%)**
Number of participants in focus-group	10	7	5	6	**28 (100%)**

The perspectives and opinions of participants provide the descriptive data for the study. The researcher contends that the type of ALS qualification(s), and institution(s) through which focus-group participants obtained their qualification(s), forms part of the professional identity of focus-group participants and determines their understanding of clinical simulation (cf. Section 3.5.3.2). This professional identity and their experience of clinical simulation as students may have been developed further through clinical experience and involvement in emergency-care-education programmes at various levels.

This post-qualification involvement in emergency-care education programmes by the majority of participants included designing and/or presenting and/or assessing clinical simulation at one or more levels of emergency-care training (cf. Table 5.1). The qualification profile of focus-group participants contributes to the credibility of the study by providing *thick descriptions* of participants relevant to the study (cf. Section 4.3.3.7).

5.2.3 Demographic and professional profile of the researcher

The researcher is a white male of 47 years of age at the time of submission of the study. He has been qualified as an ALS paramedic since 1995 (19 years). He has 16 years' experience in higher education (emergency medical care). The researcher has been involved with emergency medical services education and training since 1998, starting in the short-course ambulance training college programmes. He began his career in higher education at Technikon Natal in 1999. Integral to these programmes has been the employment and practice of clinical simulation and its use as a summative assessment instrument.

The researcher is registered with the HPCSA as an Emergency Care Practitioner (ECP) and during the time over which the study was conducted, he has held a position as a lecturer in the Department of Clinical Sciences in the Emergency Medical Care programme at the Central University of Technology. The researcher progressed through education in emergency medical care through both the short-course and tertiary qualifications as follows: Basic Ambulance Assistant (BAA) in 1991; National Diploma: Ambulance and Emergency Care (N.Dip:AEC) in which the Ambulance Emergency Assistant (AEA) and Critical Care Assistant (CCA) qualifications were embedded (obtained in 1994 and 1995 respectively) with the N.Dip:AEC being obtained in 1995, and the Bachelor of Technology: Emergency Medical Care (B.Tech:EMC) 2002.

Since 2006 the researcher has been instrumental in transforming a third-year emergency-medical-care module from a didactic teaching approach to simulation-based approach for facilitation of learning. This has involved the use of integrated clinical simulation, using HPS to simulate both adult and paediatric emergency conditions and contexts as a summative assessment instrument.

The researcher has experienced many frustrations and inconsistencies regarding the use of integrated clinical simulation for summative assessment for different programmes and within the programmes at the CUT. Consequently he has become acutely aware of the need for a set of standardised and validated assessment criteria and case types to objectify the use of this instrument by emergency-medical-care programmes in South Africa. It is the opinion of the researcher that the manner in which integrated clinical simulation has been and continues to be used may not prepare practitioners effectively, nor prove fitness for practice, as is held to be the case. It is the belief of the researcher that integrated clinical simulation has a crucial role to play in both the preparation of practitioners and the provision of an excellent and effective assessment instrument that involves integration of learning and exit-level outcomes of the programme(s).

The researcher was involved in the education of the 19 participants who obtained their N.Dip:EMC qualification at CUT. The researcher is thus familiar with these participants as students and also has professional connections with them post-qualification.

5.2.4 Factors influencing participant interaction and responses

The reference system for participant responses (extracts) is as follows: an example of the format is 1(1.1). This means that the response was to question 1 from focus group number 1 from participant number 1.

During discussion and interaction, participants assumed different roles that framed their perspectives. The roles emerging in the context of discussions across the groups included the educator (including assessor), the manager, the clinician and the student. In some instances these roles overlapped, such as the case of a participant who functioned as both an assessor (educator) of clinical simulation and as a clinician supervising students "on the road". These roles were expressed particularly when giving examples to emphasise or demonstrate a particular point. The following extracts from responses illustrate each role:

5.2.4.1 *The educator*

Being in the higher education centre *the trend now is to direct simulation"* and *"**coming from an educator's perspective**, the scenarios that are set up are set up with certain aims and objectives that need to be covered* 1(1.1)

*What we always need to remember, **especially in a teaching situation** … one should be able to give a paramedic student for one saying, this is the condition that you as a paramedic student on this level are supposed to be able to manage* 2(2.5)

5.2.4.2 *The manager*

*In my experience is that sometimes when **we test people to come and work** you give them a simulation* 4(4.3)

5.2.4.3 *The clinician*

*Those **in my experience** will be the most stressful and most testing because of the short space of time which you have to decide what you need to do and because of the fact that if your decision is wrong you may actually speed up the process of them going into cardiac arrest … so ya, **in my experience that has been the kind of patient** one needs to utilise in a simulation* 2(4.1)

5.2.4.4 *The student*

*If from experience it was for me personally **when I studied*** 2(1.9)

***we've all worked as students** and I think, being in a simulation environment, you walk in – it's quiet – you've got the simulator, you basically do what you see there* 3(2.3)

*Myself – **reflecting on my experience** – **coming through the whole thing of learning** is* 4(1.2)

5.2.4.5 *Overlapping roles*

The following is an example of the roles of educator and clinician being intertwined:
in my experience** we have had cases where there's been a clear difference between the way the **student paramedic performs in a simulated environment as compared to the way they perform in real life 3(4.1)

5.2.5 Creating a safe and non-judgemental environment for discussion

5.2.5.1 *The physical setting for focus-group-interview discussions*

The emergency-medical-care simulation laboratory at Central University of Technology was selected as the venue for the focus-group discussions (Figure 5.9). The venue layout illustrated in Figure 5.9 shows seating arrangements for the first focus group, which was the largest of the four groups. The number of chairs was adjusted to the number of participants attending each focus-group session.

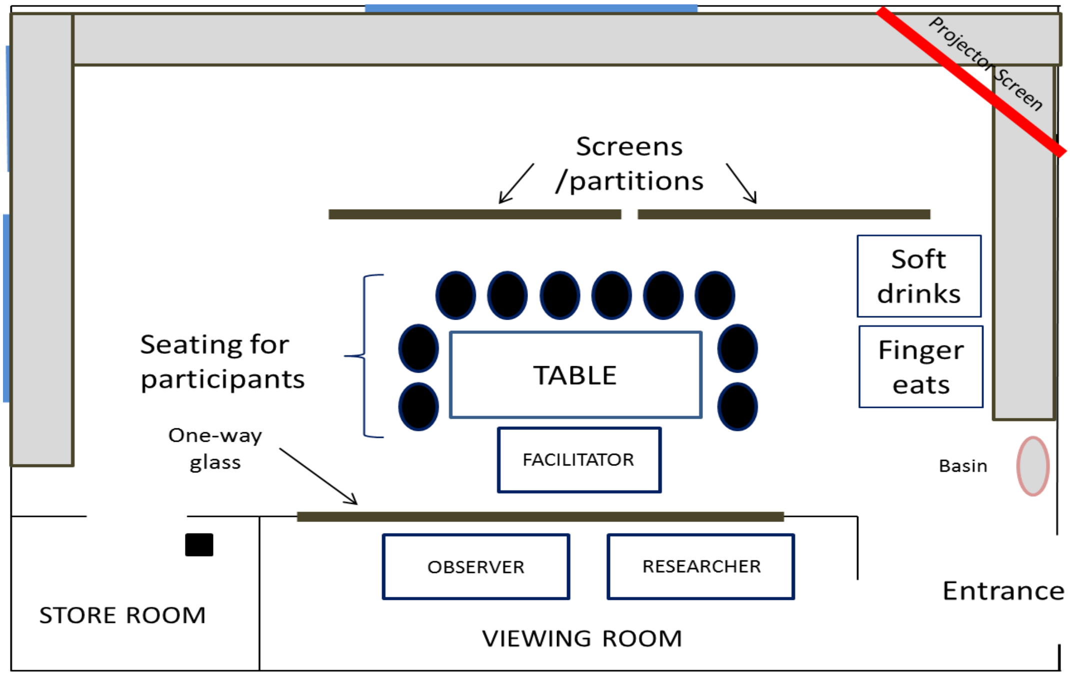


FIGURE 5.9: CONFIGURATION OF VENUE FOR FOCUS-GROUP INTERVIEWS

The venue offered air-conditioning, good lighting and was of sufficient size to comfortably accommodate the different groups as well as provide an area for refreshments. Screens were positioned to isolate the focus-group-discussion area and limit distraction that could be created by simulation equipment in the laboratory.

A table was positioned and chairs could be arranged so that participants could see each other (cf. Section 4.3.3.9). The facilitator was seated at one side of the table and had eye contact with all participants in a group. The participants of each group were not seated in any specific order and were given a choice of where to sit. The researcher and independent observer were able to see all the participants, which aided observation of interaction.

5.2.5.2 *Ground rules and guidelines for focus-group discussions*

Ground rules and guidelines were drawn up to enable mutual understanding of interaction during the discussion. These ground rules and guidelines were set out in writing and communicated verbally to participants by the focus-group facilitator before starting the discussion (cf. Appendix C).

These ground rules and guidelines were applied consistently to all four focus-group discussions. Establishing the ground rules and providing a framework and boundaries for discussion contributed to a safe and non-judgemental environment in which participants could express their opinions freely (cf. Section 4.2.3). During the discussions the focus-group facilitator ensured conditions for mutual respect and freedom of expression by participants (cf. 5.2.5.3).

5.2.5.3 *Role of the focus-group facilitator in promoting constructive and focused engagement*

As stated in Chapter 4 (Section 4.2.3) the role of the facilitator is to "encourage as much participation and interaction as possible while keeping the discussion focused on the topic" and also to "create a safe and non-judgemental environment where participants are free to express themselves openly". The following quotes confirm the manner in which the facilitator achieved this role effectively by "posing guiding questions, and occasionally probing, asking an additional question or making a refocusing statement in order to sustain the group's interaction" (Bender & Ewbank 1994:85; cf. Section 4.3.3.9). A reference to the specific focus group (FG) follows each excerpt as the number of the focus group.

<u>Encouraging participation</u>

No. 5, you would like to add? FG 1
No. 8, do you have a burning issue? FG 1
No. 1, can you help him? FG 3
No. 4, I saw you made a few notes, share with us. FG 3
what do the rest of you think? Is it really an issue that we need to consider when we talk about behaviours and attitudes? FG 4

<u>Engaging the reserved participant</u>

Right … No. 4 you are so quiet. FG 1
Let's just hear from No. 3 … from your experience, what type of competencies should be assessed? FG 1
No. 4, I was listening to you before the session while you were discussing – I don't know who you were discussing, but don't you think the simulation could be used to assess that type of competencies? FG 4

<u>Reigning in the dominating participant</u>

Before No. 1, [directed at No. 2] can you then explain to us how do you see aggressiveness? FG 1
No. 7,… I'll come back to No. 2, don't worry. FG 1

<u>Asking probing questions</u>

I hear what you are saying but what about the personality of paramedics? FG 1
So, you don't think we should focus on one specific area or type of case? FG 2
What do you think? What are the important cases that should be …? FG 2
Why do you say critical thinker? Practical experience that you can share with us? FG 4

<u>Refocusing the discussion</u>

But what type of cases do you think would be appropriate to put in a simulation for the students [laughter] .. .it's like you are talking all around the topic. You have mentioned a few. FG 2.
[Participant] I think we are off the question again [Facilitator] That's why I am trying to bring it back – that's the purpose of this session. FG 2.
I see you've mentioned all the factors that we need to consider, but what about the types? ... nobody wants to put their head on a block [laughter]. FG 3.

<u>Managing the flow of discussion to cover questions adequately, and reaching conclusions</u>

It seems like there is now repetition coming out, so there's no new attitudes and values. I think we can continue to question 2. FG 1.
Right, do you think that's a good conclusion of this discussion? It seems closeness of reality and part of the entire assessment of the student. Right, thank you very much for this interesting discussion; I hope you've enjoyed it. FG 2.
You've already touched on Question 4 … No. 7. FG 3.
Any other inputs? … Are you satisfied that we have mentioned everything? Right, so if you are ... No. 3, can you summarise for us? FG 3.

Although the time stipulated for focus-group discussions was 120 minutes as a maximum, the facilitator paced the sessions according to the engagement of participants and concluded the sessions when he considered the questions had been exhaustively covered by the responses of the participants. The duration of each focus-group session is summarised in Table 5.2.

TABLE 5.2: NUMBER OF PARTICIPANTS AND LENGTH OF INTERVIEW PER FOCUS GROUP

Focus Group	**Number of Participants**	**Duration of Session**
No. 1	10	103 minutes
No. 2	7	72 minutes
No. 3	5	83 minutes
No. 4	6	56 minutes

5.3 REPORTING OF THE RESULTS: DATA ANALYSIS, DESCRIPTION AND DISCUSSION OF FINDINGS OF THE FOCUS-GROUP INTERVIEWS

A schematic overview of the themes and categories is presented in Figure 5.10. The themes into which descriptive data was placed were derived from the elements of assessment criteria defined by SAQA (2001:16) (cf. Section 2.4.1.2).

Theme	Categories
Theme 1: Clinical simulation as an integrated summative assessment instrument	*Category 1.1: Assessment in the authentic situation* *Category 1.2: Fictional features of clinical simulation confounding true student performance* *Category 1.3: Influence of assessment on true student performance in clinical simulation* *Category 1.4: Assessment principles and the integrated clinical simulation*
Theme 2: The context and conditions of Advanced Life Support paramedic practice relevant to the integrated clinical simulation summative assessment	*Category 2.1: The social context and dimension of Advanced Life Support paramedic practice relevant to integrated clinical simulation summative assessment* *Category 2.2: Conditions of Advanced Life Support paramedic practice relevant to integrated clinical simulation summative assessment*
Theme 3: The physical dimension of Advanced Life Support paramedic practice relevant to the integrated clinical simulation	*Category 3.1: Physical fitness* *Category 3.2: Psychomotor competence* *Category 3.3: Sensory acuity* *Category 3.4: Technological knowledge and competence* *Category 3.5: Logistical competence*
Theme 4: The knowledge framework and cognitive dimension of Advanced Life Support paramedic practice relevant to the integrated clinical simulation	*Category 4.1: Knowledge framework of Advanced Life Support paramedic practice relevant to the integrated clinical simulation* *Category 4.2: Roles and functions in Advanced Life Support paramedic practice relevant to integrated clinical simulation assessment* *Category 4.3: Clinical reasoning and decision-making in the integrated clinical simulation* *Category 4.4: Metacognition, critical thinking and reflection in the context of the integrated clinical simulation assessment*

FIGURE 5.10a: SCHEMATIC OVERVIEW OF THEMES AND CATEGORIES

Theme 5: **The affective dimension of Advanced Life Support paramedic practice relevant to the integrated clinical simulation**	***Category 5.1: Display of appropriate attitudes in the clinical simulation setting*** ***Category 5.2: Self-management and stress management in the clinical simulation setting*** ***Category 5.3: Display of ethical values in the clinical simulation setting***
Theme 6: **The social-professional dimension of Advanced Life Support paramedic practice**	***Category 6.1: Relevance of the personality of the Advanced Life Support paramedic in the integrated clinical simulation*** ***Category 6.2: Professionalism in the context of the integrated clinical simulation***
Theme 7: **Case types and scenarios for integrated clinical simulation assessment: range, conditions and complexity**	***Category 7.1: Life-threatening conditions as a limitation of case type for integrated clinical simulation assessment*** ***Category 7.2: Medical versus trauma categorisation of cases for integrated clinical simulation assessment*** ***Category 7.3: Medical-discipline categorisation of cases for integrated clinical simulation assessment*** ***Category 7.4: Life-support interventions categorising cases for integrated clinical simulation assessment*** ***Category 7.5: Conditions and complexity of cases for integrated clinical simulation assessment*** ***Category 7.6: Action-response mode of the Advanced Life Support paramedic as a determinant of case type for integrated clinical simulation assessment***

FIGURE 5.10b: SCHEMATIC OVERVIEW OF THEMES AND CATEGORIES

The focus-group questions were designed to elicit information relevant to these elements as well as perspectives on case types producing these elements. Categories within themes were identified from specific elements of the SAQA definition of assessment criteria. Open coding analysis of focus-group discussions are used to link participant perspectives to elements of assessment criteria under relevant categories. Participant perspectives were then developed in a more abstract form, as deduced and interpreted by the researcher in conjunction with perspectives presented in Chapter 2 and Chapter 3 (cf. Section 4.3.3.10).

Direct quotes are used extensively to represent the voices of participants. The content of quotes relevant to themes and categories under discussion are highlighted in bold for emphasis. Some responses are rich in information that span a number of themes or categories and may be used more than once to support discussion across themes or categories. The researcher includes comprehensive quotes of participant responses to retain meaning and accuracy of the participants' voices to comply with conditions for "thick descriptions" (cf. Section 4.2.2).

In response to questions on behaviours, attitudes and competencies that are expected of ALS paramedics and which should be assessed by means of integrated clinical simulation, participants capture aspects of the conditions, context and complexity together with the "knowledge, understanding, action(s), roles, skills, values and attitudes" elements of assessment criteria (SAQA 2001:21; cf. Section 2.4.1.2; 3.5). Aspects of simulation design are discussed within themes and categories since simulation design is integral to the quest for the authentic situation in the integrated clinical simulation assessment (cf. Section 2.4.3).

Theme 1 addresses perspectives of clinical simulation as an integrated summative assessment instrument. Theme 2 explores the context and conditions of ALS paramedic practice relevant to integrated clinical simulation, while Themes 3-6 capture the dimensions of ALS paramedic practice (cf. Section 3.4) reflecting the "knowledge, understanding, action(s), roles, skills, values and attitudes" (SAQA 2001:21) as elements of assessment criteria relevant to integrated clinical simulation assessment. The final theme presents perspectives on case types relevant to integrated clinical simulation.

Although the researcher attempts to achieve clarity by isolating concepts and phenomena under discussion, the complex interconnectedness of concepts and phenomena are realised, with overlap of discussion and cross-referencing expected.

5.3.1 Theme 1: Clinical simulation as an integrated summative assessment instrument

5.3.1.1 *Category 1.1: Assessment in the authentic situation*

Focus-group participants were vocal in their support of assessment of student performance in an authentic situation. The authentic situation was identified with the real patient, real-time interaction and real conditions. Assessment of student performance in the authentic situation was discussed by all four focus groups, as illustrated by the following responses:

*It does not matter what we ever try do it is **still not going to be reality because it is not a human being** therefore I find the **most accurate way of assessing somebody is if he is dealing with a real patient who is experiencing everything real time*** 2(1.5).

*The **most important factor is reality**; you should make it **as real as possible*** 4(2.7).

*and I mean if you really want to assess somebody on patient management and identification of underlying illnesses it should **actually be on real patients with real conditions*** 2(3.3).

*we are saying that the **actual ideal assessment is the very critically ill, real patient** which we can't guarantee for each student* 4(4.1).

The need for patient simulations to replicate the clinical setting as realistically as possible was commonly identified by all four focus groups (cf. Section 3.3.2.4). This realism in the clinical simulation context includes replication of the social context, environmental conditions and range of clinical conditions (routine and complex) faced by ALS paramedics in practice (cf. Section 2.5 and 3.5.2.2). Faithfully replicating all aspects of clinical practice was poignantly expressed by one participant as follows:

*The **closer you can get the simulation to mimic the real thing** – the closer you can get it – **whatever you need to do;** turn the temperature down or up or fill the room with smoke or noise, but **if you can get it close to that ideal** where we are saying that the **actual ideal assessment is the very critically ill, real patient** which we can't guarantee for each student* 4(4.1).

The quest for realism in the clinical simulation setting underpins a belief that student performance in a clinical simulation setting should translate to and correlate with student performance in a real clinical setting under real-world conditions. This belief is supported by the researcher and succinctly expressed by a participant who stated that (cf. Section 1.2),

*The **reason that sims have always carried so much weight** to my understanding was **because [I was] demonstrating what I would do if you let me loose today and if this was the scenario I was faced with then this is what I would do** – and that's why it has always been so weighted heavily is that in that demonstration you are either convincing your examiners that you are therefore competent because we don't need to be there to* *intervene or you are not because **if you did this in real life someone would get hurt, someone might die** ... ya* 4(4.1).

Replicating out-of-hospital emergency-care situations to achieve authentic situations in clinical simulation and correlating student performance in clinical simulation with student performance in emergency-care practice have been driving forces in efforts by the researcher to design, facilitate and assess high-fidelity immersive clinical simulation events (cf. Section 1.2).

5.3.1.2 *Category 1.2: Fictional features of clinical simulation confounding true student performance*

In contradiction to the ideals of integrated clinical simulation as an assessment instrument identified in Section 5.3.1.1, experience-based opinions that student success in a clinical simulation assessment under controlled laboratory conditions did not lead to the same demonstration of clinical competence in the real clinical context was expressed by a few participants;

*What is being safe? What does that mean? This is once again – you said this is kind of an objective measurement, I challenge that – what do you consider to be a safe paramedic? When do you consider a student to be safe when you've seen a couple of simulations? **I've seen** students that are **brilliant in simulations**, but you **give them a real patient and they can't think straight for 2 seconds*** 1(1.2).

*I was going to say to quickly answer that one if he was asking; "Is it an assessment which is used to evaluate a person", **I would say no**, **mainly because it is not really giving the indication that a person who has passed a simulation is competent in whatever he was doing*** 4(3.1)

in my experience** we have had **cases where there's been a clear difference between the way the student paramedic performs in a simulated environment as compared to the way they perform in real life** and we've had **juxtapositions** with different students where we've had confident students who **excel at the roadside under real circumstances** and then and **then fall to pieces in a simulation laboratory** kind of situation and **then quite the opposite** where others have excelled in the laboratory and **yet when it comes to the real thing they are not able to deal with it 3(4.1).

The disparity between student performance in a clinical simulation assessment context and the true clinical context was associated by focus-group participants with fictional features of clinical simulation events and the influence of assessment on student behaviour (cf. Section 3.3.2.1; 5.3.1.3).

People find it ***difficult to take something that's fiction and you have to treat it as if it's reality*** 2(1.5).

ya, ***they've got to imagine it****, but if the simulation* ***isn't close to reality*** *and the student fails to pick up the guy is not breathing* ***because it's not set as it would be in reality*** *then I mean there's* ***no fairness toward the student*** 4(2.7).

Fictional aspects of the clinical simulation experience include limitations of the simulator, insufficient environmental fidelity and misalignment of the social construct elements of the clinical simulation (cf. Section 3.3.2). The unrealistic and limited features of the full-body mannequin compared to a real human being as well as limited physical features of the clinical case being replicated were found to undermine the immersive experience of clinical simulation used for assessment (cf. Section 3.3.2.4);

You know ***the dolls that we are getting*** *… they are* ***making it close to reality but still it is not reality****, it is still not reality it does not matter what we ever try do it is* ***still not going to be reality because it is not a human being*** *therefore I find the most accurate way of assessing somebody is if he is dealing with a real patient who is experiencing everything real time* 2(1.5).

The ***differences between a simulation and reality*** *is that* ***reality*** *is a person can either* ***talk to you****, you can* ***see and you can visualise*** *what is actually wrong with the patient* 3(2.2).

So what is of importance in simulations is reality, ***if one has to say the patient is bleeding he must be able to see blood flowing out of his patient****; if this patient has stopped breathing* ***you should be able to see the patient is not breathing at all*** *and that you will be able to react accordingly.* ***If you are told*** *the* ***patient has a femur fracture*** *when you walk in there and* ***you don't even see any fracture****, I mean it does even get you geared up to doing something about it. You can even* ***miss the fracture and treat everything else and even forget that****, well I was informed about the fracture when I came into the* *simulation, however* ***if you can see a fracture when you walk in that will ring a bell*** 4(2.5).

Insufficient environmental fidelity represents the second fictional aspect of the clinical simulation experience that confounds student learning and performance relevant to the clinical context (cf. Section 3.3.2.1-3.3.2.2). When replication of the physical environmental and social context of clinical events in clinical simulation is inadequate or absent then students are denied the opportunity to demonstrate competence relevant to authentic situations. This aspect is aptly captured by a participant as follows:

I agree with No. 2 and No. 5 I think, we've all qualified here and ***we've all worked on the road*** *and have* ***got some sort of experience****, we've* ***all worked as students*** *and I think,* ***being in a simulation environment****, you walk in –* ***it's quiet*** *– you've* ***got the simulator****, you basically do what you see there. Once you get on the road* ***there's a difference*** *there, 'cause* ***there's traffic, there's noise, it's raining*** *– the* ***students start reacting differently*** *– their* ***thought process is different – what they might have passed here they forget the stuff they have to do on the road –*** *you know even walking into a house and they have to – there's* ***dogs barking****, there's* ***family fighting – all those kind of things that you don't find when doing a simulation*** 3(2.3).

The final fictional aspect of the clinical simulation experience that thwarts true student performance in a clinical simulation environment is the misalignment of the social construct elements of clinical simulation. These social construct elements include social primary frames adopted by students through engagement in the education and clinical practice context, on the one hand, and the design elements of clinical simulation events as modulations of clinical cases (the primary frame) on the other hand (Cf. Section 3.3.2.2). Integrity of the modulation requires sufficient representation of the clinical case and clinical settings, where appropriate rules to navigate discrepancies between the clinical simulation and the clinical case are explicit.

Simulation fidelity is undermined where insufficient representation of the clinical case occurs. This limited replication of the clinical case is alluded to in the following responses:

the problem is all the ***obstacles*** *you are faced with again, the* ***same issues of your restrictions in terms of personnel****,* ***availability of people to enact whatever you want to do*** 4(4.1)

You have ***got your own picture in mind when you are setting up your simulation****, but with coming in the student doesn't always – I mean you are* ***limited because of you have your picture*** *but it's* ***not always that realistic to somebody else to seeing what you are seeing*** 2(3.3).

The limitation on the simulation it is ***quite difficult to set the simulation around the clinical view for the learner to be able to pick up****; this is what is happening just based on* ***expressions and the clinical vital signs of the patient****. So that is* ***one limitation that I think is making it difficult to bring the simulation closer to the real environment*** 2(3.1).

From participant responses, the idea was promulgated that student success in clinical simulation may be a result of students adapting to this artificial context by developing skills to navigate fictional aspects of the simulation environment. Those students who cannot adapt in this manner are then at risk of underperforming in the clinical simulation assessment;

I think the one thing we always miss on a scenario – ***there is always somebody that interprets everything for you –*** *so there's* ***always somebody, you are asking somebody a question****; is he pale, is he fat?* 4(3.4)

it's just not realistic, because – as No. 4 is also saying now is – ***you are looking at the narrator****, looking at them and* ***it's sometimes you learn to –*** *you get students who are* ***looking at your facial expressions,*** *"what are you doing now?" or, "just show me again what you are doing there?" – I mean* ***it's not natural because you are trying to fish for things there; clues or voice tones*** *and stuff like that which I actually* ***not giving you that realistic environment*** *…* ***some individuals*** *they are excellent theoretically, they can do good practical work outside* ***but they are not actors and you have to have a sense of acting or role-play in a simulation*** 4(3.3).

The researcher suggests this adaptive behaviour renders suspension of disbelief difficult or impossible and is prevalent where, (1) rules that convert a clinical case into a clinical simulation are not made explicit, (2) rules that address how inconsistencies between the clinical simulation and real clinical case will be managed are hidden or are constantly changing (cf. Section 3.3.2.2), and (3) expectations of performance in assessment differ from performance expected during facilitation of learning through clinical simulation (dissonance in constructive alignment) (cf. Section 3.3.1.2).

An example of inadvertent fictional conditions introduced into the clinical simulation assessment happens when task fidelity (cf. Section 3.3.2.1), as an “as-if” element enhancing psychological fidelity for suspension of disbelief by students, is obstructed or trivialised in favour of assessing the overall management of the simulated patient.

Although precision and efficiency of clinical procedures is not scrutinised in the clinical simulation in the same way as in an OSCE, the clinical simulation event should be designed for realistic performance of such skills for the purpose of fidelity. Another consequence of failing to provide for or expecting task fidelity in clinical simulation is that claims of achieving the “competent” level of psychomotor skills as defined by Dreyfus cannot be made (cf. Section 3.3.1.2)

In order to enhance simulation fidelity and mitigate fictional aspects of clinical simulation, a number of suggestions were made by participants for enhancing environmental fidelity and scenario fidelity (cf. Section 3.3.2). These suggestions are elucidated in Section 5.3.3.3.

5.3.1.3 *Category 1.3: Influence of assessment on true student performance in clinical simulation*

The psychological effect of assessment on student behaviour was identified by participants as a second major reason for the disparity between student performance in a clinical simulation assessment context and the clinical context. High stress levels triggered by assessment were suggested by participants to negatively influence student performance in the clinical simulation event (cf. Section 3.5.3.3).

I think there should be a continuous process because ***in the heat of the moment there is so much stress that goes with the student in that specific moment*** *of time* ***I don't really think*** *... get the perspective or* ***view or the real reflection you are really looking for****, so I think it should be a continuous process* 2(1.7).

there's a ***clear cut difference between how you would act inside the plastic environment as to how he would act like in the real world*** *– to try say this,* ***if he walks in the room and he is all sweaty and trembling*** *… so there’s a* ***psychological aspect, how he presents himself and carries himself inside the plastic environment*** 4(4.6).

they were ***great as paramedics and they were working as paramedics for years****,* ***but they got such a fright for actually going into a simulation room*** *– it was absolutely useless testing them* 4(3.5).

Stress experienced by students in the context of the clinical simulation assessment event is linked by the researcher to a high density of stressors associated with such an event, which include (cf. Section 3.5.3.3):

- Uncertainty in students about the clinical case and clinical simulation setting of the assessment, as these are hidden from students prior to the assessment event;
- The inability of the student to accurately predict the clinical case (content and complexity) due to the extensive range of possible clinical simulation scenarios;
- Student awareness of the high-stakes nature of the assessment (promotion to the next level of study or obtaining a qualification);
- The predefined time limit allocated to the clinical simulation assessment event (cf. Section 3.5.3.4; 5.3.2.2); and
- Student difficulty with effective engagement in the clinical simulation environment (suspension of disbelief) (cf. Section 3.3.2.1; 5.3.1.2).

Such stressors may create vulnerability amongst students, where risk of failure and criticism by members of the community of practice (assessors) is high and the social self-preservation system of students activated in response to perceived threats to professional identity, self-esteem and self-worth (cf. Section 3.5.3.3). Self-preservation strategies (affective domain) active during the clinical simulation assessment event may negatively impact the psychomotor and cognitive domain of student performance, resulting in difficulty with executing procedures, insufficient information gathering (or over-repetition of questioning the "patient"/confederate/facilitator), forgetting (short-term memory) relevant information gathered in the clinical simulation context, poor clinical reasoning and delays in making decisions (cf. Section 3.5.3.5).

A panel of assessors present in the simulation environment was identified by one participant as contributing to the fiction element of the clinical simulation assessment and by another as a threat to student achievement (cf. Section 5.3.1.2).

If you look at the majority of assessments ***you sit with a panel of 4 or 5 assessors, everybody's eyes on you – it's just not realistic*** 4(3.3) *when we did CCA your whole CCA depends on one sim and* ***you get in that room and there's 7 or 8 doctors, professors and paramedics, so it really intimidates you*** *and even though* ***some of the best students failed the sim*** *it* ***should not be the last one*** 4(3.4).

Notwithstanding the dilemma of having a single clinical simulation event to assess student competence across an extensive range of clinical cases, complexity of cases and clinical settings, a general consensus within and across focus groups was that employing clinical simulation as a single, once-off high-stakes assessment opportunity was an unfair risk to student success (cf. Section 2.3.3.2; 3.4.2.1). This consensus was captured by the following statements:

Not by ***putting the poor fellow or lady at the end of the year into a situation where this is your be-all and end-all*** *… you've* ***wasted your whole year if you do not pass today's assessment!*** 4(1.2)

Simulations should ***not be the be-all and end-all*** *when* ***the student is now assessed at the end*** *and,* ***based on the simulation, a student can be failed*** 3(2.5).

A recommendation by participants to address the risk caused by the high-stakes nature of a single assessment was to have a system of continuous assessment over time, where a number of clinical simulation assessment events could be conducted. One reason suggested for multiple clinical simulation opportunities through continuous assessment was to enable student learning and success for application in the clinical context.

I think and feel ***the final simulation as a summative simulation*** *and so forth* ***I think it should be a continuous process throughout the whole year to be able to get to that final point*** 2(1.7).

So to have that fairness ***instead of one this is the be-all and end-all, but to have 3 assessments continuously over a period – or four assessments*** 4(3.3).

It must be a continuous process that's why I refer to the word "range" or the time … ***how many times do you have to do it*** *till you think "ya, that's better"* ***so that when he comes to the point where he actually touches the patient that time is that appropriate what you taught him on a plastic doll*** 2(1.9).

In order for clinical simulation to qualify as an authentic situation for assessment, it must effectively engage the modes of thinking that promote buy-in to the fiction contract and willingness of students to suspend disbelief. Suspension of disbelief by the simulation participant is mandatory for engagement of the clinical simulation scenario as would happen in a real clinical context (cf. Section 3.3.2.1). As succinctly stated by one participant,

But if we can get that student to believe that is the real thing, then you are going to get the demonstration *hopefully* ***as close as possible to what they would do in real life*** 4(4.1).

Suspension of disbelief necessary for an immersive experience (cf. Section 3.3.2.4) is obstructed by insufficient fidelity in the simulation scenario, mismanagement of social construct elements of simulation and unmitigated effects of assessment on student performance. These obstructions cast aspersions on clinical simulation as a credible assessment instrument and claims that clinical simulation represents the authentic situation. As succinctly put by one participant:

Then as a summative assessment, ***if you can't do it in a sim as real as possible, then maybe the sim is not a summative assessment*** *and* ***can you be objective*** *then between the students?* 4(3.5).

5.3.1.4 *Category 1.4: Assessment principles and the integrated clinical simulation*

The challenges associated with clinical simulation as understood and experienced by participants lead to questions about the credibility of clinical simulation as an integrated summative assessment instrument (cf. Section 2.4.2; 5.3.1.3). Validity, fairness and practicability of clinical simulation were the specific assessment principles questioned by participants (cf. Section 2.4.2.2-2.4.2.3).

Fidelity aspects of clinical simulation relevant to the validity and fairness of clinical simulation as a summative assessment instrument were addressed in Sections 5.3.1.2 and 5.3.1.3. Sufficiency of assessment for making valid inferences about students' achievement of competence is addressed in Section 5.3.4.1.

The practicability of truly replicating the clinical context in clinical simulation for the integrated summative assessment event was questioned in the context of time constraints, student numbers, providing real-time high-fidelity clinical simulation experiences for assessment and the range of assessment events necessary to achieve sufficient evidence of competence:

How do you do it with a ***class of 20-25 to ensure every person has had the same type of assessment*** *being* ***conducted by the same person, the same environment and so forth****, so that's going to make it quite difficult* 2(1.7).

The problem is we know and are all aware there are ***time constraints*** *and there's* ***personnel constraints*** *and you know rigidity in terms of educational systems, ways of allocating marks and so on but you* ***essentially would need a paediatric simulation, a maternity, a cardiac – or a medical, and trauma,*** *which we've* ***all had at some stage in our careers*** *but* ***never as part of as part of a formalised assessment that you would have to do each and every one in that programme*** 2(4.1).

because of the time it takes *as well* ***in doing a scenario, packing up, getting the next student to come in*** *– you have a* ***limitation****, you are not actually trying to assess skill* 3(3.3)

The ***most important one has always been a time issue –*** *we've* ***always had to compress time –*** *in other words the* ***time that is been spent in a simulation is not the same as the time it would take in real life*** *but you are forever compressing certain aspects to say, ok we consider that as done although it is not yet done – so* ***those are the stumbling blocks*** *–* ***if they weren't there then if you had a day per student to assess then it would be great****, it's unrealistic* 4(4.1)

Despite the conviction expressed by some participants that true student performance is only elicited in the authentic clinical context (cf. Section 5.3.1.1), the inability to predict or control clinical case type and patient severity in the real clinical setting is a reason articulated for questioning the validity and fairness of using real clinical cases for assessment:

Taking them out and ***assessing them on the road****, the* ***fairness of it I don't see*** *because you* ***cannot be consistent in what you are assessing*** *'cause each student is going to be getting a* ***different patient every time*** 3(2.5).

I ***fully agree*** *with what he says – there is a* ***definite neglect*** *these days* ***in assessing the student on the road****, there is a* ***definite place for it****,* ***but*** *as he said* ***– on the other side of the coin*** *- you* ***can't be guaranteed your student will have five heavy cases*** 3(4.3).

A concession was made by some participants that, despite its challenges, clinical simulation was still the fairest available alternative to the clinical context for assessment, given the ability to control the simulation environment and provide consistent exposure of students to the same set of clinical cases (cf. Section 1.2; 3.3.1.2);

*I think **simulation is the closest in today's training environment**, I mean the **best would actually be to the old way** with practical’s [participant referring to road evaluations] **but there is not fairness and consistency like in a simulation*** 4(2.7).

***Simulations, where everyone’s getting the same or more-or-less the same – where there's fairness**, transparency – **simulation plays a vital role** in the final mark* 3(2.4).

*if it [simulation] is to be used as an assessment tool it **has to happen in an environment that is controlled** where one can be **consistent with all individuals being assessed** and that **fairness is continuously being applied*** 3(2.5).

Some participants raised subjectivity of assessors as a concern, in that it undermines the fairness and validity of assessment. The variation in knowledge and experience amongst assessors, motivation of assessors and the effect of assessment on examiners were voiced as factors contributing to assessor subjectivity:

*One of the **thing I don't like about simulations is the assessors** or the evaluators … with the evaluator his **knowledge, skills and experience will also determine the way he's going to evaluate the specific student** ... again **subjective*** 2(1.7).

*It all depends on who is doing the assessment – in some cases I think it is **more the fault of the assessors who are not properly assessing people letting them through** the system **just to fulfil the number of people to go through the system instead of quality assessment** on those students* 3(4.3).

*If I can just add onto that, that's harsh to the student **but how harsh is that to the evaluator or assessor** because now you are **sitting with 5 or 10 or 20 or whatsoever assessments during that specific day – you also get exhausted, you are also getting tired** [someone responds: true] [No. 2 interjects ... **contributing to the subjectivity as the day progresses**]* 2(1.7).

Suggestions related to ways to mitigate subjectivity of assessment by providing clear guidelines to assessors for assessment and ensuring more than one assessor is present:

there needs to be a ***set of rules that guides the assessors as to how they interpret that information*** *and* ***how they make a decision on a student*** *… The problem is* ***how do we get each and every assessor to apply it fairly accurately and objectively****?* 3(4.1)

There is ***more than one assessor so there's an objectivity that comes in to someone's subjectiveness*** *involved in the assessment and it's* ***not just one person who makes a decision*** *about the fate of one candidate* 2(1.1).

5.3.2 Theme 2: The context and conditions of Advanced Life Support paramedic practice relevant to the integrated clinical simulation summative assessment

Perspectives offered by focus-group participants support the premise that ALS paramedic education should challenge and prepare the learner to display competence as an ALS paramedic practitioner in the various contexts and under similar conditions found in clinical practice in South Africa (cf. Section 2.5; 3.4-3.5).

5.3.2.1 *Category 2.1: The social context and dimension of Advanced Life Support paramedic practice relevant to integrated clinical simulation summative assessment*

Expected behaviours and attitudes of ALS paramedics are connected by focus-group participants to the social context of clinical practice (cf. Section 3.5.4.2; 5.3.5.1). This social context includes the diverse spectrum of ethnic groups and cultures found in South Africa (cf. Section 2.5.1; 3.5.4.2). This social context of clinical practice is represented in the following participant responses:

I'm not meaning you should be aggressive in the face of whoever is there ***it is also respecting other cultures, other belief systems*** 1(1.2).

If I may add one thing – as ***we are dealing with a diverse nation*** *... it boils down to what No. 3 was talked about ethical values* **–** ***respect other peoples' cultures*** 1(3.1).

An observation was voiced in jest by one participant, namely, that the physical appearance of simulators only represents the white population group:

*In a simulation it becomes more difficult because **all of them are white patients** [pause] – **no I'm just playing** [general laughter] – **white simulation dolls,** but it becomes difficult in a sense in a black guy because sometimes it is more difficult for you to see on dark-skinned people and that becomes a problem* 2(1.5).

Using light-skinned simulators has implications for including ethnic-specific contexts in the clinical setting (cf. Section 3.3.2.4). For example; using a light-skinned mannequin with Caucasian features to simulate a clinical case in the clinical setting of a local black informal settlement is contextually inappropriate. Using only light-skinned simulators to simulate ethnically appropriate contexts limits the range of simulation contexts to a minority group and does not reflect unique settings associated with other ethnic groups who are in the majority in South Africa (cf. Section 2.5). One participant commented on skin tone developments in simulation technology as providing opportunity for better cultural representation in clinical simulation as follows:

*We're getting manikins with **different shades of skin**, the **new technology** coming out, so it's definitely **more conducive to a multicultural society** so you can see that cyanosis looks different on a white person and a person with a darker skin and **that variability is trying to be integrated into the current learning** and to take it forward from here* 2(1.1).

Although both responses reflect the physical representation of simulators, the importance of addressing simulator deficiencies extends to simulation as a social construct (cf. Section 3.3.2.2). If rules for interpreting the use of white-skinned mannequins in representing other ethnic groups have not been made explicit, confusion amongst simulation participants is likely, undermining psychological fidelity and the immersion experience of clinical simulation (cf. Section 3.3.2.2 and 3.3.2.4). This misrepresentation of ethnic realism challenges claims to an authentic situation required for an integrated assessment (cf. Section 2.4.1.5).

On-scene interactions by ALS paramedics with patients, family members, members of the public, other emergency service personnel, such as police and fire-department, other EMS personnel and other healthcare professionals, are a given in ALS paramedic practice, as reflected in the following participant responses:

You need to be assertive in you management of the patient ***with the patient and your colleagues*** *on the scene* 1(1.2).

hopefully the training that you received will bring out those aspects that you can actually take charge in a professional manner when you ***address patient and any spectators or family members present*** *so that you can perform the task at hand* 1(1.1).

ok I think for the real road when you work on the road, the most difficult scenes are the scenes where the ***bystanders*** *and where you get outside* ***influences like bystanders, where there is a crowd, doctors on scene ... professors on a scene*** *[laughter]****,*** *you get into a church and there are* ***four doctors but they are not sure about the patient*** *–* ***that's difficult scenes*** 2(3.4)

Emergency care in the out-of-hospital environment and the complexity of human interaction give rise to situations that are chaotic, rich in distraction, and conflict-generating (cf. Section 3.5.2.2). Chaotic situations, distractions, and conflict with others are reasons cited by participants for ALS paramedics to develop skills that enable them to mitigate these issues and maintain a patient-care focus. The following participant responses express these reasons:

Every scene is chaos *and you have to make it organised chaos [laughter] ...* ***you have to organise all the chaos*** *to being almost being perfectionist at the end and I think that's basically what we have to do* 1(3.4).

How does he act when ***something out of his control*** *influences him on a scene…when* ***somebody*** *comes in and* ***distracts*** *him, so ya* 3(3.4).

if it's a situation where you have ***fire brigade*** *… and* ***you must be boss with a patient*** *it* ***gets you in sticky situations because there is conflict*** *were* ***aggression can happen*** 1(1.9).

The context of ALS paramedic practice requires an appropriate set of behaviours and attitudes necessary to function effectively (cf. Section 3.5.4). Simulation design should include contextual elements found in clinical practice and that elicit and assess attitudes and behaviours expected of competent ALS paramedics (cf. Section 3.5.3.1).

In discussing case types for use in clinical simulation, one participant suggests explicit inclusion of human interaction elements as part of clinical simulation case design:

I would like to agree with No. 2 in that there is no specific case type itself but ***another dimension would be to have somebody who adds another dimension of experience and that would go to testing the practitioner's ability of dealing with that aspect and also managing the patient*** *whether it be paediatric, whether it be cardiac, respiratory or polytrauma, but that* ***adds the aspect we have to deal with on the road – it's interference from a family member, a mother, grandmother – whoever might be there who's actually pestering you*** *whether making demands "no but you should be doing this", "he's not breathing, get on with it", "why we still sitting here let's get moving" type of thing. So to bring that aspect in ...* ***it's not just a 2-dimensional scene you have to attend the patient but you have another dimension of interference that tests your ability to stretch across that scope*** 2(1.1).

5.3.2.2 *Category 2.2: Conditions of Advanced Life Support paramedic practice relevant to integrated clinical simulation summative assessment*

Conditions of ALS paramedic practice identified in response to questions asked of focus groups include environmental conditions, time pressure and working conditions. A belief that any environmental condition found in clinical practice could and should be replicated in the simulation environment was discussed in one focus group (cf. Section 2.4.1.3).
I don't think there's anything out there that you can't bring into a sim ... ***most of it you can bring into a sim*** *to make it realistic … ya, I mean we brought* ***smell*** *into the simulation – we actually put the* ***chemicals*** *there* 3(2.7).

To go with what [No. 7] said is, "what can't you bring outside in?" is rather, if you can swop that around and say what ***can't you take inside out****? Do the* ***simulations outside****, if it's sunny outside – there's your simulation – if it's rainy outside, it's your simulation –* ***it's what's happening on that day****. I think we focus on what we can do in the classroom – instead* ***we are primarily prehospital, we are outside, so take the simulation outside and see what happens*** 4(2.1).

I agree, bring what's outside in and if we can, take what's inside out – ***take the manikin and put it on the tar road, let the students get on their knees on the tar road and do CPR while treating a patient*** *– there is limits, unfortunately* 4(2.4).

Replicating environmental conditions in clinical simulation events was recommended to achieve scenario fidelity (cf. Section 3.3.2.1). Difficult environmental conditions, such as noise, lighting, weather and temperature, challenge the effectiveness of patient care by ALS paramedics in the emergency setting (cf. Section 3.5.1.3). Uncomfortable and distracting environmental conditions also serve as stressors for ALS paramedics (cf. Section 3.5.3.3). Maintaining a patient-care focus and managing stress require an effective response to these environmental conditions (cf. Section 3.5.3.5). Specific environmental conditions are reflected in the following participant responses:

The most important factor is reality; you should make it ***as real as possible*** *… by means of* ***tinting the windows make it pitch dark, put background noises, smell*** *– if it's a motorbike accident put a motorbike in* 4(2.7).

The factors that I think should be included when you are designing your simulation … if you are going to be talking about the ***cold weather*** *really the* ***room must be really, really cold*** *so you can be able as the* ***person going in you can feel the room is cold – be as close to reality as possible*** 4(3.1).

Time pressure was reported across all focus groups to be an important condition influencing ALS paramedic practice (cf. Section 3.5.3.4). The importance of time is illustrated in the following participant responses:

You know the ***environment*** *that we are working in* ***where time is crucial****…*1(1.7).

I would like to add to that there should be a ***sense of urgency*** *and we should* ***take note of timing –*** *your timing should also be right, so that you can make decisions as he mentioned now – you've* ***got only a certain of space of time to do critical things*** *so there should be a time management issue or* ***behaviour regarding time management*** *as well as a* ***sense of urgency*** 1(4.1)

but at the end you need to also see if the individual ***can treat a time-critical patient under pressure*** *and – with its limitations that it has – I think that is* ***one area of the areas of assessment that shouldn't be omitted****, even though you can have other assessments as well…* 2(3.3).

Time pressure was linked by one participant to stress in clinical practice and therefore justifying time limitations in clinical simulation:

the ***stress management in any scenario will give you timelines*** *–* ***if you don't*** *intubate the patient with anaphylaxis* ***in time then he's dead*** *– then you have to cry. So you have to* ***manage stress and that timeline gives you stress*** *… I think the bottom line is, people, we want to educate professionals being able to* ***do certain skills in certain times to save a life*** 2(1.6).

Various sources of time pressure were identified by participants (cf. Section 3.5.3.4). One source of time pressure identified was the time-critical nature of life-threatening emergencies, where problem identification, decision-making and clinical interventions are time-dependent.

In terms of competencies or abilities to be assessed, what is of importance is a student's ability to recognise a ***life-threatening emergency*** *and* ***treat it within a certain time****.* ***– that I feel is very, very important*** 3(2.5).

Another source of time pressure identified by a participant was that imposed by medical aids:

particularly ***in the private sector when you talk about minutes wise*** *– 15 minutes, 20 minutes – you are almost* ***bound to the medical aid****, the ALS patient you've got 20-25 minutes max, then you've got to* ***start justifying why are you still with the patient*** 2(2.1).

A concern was raised by a participant that, despite challenges of time and logistics, the duration of an integrated clinical simulation assessment event was unrealistic given the high-stakes nature of the summative assessment.

I know ***there's an issue with regards to logistics in terms of time and how many people you have to do today****. I think 20 minutes –* ***if that's your scenario that you have to pass or not – I think 20 minutes is harsh, I think it's not realistic*** 2(1.9).

Despite the concern for an unrealistic time frame for assessment of the clinical simulation event, an opinion that a time limitation is necessary to represent real clinical practice was supported by all focus groups. Participants were cognisant of reasons for the time-dependent display of clinical competence and time-management skills in the integrated clinical simulation assessment by students (cf. Section 3.5.1.2; 3.5.3.4). As stated by one focus-group participant:

We want to educate professionals being ***able to do certain skills in certain times to save a life****. If you are not able to do an intubation in the first 5 or 3 minutes with an anaphylaxis your patient is dead.* ***What does it help you put someone out in the field who can't complete 5 skills in 20 minutes*** *– he's going to kill people – are you going to let that person practice on your family?* 2(1.6).

Clinical simulation as a social construct within an educational and clinical practice paradigm is inferred from perspectives offered by participants in response to focus-group questions (cf. Section 3.3.2.2). Though a time limit may be an artificial construct, the educational design of the event may lead to realistic, time-dependent outcomes, as reflected in the following responses:

Ok, coming from an educator's perspective, the scenarios that are set up are set up with ***certain aims and objectives that need to be covered*** *– it's usually about only 3 or 4 – and so* ***it is reasonable for 20 minutes*** *plus you've got* ***some distractions and distracting elements*** *that can interfere but at the end of the day the question* ***you asked is, "is the student safe?"*** 2(1.1).

Also the ***time in which a learner must reach a certain goal****, it doesn't help your sim says you have to intubate the guy;* ***it states you have to intubate within 3 minutes or you have to attend to his airway problem within 2 minutes and I think that is part of setting the goal to the sim and I think that's important*** 2(3.4).

the ***timeframe on simulations is specifically for life-threatening conditions*** *– like he said – the* ***student needs to do this within this time****, because* ***you cannot have someone trying to manage the airway ten minutes down the line*** 4(1.4).

Working conditions cited include the effects of shift-work and nature of the job on ALS paramedic effectiveness and personal well-being. Long hours, fatigue and emotional trauma were identified by participants as contributors to stress and factors negatively influencing personal performance and motivation in clinical practice (cf. Section 2.5.2; 5.3.5.1).

If you tend to neglect the way that you feel because you are ***experiencing stressful situations and emotional situations*** *which are also contributing to your well-being, so at times you find this thing of* ***post-traumatic stress*** *at the end of the day if you have not really prepared your mind for those things* 1(3.1).

I think what you experience, if you've been working quite some time ***– 24 hours a day, 7 days a week –*** *on your first day of work, when you come towards a critical patient, your* ***attitude and behaviour will be different to the one on day No. 7 because you'll be tired****, and you'll frustrated in terms of treating this patient – I've* **had enough now I just *need a break*** *…* ***even if you are working a 12-hour shift*** *you will start off with a bang, you're all nice and fresh and* ***towards the twelfth hour you are already frustrated, seen enough, and I think that the traumatisation and all the emotional things*** *that you have seen during the day –* ***by hour No. 11 your attitude and your behaviour is going to be changing*** 1(2.2).

It is necessary that sufficient elements of context and conditions of ALS paramedic practice in South Africa are integrated in clinical simulation summative assessment events for the assessment to be considered an authentic situation (cf. Section 2.4.1.3; 2.4.1.5). This adequate representation of conditions in the clinical simulation is pertinently captured by the participant who stated that:

You need to have one simulation that ***incorporates a lot of items to see if he is really competent or not****, and that* ***includes a timeline of 15 or 20 minutes*** *for the simulation so you can see this guy* ***can also manage stress****,* ***incorporate a distraction*** *so you can see he's got a* ***good attitude*** *towards positive* ***professionalism*** *to handle that* ***and then treat the patient*** 2(1.6).

Conversely, the complex nature of the out-of hospital environment challenges the degree of fidelity possible in clinical simulation and contributes to perceived limitations and mistrust by participants towards integrated clinical simulation as a valid summative assessment instrument (cf. Sections 5.3.1.2 and 5.3.1.3)

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5.3.3 Theme 3: The physical dimension of Advanced Life Support paramedic practice relevant to the integrated clinical simulation

5.3.3.1 *Category 3.1: Physical fitness*

Physical health and fitness is recognised as an essential aspect of ALS paramedic practice. The nature of the work requires a certain level of fitness in order to access, treat and transport patients (cf. Section 3.5.1.1).

I think it's something that we tend to put at the back of our minds – your health as an individual who is a paramedic – you need to take care of yourself; those are the behaviours we have to look at because your ***physical well-being*** *as a practitioner is of utmost importance* 1(3.1).

'Cause, I mean, if you are, like, ***unfit*** *and you need to get to a patient, like, in ten flights of stairs within ...* ***you can't do your work*** 1(4.4).

in physical *– if you have to* ***carry the board*** *you have to do that, if you have to* ***climb through a window*** *you have to do that, if you have to* ***lift a patient –*** *a 100 kg patient –* ***down the stairs****,* ***you have to be able to do that****, so you can't slack on one thing* 4(3.4).

Maintaining physical health is also associated with emotional well-being and resilience against the stressors of the job (cf. Section 3.5.3.5).

if you take it into your after-work life, private life, to have a stable home environment – you need to be stable in terms of emotions, mentally stable in terms of handling the kinds of things that you deal with. ***You need to be pro-health, in other words in terms of your attitude towards what you eat and how you keep yourself in shape*** *– it's just* ***multi-layered*** 1(4.1).

A clinical simulation event may require physical exertion such as accessing a patient (flight of stairs), performing chest compressions, carrying medical equipment, and moving or lifting a patient (cf. Section 3.5.1.1).

5.3.3.2 *Category 3.2: Psychomotor competence*

The view held by the PBEC, namely, that the term "simulation" is applied to the integrated clinical simulation assessment and not to assessment of clinical skills using simulators (cf. Sections 2.3.3.2 and 3.3.1.1), was supported by participants and illustrated in the following responses:

Looking at the specific skill as per, say, my view is you are ***not always looking for skill assessment in a simulation*** – *that is all for the* ***OSCE type of scenario where you are looking specifically*** – ***simulation is trying to integrate more*** 3(3.3).

According to me the ***OSCE will test your knowledge on that particular thing*** – *the LMA, the ventilator* – *whatever the case might be* – *but you* ***need to show in your simulation*** *then your thinking skills and your capabilities in actually* ***incorporated into this patient you are seeing*** 3(4.5).

Aspects of psychomotor competence highlighted by participants included the conditions of efficiency (how quickly the skill should be done) and precision (accuracy in performing the skill) (cf. Section 3.5.1.2). The pressure of performing psychomotor skills was connected to time-limits (a stressor) where life-threatening emergencies include time-critical conditions requiring rapid intervention (cf. Section 3.5.3.4). Rapid, precise and context-appropriate performance of skills was associated with sufficient practice for skills to become second nature or "muscle memory" (cf. Section 3.5.1.2);

Psychomotor skills *... ya, in a sim you can test the skills in a way* ***under pressure – usually as a time limit*** *so you want to* ***test the person's ability to actually [be] under pressure*** *be able to perform this, and some skills you need to be able – like a chest deco or a surgical cric* ***you need to pressurise it*** – *what do you call it? ...* ***it must be so drilled into you****, so when that situation comes and you identify the situation you* ***can do it under pressure correctly*** 3(3.5).

perfection*; so if you do something do it right,* ***do it right the first time*** *and that is part of planning so the planning part of it must be ...* ***precision****, everything they must do must be* ***done right the first time*** 3(3.4).

Skill competence for application in clinical simulation events were seen as a prerequisite to participating in such events. This suggests agreement by participants regarding a staged approach to clinical competence development as encapsulated by Alinier (2007:e245-e247) (cf. Section 3.3.1.3) in his proposed simulation typology, and supported by the Dreyfus model of skill acquisition where the "competent" level is achieved by a learner applying skills appropriately in clinical simulation events (cf. Section 3.3.1.2).

Skills are done when they get to *the time where they do* ***their scenarios****, they are* ***competent with regards to their skills*** 2(1.9).

it's the application of the ***OSCE will be the bolts and nuts of how it works*** *and so forth but then the* ***application in the sim*** 3(4.2).

A perspective that skills should be assessed in detail in the OSCE assessment (cf. Section 2.3.3.2) but not in the integrated clinical simulation was expressed as follows:

ventilators and stuff, are people being assessed on setting up a ventilator and ventilating a patient properly ***in a simulation part or is it an OSCE skill****?* [someone confirms it is an OSCE] – *ok.* The facilitator asks: *Don't you think it should be a simulation skill?* Reply by same participant: ***If it's done in an OSCE it should be fine*** 3(4.3).

The objective of the integrated clinical simulation, therefore, was seen to assess primarily rule-based and knowledge-based thinking rather than procedural competence (cf. Section 3.5.2.3). The suggestion was that certain skills had already been assessed in detail prior to the integrated clinical simulation summative assessment. The obligation to assess psychomotor competency in the context of an integrated clinical simulation was understood to be subservient to the indication for the procedure, when the skill should be performed in the treatment process and what alternative options to the procedure are available.

You want to know ***what type of IV line*** *he's going to put on because they've* ***already been assessed on putting up an IV line****, so it's more in the sense of, ok,* ***what*** *are you putting on,* ***where*** *are you going to try and put it* 3(3.3).

This is a very interesting question to be asked, because the competencies like what No. 7 has mentioned already – the ***skills are being assessed – all the different little bits and pieces of this puzzle have been trained for and has been assessed throughout****. In the end of the day, when you give a* ***simulation****, I think the objective is to* ***test whether the***

student can take all these pieces of puzzle and put them together to make this picture work in the right order *– and there are different puzzles with the same pieces* [facilitator: and that's my question]*; but the* ***sequence*** *in which you put these things together is going to give you an end result* 3(1.2).

The issue of the practicability of assessing every skill in detail in the context of the integrated clinical simulation is expressed as a factor limited by time and resources (cf. Section 5.3.1.4). The blurring of boundaries of how detailed the performance of procedures must be is evident in participant responses.

Looking at the ***specific skill*** *as per, say, my view is you are* ***not always looking for skill assessment in a simulation*** *– that is all for the OSCE type of scenario where you are looking specifically –* ***simulation*** *is trying to integrate more …* ***because of the time it takes*** *as well in doing a scenario, packing up, getting the next student to come in –* ***you have a limitation****,* ***you are not actually trying to assess skill*** 3(3.3).

No, ***you don't have the time*** [agreement in background]. *It's the microscopic and macroscopic approach. The* ***microscopic assesses the specific skill – down to the finest detail*** *– and* ***the simulation is more a macroscopic whole picture of your approach in handling a situation****, so you've got to have both, but* ***it's how you tie them together*** 3(4.1).

The expectation is expressed that some skills need to be performed with fair detail and then others are assumed to be done when mentioned. "Fast-tracking" skills is perceived to be unrealistic and challenges the dimensions of fidelity, the integrity of which is essential to achieve suspension of disbelief and a truly immersive experience necessary to support the claim of a "true test" (cf. Sections 3.3.2.1 and 2.4.3).

We've always ***had to compress time*** *– in other words the* ***time that is been spent in a simulation is not the same as the time it would take in real life*** *but you are* ***forever compressing certain aspects*** *to say, ok, we* ***consider that as done although it is not yet done*** *– so* ***those are the stumbling blocks*** *– if they weren't there then if you had a day per student to assess then it would be great,* ***it's unrealistic*** 4(4.1).

A disclaimer to the opinion that detailed skill performance is not required in clinical simulation is where performance of some psychomotor skills are needed to sustain the interactive element of simulation (cf. Section 3.3.1.1), such as CPR, defibrillation, synchronised cardioversion, transcutaneous pacing and endotracheal intubation (including any basic airway procedures). When such skills are performed then these skills need to be evaluated, as stated by one participant:

*I believe – yes – while you're doing a simulation and so forth **there's certain skills that you do evaluate**, but it's more **specifically skills like intubation, or drug administration or IV*** 3(1.7)

Simulator fidelity allows for some psychomotor skills to be performed with reasonable accuracy (cf. Section 3.3.2.1). The detail with which these skills need to be performed in the clinical simulation context compared to performance of these psychomotor skills when assessed in isolation, is unclear. Critical points, such as correct placement of the endotracheal tube, safety while defibrillating and using real equipment in clinical simulation, contribute to fidelity by providing "reality cues" and invoking the "as-if" principle to draw students into an immersive experience (cf. Section 3.3.2.2).

Precision and efficiency of clinical procedures include patient safety factors and may be part of the standard required for performance in the integrated clinical simulation. Performance standards are part of the conditions for selecting an appropriate simulator (cf. Section 3.3.1.1) and for translating a clinical case into a simulation – the modulation of the primary frame (cf. Section 3.3.2.2). The performance standards and rules for demonstrating clinical procedures in the clinical simulation context require explicit communication and must be included in the formative phase of procedural training and clinical simulation. Consistency between facilitation of learning and summative assessment emphasises the principle of constructive alignment (cf. Section 3.3.1.2).

Undermining simulation fidelity is a risk when task fidelity in simulation design is ignored or downplayed and where detailed performance of psychomotor skills in clinical simulation is not expected, or it is de-emphasised (cf. Section 5.3.1.2).

5.3.3.3 *Category 3.3: Sensory acuity*

The limited diagnostic tools and reliance on information gathered through the senses is part of the matrix of ALS paramedic practice (cf. Section 3.5.1.3). The importance of environmental factors affecting sensory information was identified and perceived by participants as necessary in the clinical simulation context.

*All the **windows is dark – the students have to wear headlamps, simulating night time – dogs barking, we had noises of cars responding** – students **can't hear that*** 3(2.7).

The necessity of sensory acuity was also mentioned by participants with regard to situational awareness, and for information-gathering processes involved in activities such as observation, percussion and auscultation (cf. Section 3.5.1.3).

*Yea, you just **have to be conscious all the time** – you **have to be alert** from the time you get the call to the time you are on the scene till you've handed over the patient* 1(2.2).
*trauma has got its own challenges but with trauma what you see is what you get; medical you **must go look** – sometimes you spend 10 minutes taking a sample history, going through the patient – **auscultating, percussion** – the whole management **to get to the answer*** 2(2.6).

*Does he have the reasoning skills to apply the knowledge to the **observations that he's making? Does he have the normal skill required to make observations accurately?*** 3(2.1).

Reliance on information acquired through the senses is also a source of frustration in the context of clinical simulation, where equivalent information available in the real clinical context is not available in the same way in the simulation context (cf. Section 5.3.1.2). This inconsistency in sensory information available is perceived as both a limitation of and opportunity for simulation design (cf. Section 3.3.2.1). Solutions suggested for improving physical and environmental fidelity of clinical simulation when replicating relevant sensory information from the clinical context include providing similar information via the same sense but by another means. Examples include the use of moulage and using pictures that show visual information, such as skin colour, age, body build and injuries (cf. Section 3.3.2.2).

*What I wanted to add is **to design a scenario** like you want to have a person who has been stabbed … **you can try by all means to make it look real – real blood**, **instead of telling the student you are seeing blood** whereas they are not seeing anything wrong with the patient – **if we can have those type of things which are going to be used to help the visual aspect of the simulation*** 4(3.1).

*So **if I can have a picture** on a small clip showing that's **how big is your patient**, here's the presentation. If I'm presenting and saying you are having a pregnant lady or you are working in the room **and you can obviously see the patient is pregnant** – if I can actually* *give you the picture – it will save the time of showing the description by* ***showing the patient is blue, the patient is bleeding*** *– you have a* ***picture that reflects here's what I see*** *as I walk in.* 4(3.2).

Simulator fidelity, scenario fidelity and environmental fidelity elements should contain sufficient sensory cues that replicate clinical-case elements and contexts. Breathing should be observed and rate counted, breath sounds auscultated, pulses palpated, blood pressure measured, and replication of physiological monitoring with visual and auditory information provided, among other cues. Providing this clinical information as verbal cues detracts from scenario fidelity and denies the display of competence in information gathering through the senses under stressful clinical simulation conditions. Environmental factors confounding information gathering through the senses are relevant to replicating difficult conditions for assessing and treating patients in the emergency care setting, and provides conditions under which true competence can be assessed (cf. Section 3.5.1.3).

5.3.3.4 *Category 3.4: Technological knowledge and competence*

Knowledge and use of technology are important constituents of ALS paramedic practice (cf. Section 3.4.2.6 and 3.5.1.4). An expectation is expressed that equipment used in clinical practice should be employed in the simulation context.

I think most of us are taking them for granted, it's the competencies you would expect a simulation to test which is your ability to apply the knowledge you've learnt … your ***ability to utilise your equipment in the way it's supposed to be used****, to interpret information and make decisions assertively* 3(4.1)

Use of specialised equipment is linked by one participant to transferring patients between medical facilities (cf. Section 3.4.1).

Transfers, handling transfers – it's a ***specialised field on its own – certain equipment****, background, maybe training on background in ICU settings. There's* ***lots of equipment where new technology becomes involved*** 3(4.3)

It was not only the routine use of equipment that was identified as important for assessment in simulation, but also the ability to troubleshoot equipment failure in the clinical context.

As stated by one participant:

Then the application in the sim and should there then be – you're ***transporting a ventilated patient and all of a sudden the ventilator fails*** *is there may be* ***in the simulation is there a back-up plan*** *– is there a BVM or something of that kind?* 3(4.2).

Complications may develop when using equipment, and bail-out options required in the case of equipment failure.

There's lots of equipment where new technology becomes involved *…* ***What do [you do] when*** *a patient in ICU on all the* ***infusions crashes*** *– it is maybe something that is being taught now but previous years it wasn't emphasised* 3(4.3).

The aspect of equipment use in simulation gives rise to questions relating to the objectives of the clinical simulation and the purpose of assessment. Given the complexity of ALS paramedic practice and the range of competencies that can be assessed, concerns were expressed about what is important and what should be the focus.

do you test a guy's ***knowledge about equipment*** *or do you test his* ***knowledge on the sim*** *itself?* 2(3.4).

I don't know what's the answer – I think there ***must be a range of scenarios*** *you have over a time that should make sure your students is* ***taking all the other stuff, let's say the collateral stuff*** 2(1.9)

Students should be expected to apply technological knowledge and demonstrate technological competence in the clinical simulation setting (cf. Section 3.4.2.6 and 3.5.1.4).

5.3.3.5 *Category 3.5: Logistical competence*

Logistical competence is expressed by being organised and neat on scene. Unlike the order created in a hospital context, where physical facilities allow for routines of storage and access to medical supplies and equipment, the varied contexts of out-of-hospital emergency care require the ALS paramedic to carry necessary medical equipment and supplies to where the patient is. How the ALS paramedic places, accesses, uses and controls equipment, medical supplies and other emergency service personnel may either enhance order and control of a situation or add to disorder and chaos at an incident (cf. Section 3.5.1.5).

*I think also what is important is to **be organised on a scene**. Especially when you have multiple casualties* 1(1.0)

neatness** at the end of the scene – you will pick it up in the scenario if the guy is **not neat on the scene, he's going to fall over all the stuff**, that naturally comes with the sim – it's not really something you can test but it's something you can look at. Control: **how you control people around you** – that's **part of management 3(3.4).

*It seems to me there is a difficulty in some of the new students that comes out on the road **they cannot stand back a bit and delegate tasks** and stuff. **I don't think it's important for you to do all the skills** on the patient and stuff because **sometimes you lose focus** sometimes on the patient on what is going on **specifically on big scenes** where the ALS paramedic will attach himself to one patient while there's six more other patients* 3(4.3)

In an integrated clinical simulation a student is expected to have the full range of medical equipment and supplies that would be available on an ALS response vehicle. How the student manages equipment, medical supplies and on-scene human resources influences student performance in the clinical simulation environment and demonstrates logistical competence.

5.3.4 Theme 4: The knowledge framework and cognitive dimension of Advanced Life Support paramedic practice relevant to the integrated clinical simulation summative assessment

5.3.4.1 *Category 4.1: Knowledge framework of Advanced Life Support paramedic practice relevant to the integrated clinical simulation*

The importance of assessing applied knowledge in the clinical simulation was expressed, although the types of knowledge were not explicitly identified but embedded in participant responses (cf. Section 2.4.1.3). An appreciation of the process of assimilating knowledge in practice was articulated (cf. Section 3.5.2.3). Simulation was identified as a tool to bridge the gap between theory and practice.

*That is the **application of knowledge** into that scenario … It's the **application of our theory knowledge** that teaches us **when to act and recognise when this needs to be applied.** So I think **that is the fundamental and essential part of what simulation is** – it's just to **bridge that gap of sitting at a desk listening to a lecture, to actually now applying that knowledge into a scenario** that could require you to think a little bit more … They've got to move on and **build that knowledge** to a point where they **can actually integrate all into a situation where they can adapt and address each patient** that presents themselves* 3(1.1).

*Once again, this is a **multidimensional, multiple-aspect situation you are working with** – this **isn't something you can put down on a piece of paper**. There's different dimensions you need to look at here* 3(1.2).

Integrating the scope of knowledge acquired during the course of study was realised to be one of the objectives of the clinical simulation, including basic sciences knowledge (cf. Section 3.4.2.1; 3.5.2.3).

*I want to agree, I would just like to say while you are building your pictures I also had my picture, and my picture I see the **simulation** as a skeleton – the organs and the muscles and the tendons, **absolutely everything that's being put together is the pathology, the anatomy, the pharmacology** – it's **absolutely everything else that's been done within the programme** that's completing the year* 4(1.7).

Knowledge of medical disciplines as relevant to clinical simulation is addressed in Section 5.3.7.3. Clinical knowledge was linked to competencies such as clinical reasoning, clinical judgement and decision-making (cf. Section 5.3.3.3) and underpins the role of the ALS paramedic as a clinician (cf. Section 3.4.1.1). Development of clinical knowledge was associated with experience in clinical practice (cf. Sections 3.4.2.3 and 3.5.2.3).

*Something else you can test is his ability to think and **clinically evaluate the situation*** 2(3.5).

*Well, you **want him to get to a diagnosis** – if you see the patient's blood pressure is low you know you should give fluids, but you should also know to stop where he's bleeding* 3(2.5).

This situation when it arises and it is ***not always arising the same way that you have been taught*** *but something else. You might be having a patient who's* ***having a MI who is not presenting the same way you have been taught*** *yet he is having an MI but you* ***need to be able use the knowledge that you are having to be able to treat that type of a patient*** 4(3.1).

Participants expressed the importance of evidence-based knowledge (cf. Section 3.4.2.4). Sources identified included textbooks, articles and guidelines.

I think whatever's left you ***should be current in the latest developments in the latest research*** *and stuff because there's no point in being professional and having all this attitude* ***but you're not current in what you're doing****, because you might mislead everybody on scene because of how you perceive yourself and how you conduct yourself on scene* 1(1.5).

Of any of the scenarios, you should be able to run a resus, because in any type of scenario, if you make a bugger-up you may end up resussing - so if you make a mistake there ***you should be able to resus according to the guidelines*** 2(2.7).

Some participants expressed the opinion that it was insufficient for a student to be assessed on evidence-based knowledge in a written test, but that the application of evidence-based knowledge in a practice context was required. This demonstration of knowledge in a practice context is supported by the "shows how" and "does" levels of clinical competence presented by Miller (1990:S63; cf. Section 3.3.1.2).

Once again, this is a multidimensional, multiple-aspect situation you are working with – this ***isn't something you can put down on a piece of paper****. There are* ***different dimensions you need to look at here*** 3(1.2).

I believe now, when we assess you in the simulation we assess ***how you interpret the information when you evaluate the patient****, what is your thinking process on solving the problem – it's not about – now I can go back and put the* ***textbooks and all the articles and read through*** *and ok, I should have done this and that, but* ***will I ever do exactly what I am saying now on paper – can I apply on the patient –*** *because that's* ***what we are really all on about – the practical part*** 4(4.1).

Professional knowledge was articulated in the context of professionalism (cf. Sections 3.4.2.5 and 3.5.3.1). Professional accountability and duty to act in the best interest of the patient despite the risk of interpersonal conflict with a colleague were seen to be important characteristics of the ALS paramedic.

If it is going to be life threatening it is going to ***be my obligation to step in as a professional*** *and* ***from our registration with the Health Profession Council of South Africa it is our duty to step in*** 1(1.7).

Familiarity with ALS protocols (cf. Section 2.5.3; 3.4.2.5; 3.5.3.1) as a component of professional knowledge was identified by one participant as a reason for selecting a case used for integrated clinical simulation as follows:

If you are thinking about the end which one they should pass, I must say I don't know exactly which one … ***let's use protocol; you want to make sure the guys have sorted out their protocol*** 2(1.9).

A condition stipulated by SAQA (2001:26-27) for use of summative assessment is that summative assessment "can be conducted on a continuous basis and at any point within the learning process" (cf. Section 2.4.1.4). Integrated assessment is neither limited to summative assessment nor to a single event (SAQA 2005:1; cf. Section 2.4.1.5). In order for integrated clinical simulation to be a valid assessment instrument, sufficiency of assessment must be achieved to extrapolate competence to clinical practice. Given the knowledge framework of ALS paramedic practice, sufficiency includes assessing competence in each relevant medical discipline (cf. 3.4.2.2; 5.3.7.3). Other types of knowledge required for ALS paramedic practice inform the "knowledge" element of assessment criteria relevant to clinical simulation (cf. Section 2.4.1.2).

5.3.4.2 *Category 4.2: Roles and functions in advanced life support paramedic practice relevant to integrated clinical simulation assessment*

The roles and functions of the ALS paramedic in practice and those relevant to integrated clinical simulations were identified by participants as follows (cf. Section 3.4.1):

<u>The role as clinician</u> (cf. Section 3.4.1.1)

Support by participants for the ALS paramedic role as a clinician was addressed under Section 5.3.4.1.

<u>The role as leader </u>(cf. Section 3.4.1.2)

Leadership *I think as well because you are* ***working with personnel with or under you that you will be able to manage*** *– I think leadership is also important* 1(2.4).

management that was also mentioned as well ***and your leadership that is being assessed*** *on that because* ***you as the senior*** *you usually have a* ***member of the public****, or a* ***family member*** *there or maybe a* ***lower level emergency care practitioner*** *as well on scene* ***–*** *so* ***to see your leadership*** 3(3.3).

large part of the work involves managing – *whether it's in an official capacity or by virtue of* ***managing a scene****,* ***managing junior staff****…* 1(4.1).

<u>The function of communication(s) </u>(cf. Section 3.4.1.3)

That is something that might change by education ***–*** *that is by* ***learning different means of communication*** *by learning to properly communicate and very importantly* ***learning how to listen to other people*** *to see where they are coming from and maybe why they are making the specific statement and* ***being able to act in professional manner*** *… It is something that is always said this is the most important thing and it is often proven later on that* ***communication is the backbone of any system because when communication is broken down the system breaks down****. Now communication is terms of described in worst terms is just* ***basically how to pick up a telephone how to do radio procedures, how to write a report****. The other parts of communication are not focused on,* ***interpersonal communication*** *this is something that can be mitigated … The type of education that I am referring to here is just basic* ***people skills*** *… we* ***all have got some form of communication module*** *… those communications forms are* ***normally just basic systems-based****; it is* ***not interpersonal*** *… I think that is one of our major concerns because it carries through at the end of the day … to* ***how you act on a scene, how you act towards a patient****, to a* ***patient's family****,* ***friends****, to* ***other services*** *[and] to* ***colleagues*** *that are sitting there on the same scene, how they act to the inputs that are given them ... what I mean by this is just to expand the communication [to] interpersonal communication … through education by exposing the student perhaps to a brief session [on]* ***conflict resolution where there is a person in his face arguing*** *with him and instead of jumping up and down getting red in the face and spittle flying everywhere shouting match happening which sometimes happens on scene so it is quite embarrassing if you hear about it in the service* 1(1.2).

<u>The function of logistics</u> (cf. Section 3.4.1.4)

Support by participants for the function of logistics clinical simulation was addressed under Section 5.3.3.5.

<u>The function of administration</u> (cf. Section 3.4.1.5)

Administrative responsibilities associated with ALS paramedic practice were neither identified nor discussed in the discourse between focus-group participants. Contributing factors to the failure to pay attention to this aspect may be the general perception that there is no administration required in clinical simulation, or might be, as deduced from the experience of the researcher, the distinct dislike ALS paramedics have for paperwork and hence avoidance of this topic.

5.3.4.3 *Category 4.3: Clinical reasoning and decision-making in the integrated clinical simulation*

Having knowledge and experience of routine clinical cases in emergency care was identified as important as a precursor to addressing more complex clinical cases requiring clinical reasoning and problem-solving; as stated by one participant:

what can also help maybe ***if you know the calls you experience more regularly – get them under the belt, then go into the more complex ones, to go and dig deeper into those****. Since I was operational a lot of the calls [are] like second nature after a while – you just do them over and over and over again, sometimes you get bored by doing them. Also* ***you need to get the calls under the belt that's really – how can I put it – life-threatening and you need to act in a short amount of time****, but like I said – very broad, you need to know everything* 3(1.3)

One of the main purposes of clinical simulation assessment cited by participants was to assess clinical reasoning and decision-making in the emergency-care context.

I will say ***we have to evaluate the student on their thinking or evaluating ability on a specific patient – how they evaluate the patient; how are they interpreting the information and thinking about the things that might happen*** *– that might go wrong – and* ***when and how are they managing the patient*** *– that's what we must think about; and are they safe or are they doing harm to the patient* 3(1.4).

*It's **more a clinical reasoning process that's going on**, but you can't necessarily see if he's writing it down* [reference to theory]*, you can't identify his clinical reasoning process putting everything together – **that is the thing that the sim does is actually testing everything, your reasoning, management and knowledge*** 3(3.5)

*I think – to agree with No. 5 again – their **clinical judgement of how to approach that patient**, it shouldn't be a set rule … but if he jumps around during the whole process and gets to the objective via a, let's say save the patient but not kill the patient – I feel that would be more than enough – **but the whole reasoning part, the clinical judgement part behind it should be assessed*** 3(4.6).

*I think you **have to be fairly analytical** if not in the true scientific sense of the word yet you **need to be able to assess very quickly what's in front of you, put things in order, make a decision about your plan of action** – what order am I going to do what – all of which must be done in a very short space of time.*1(4.1).

Applied knowledge of routine emergency situations should be assessed by means of clinical simulation and, in support of a simple-to-complex approach, be an antecedent to assessment of more complex cases requiring clinical reasoning and critical thinking (cf. Section 3.3.1.2). The characteristics of case types are elucidated in Section 5.3.7.

5.3.4.4 *Category 4.4: Metacognition, critical thinking and reflection in the context of the integrated clinical simulation assessment*

Critical thinking is described as the type of thinking required to navigate complex aspects of patient care in the emergency-care setting. Critical thinking was conceptualised by one participant as the ability to "think outside the box", to be forward thinking in clinical situations, and to possess the ability to think independently, without reliance on others or being easily influenced by others:

*I think he **must be a critical thinker** … this should also **form part of his thinking process** … I think if you get to a patient you **should be able to think in advance and be able to think out of the box** when you get to situations, so – and you **should be able to do that on your own and not depend on influences from outside*** 1(4.5).

The disposition of open-minded judiciousness associated with critical thinking (cf. Section 3.5.2.3) was expressed by one participant as "adaptability" required to negotiate the unique aspects of each emergency-care situation:

It's something that basically all ***comes back to adaptability of the professional****, you [have] to* ***adapt to every situation that presents itself****. You are* ***not going to approach every scene in the same manner*** *because* ***no two scenes are the same****. I think the key then is the* ***adaptability of that practitioner to fit the situation that arises and deal with it at the time and that would then encompass their professionalism, the attitude*** *that goes with it so that they can then deal with the situation and that is to treat the patient* 1(1.1).

Opportunity for students to critique their own performance and make changes was identified as an essential component of the assessment process in conjunction with the integrated clinical simulation event. Methods identified for self-critique included reflective reports and viva voce immediately following the clinical simulation assessment event:

maybe a ***simulation must go together with an oral component*** *that can maybe* ***include rectification and reflection*** *and maybe a few knowledge questions about that thing and where you can – where you have an* ***opportunity to say your say*** *…* ***just to rectify or reflect*** *to* ***give the examiners just an idea of what your thought process are*** 4(3.5).

Examples identified by participants of the value of reflection included affording students the opportunity to learn (from mistakes), developing student self-awareness in practice, and benefit to examiners in cases where motivation for actions and behaviour in the integrated clinical simulation event cannot be assumed through observation.

I just ***want to agree*** *with No. 5 with the* ***reflective practice reports, I think that's imperative****. There are* ***so many different things that you're thinking about while you are drafting the reflective practice report I think that's really valuable*** 2(1.7)

should we not then ***rather have more weight added to the reflective practice report*** *rather than the simulation, because* ***that is where the actual value is coming from****. Myself –* ***reflecting on my experience*** *– coming through the whole thing of learning is:* ***I remember my reflective report much better than I remember my simulations*** *… the* ***reflective report for me was much more of worth than actually getting the result*** *of the simulation, because I knew – like you said yourself No. 6 –* ***the first time you fail you need to go back and you need to go and revisit, what did I do wrong, where did everything go wrong? You need to go and fix that, you need to go and identify, using reflective practice and you need to identify where the problem was and then come up with a solution or retrain yourself in a very short space of time*** 4(2.1).

But I think for us, it's one thing to say this is what we're going to do with the student, but ***how they perceive it and what they do at the end of the day*** *–* ***I can't understand why they gave the drug*** **–** *and that's what we, I hope that's something we can tailor in terms of* ***making sure that reflective system that we've got at the moment*** *– I think there's gaps – that we don't now harness and* ***can understand why that student did that and gave that drug*** 4(1.9).

By expecting students to engage in critical thinking and reflection in association with the clinical simulation assessment, metacognition can be developed and assessed (cf. Section 3.5.2.3). Self-critique and reflection by students on motivation for actions taken and future change in attitude and behaviour required for success, affords opportunity for such development of metacognition.

If formal reflection opportunities are employed together with multiple clinical simulation events using a simple-to-complex model and continuous assessment throughout an emergency-medical-care programme, then risks of the current assessment model using clinical simulation are mitigated and development of true clinical competence promoted.

5.3.5 Theme 5: The affective dimension of Advanced Life Support paramedic practice relevant to the integrated clinical simulation

The behavioural aspects of professionalism come into play and inform interactions in the professional context. The need for the right attitude toward people, effective communication skills, conflict management skills, stress management and ethical conduct were identified by participants as important behavioural aspects of professionalism.

5.3.5.1 *Category 5.1: Display of appropriate attitudes in the clinical simulation setting*

Acting professionally calls for a set of distinctive attitudes among and behaviours by ALS paramedics (cf. Section 3.5.3.1). These distinctive attitudes and behaviours include self-control, assertiveness, decisiveness and taking charge (control) while maintaining a respectful and caring disposition towards others. The benefit of these distinctive attitudes and behaviours were cited by participants to include defending the best interest of the patient in the context of distractions or conflict, establishing order at a scene where there is chaos, managing time pressure, making decisions and following through with them, maintaining a caring disposition towards patients and family, instilling confidence in patients and family, and upholding the dignity of the profession. The following participant responses explain these benefits;

You also ***need to be calm,*** *cannot display signs of panic so hopefully the training that you received will bring out those aspects that you can actually* ***take charge in a professional manner*** *when you address patient and any spectators or family members present* ***so that you can perform the task at hand*** 1(1.1).

Assertiveness *is* ***taking charge while respecting*** *other people's personal space, their belief systems and so forth … you need to be* ***assertive*** *in* ***how you are managing the patient what is best for the patient*** *… you are more* ***proactive in making a decision*** *and* ***following through on that decision that will be the assertiveness aspect*** 1(1.2).

Self-control*: one must be able to – take for example if you encounter a psychotic patient who ends up hitting you –* ***one should be able to control themselves and not hit back*** [laughter] *... so as part of the behaviour one must also* ***have those qualities to empathise and sympathise*** *with whoever you are treating and the family members of whom you are treating as well* 1(2.5).
Friendly and firm must be balanced because you ***must appear approachable*** *but you've* ***got to have conviction, what you are doing****, what the decisions are you are making and* ***follow through with them****. At times that* ***might not suit other people*** *but if you are the one in* ***position of responsibility and authority*** *then* ***you call the shots*** *and they need to go that way* 1(4.1).

he should ***know what he is doing*** *and in doing that* ***instil confidence in the patient and family of the patient****, so he should,* ***in a professional manner be assertive and take charge of the situation*** 1(4.3).

ALS paramedics at incidents may express conflicting opinions (such conflict situations may include that between the ALS paramedic and other EMS personnel, other emergency service personnel or other healthcare professionals). This interpersonal conflict was perceived by one participant to be a distraction from meeting the medical need of the patient by the ALS paramedic, and the paramedic therefore required an effective conflict management strategy to avoid neglecting the patient:

I think as I observe in a way he said ***if [we] foresee a problem how are we going to correct it in such a way [not] to provoke the other person being aggressive to us*** *now*

or [without] the situation ending up focusing on the two of you instead [of] on the patient*. Again, I think the relationship between the two practitioners … maybe if someone arrives on scene and the relationship between the two of you is not a healthy one the whole thing will start showing now who is the boss* 1(1.4).

Characteristics associated with the ability to listen and consider another opinion in this potentially stressful context include humility, a willingness to continue learning and placing service ahead of self-preservation or convenience (cf. Section 3.5.3). These characteristics comply with the expectation of the community for a professional response in the midst of conflict and stress and this expectation may conflict with the individual self-preservation system of an ALS paramedic (cf. Section 3.5.3.2).

The other issue is most of the time they are ***being arrogant especially on scene*** *and they are* ***not willing to work as a team*** *for we are there for the sake of the patient … if you are* ***not open up for opinions or maybe an advice then and there then you forfeit the whole thing about safety of practice*** 1(1.4).

sometimes people with these attitudes that they have on scenes …. ***I sometimes get the feeling that they're having these attitude issues because they're trying to hide their own feelings of incompetence*** *or unsure of they're actually supposed to or* ***unsure of their knowledge base and therefore they act aggressively to ward off anybody asking any questions pointing out any weakness*** 1(1.2).

I think we want to highlight what No. 4 says. It very important that as an ALS practitioner that you always ***pride yourself on the reason why you are the ALS****. Why are you here?* ***It is for the patient****, it is not about the lights and the sirens and the uniform and the attitude. I think it is* ***very important to remember to be humble and remind yourself of why you are actually a paramedic*** 1(1.10).

The clinical simulation environment should provide a safe place for students to learn affective skills (cf. Section 3.3.1.2). Replication of clinical practice conditions in simulation includes incorporating interpersonal conflict situations. This may be perceived by educators as placing students at risk by creating psychologically unsafe situations. Such beliefs by educators may result in the neglect of learning facilitation in this area. The researcher argues that such conflict situations are necessary if students are to learn conflict management and negotiation skills. In the safe context of a simulation psychological safety can be provided by educators, who support students in and coach them through such conflicts. Without this deliberate exposure to such conflicts, it would be unfair to expect an appropriate response by a student in the integrated clinical simulation assessment where such a conflict is replicated. Such conflicts may be appropriate when replicating a clinical case as an authentic situation for assessment when using clinical simulation as the instrument.

5.3.5.2 *Category 5.2: Self-management and stress management in the clinical simulation setting*

Self-management with the objective of establishing and protecting personal well-being for job sustainability was also expressed in focus-group discussions. The stressful nature of the job was cited as the necessity for awareness and deliberate attention to maintaining personal well-being. Aspects of personal well-being identified by participants included the paramedic's mental and emotional condition. Perspectives on achieving well-being include awareness of stress, maintaining a healthy lifestyle, having a sense of humour and cultivating and maintaining wholesome family and interpersonal relationships.

to have a sound mind *– I think it's something that we tend to put at the back of our minds –* *your health as an individual who is a paramedic* ***– you need to take care of yourself****; those are the behaviours we have to look at because your* ***physical well-being as a practitioner is of utmost importance –*** *if you tend to neglect the way that you feel because you are* ***experiencing stressful situations and emotional situations which are also contributing to your well-being,*** *so at times you find this thing of post-traumatic stress at the end of the day if you have not really prepared your mind for those things* 1(3.1)

You have to have a ***sense of humour****, meaning that* ***you're trying to see the best in the situation –*** *when you finished with your shift and you go home* ***don't take the things that you saw and experienced home*** *in that case* 1(2.6).

no doubt about it in the emergency services [in response to the facilitator asking whether the **job is stressful**] *therefore* ***your home life needs to be as stable as possible*** *otherwise it influences your work and often your colleagues can see that and* ***i****n some circumstances managers would send staff home as a result of that to sort things out rather than you continue working because of* ***the danger of your mind not being on your work and if you make mistakes in the business this costs lives*** 1(4.1).

Stressors arising from conditions, contexts and complex clinical problems occurring in ALS paramedic practice should be replicated to test student performance under stressful conditions (authentic situation). The pressure of time as a stressor was discussed in Section 5.3.2.2.

5.3.5.3 *Category 5.3: Display of ethical values in the clinical simulation setting*

Demonstration of ethical values in clinical practice was identified by participants and strongly associated with professionalism. Ethical values specified by participants included "respect for persons", "confidentiality", "best interest: beneficence", and "do no harm: non-maleficence" (cf. Section 3.5.3.1).

*I think also **it comes with professionalism**, you must have professional behaviour in order to execute your duties as a graduate – and I will echo the sentiment of **confidentiality because we are dealing with people's lives and their sicknesses, so at all times we need to respect and protect their dignity*** 1(3.1).

*We are intelligent beings we know why we are here **– for our patients' best interest*** 1(1.2).

***are they safe or are they doing harm to the patient** – I think **that's what we need to assess**, and that needs to be continuous, not just one time which is to decide, whether the student is competent or not* 3(1.4).

*I also think, adding onto it as well is **having a strong sense of underlying ethical values** as well, because you – just working with all your medico-legal type of cases and ... **don't go blare everything on Twitter or Facebook –** and you have these individuals that are actually **handling confidential matters or taking photographs of decapitated corpses and posting them wherever** and you see these things flying around and **by practitioners who are registered with the HPCSA** – **colleagues** – and **that is unacceptable**. I think those areas ... **the patient is putting his or her full trust in you and sharing confidential things** … **as part of the, an emergency medical service I believe that is part of a strong foundation of a practitioner*** 1(3.3).

Judgement by assessors of safe treatment of the simulated patient by a student underpins assessment of the ethical values of "best interest: beneficence" and "do no harm: non-maleficence". This aspect of assessors judging safe practice by students was strongly expressed by one participant as an important objective of the clinical simulation assessment.

*At the end of the day the question you asked is **"is the student safe?"*** 1(1.1)

*ultimately at the end of the day we're **finding that those students who are having to repeat simulations is because primarily they are unsafe in their practice** or there's the element where there's **lack of understanding in their knowledge** and it's not about not liking the student; **it's being objective about standing back as the assessor*** 2(1.1)

*we must remember that **they have been judged at a level of safety that they are not going to be indiscriminately jeopardising patients**, but it's going to be a learning process from then forward* 3(1.1)

Identifying and addressing ethical conflicts is an important skill for ALS paramedic practice. Students should be adequately prepared in a practical context for addressing such conflicts. An integrated clinical simulation assessment should assess student performance in recognising and addressing ethical dilemmas occurring in ALS paramedic practice.

5.3.6 Theme 6: The social-professional dimension of Advanced Life Support paramedic practice

5.3.6.1 *Category 6.1: Relevance of the personality of the Advanced Life Support paramedic in the integrated clinical simulation*

The characteristics required for thriving in the context and conditions of clinical practice (cf. Section 5.3.2.1) are encapsulated in the idea of a personality type associated with being an ALS paramedic (cf. Section 3.5.4.1). Specific reference to the Type A personality was made by a participant, where such a personality has the ability to be assertive and decisive and to take control of people and chaotic situations.

This personality type is believed to be both a risk and a benefit. As perceived by one participant, the Type A personality is by nature intimidating to other personalities and a source of conflict between colleagues (who also possess the Type A personality). The risk is that, in exerting controlling personality traits, conflict and unprofessional behaviour may result, which undermines the reputation of the profession. The benefits when these traits are expressed in a professional manner are conflict avoidance and resolution together with maintaining a patient-care focus.

We try to elevate this profession, we try to get out, we try to get recognised as professionals and then ***ending up having with this bad rep upon us that we are all Type A personalities****; most of the* ***other type personalities are intimidated by us****. That is a fact – any* ***other type of personality normally acquiesces to a Type A personality*** *when they come walking through the door, which* ***we are loud, we are intimidating we are assertive and decisive*** 1(1.2).

The effects of personality were viewed in the context of attitude toward others and interpersonal communication. Self-awareness and self-discipline were expressed in the willingness of the ALS paramedic to consider the opinions of others and to accept criticism by other ALS paramedics. The influence of personality is remarked in participant responses to supersede that of education and professionalism, where both the latter should assist with providing the appropriate boundaries within which the personality of ALS paramedic operates:

I think that ***we will find that we are all Type A most of us have Type A personalities so we are going to clash****. But agreement is* ***how you handle yourself*** [interrupted by 7 persons saying professionalism] *yes, professionalism* ***but personally it is a big thing*** 1(1.8).

I would like to disagree No. 2 … the reason being that yes, there is ***definitely a place for education but most of all*** *I think your* ***personality and attitude is also a very, very important stumble block*** *but* ***cornerstone in professionalism*** (1.5).

In the researcher's experience of clinical simulation assessment, assessors have frequently commented on the attitude and personality traits (or lack thereof) of students displayed in the clinical simulation event. Although such attitudes and personality traits have not formed part of the assessment criteria used, the influence of these traits and attitudes on performance in the clinical simulation was observed. Lack of confidence, loss of control, indecisiveness and lack of assertiveness have been noted by the researcher as reasons for poor communication and decision-making in the clinical simulation environment.

5.3.6.2 *Category 6.2: Professionalism in the context of the integrated clinical simulation*

Behaviours and attitudes required of ALS paramedics were identified by participants as the basis for describing and explaining professionalism in the emergency-medical-care context (cf. Section 5.3.5.1). Professionalism encompasses patient interaction (communication and clinical competence), interprofessional relationships, people skills, ethical values, leadership and management, and cognitive skills.

I believe ***professionalism determines your attitude and your attitude also determines your professionalism,*** *it is visa versa. If you are not professional you can't have a good attitude. I can't remember which number said it but you* ***hide your incompetence with being unprofessional****. You* ***hide your financial gain behind being unprofessional*** *by getting aggressive taking a patient away. It happens a lot, we have experienced it in our area a lot. So* ***being professional means you have to have a good attitude. In having a good attitude you are professional*** 1(1.6).

Ethically*, situation wise if the person's* [patient] *under the influence* [of alcohol], *he* [the ALS paramedic] *should still be* ***able to keep your – let's say cool attitude – professionalism*** 1(3.1).

if you rock up on scene and do not ***show respect*** *of the people you are going to then it also puts out a* ***bad name for you as an individual or as a profession*** *– there are* ***people who are looking at the way we are doing things****,* ***the way we execute our duties*** *and they tend to make an overall summary based on individual people's behaviours* 1(3.1).

professional obviously, and I think that's just a common cliché – one would have to define it in a way that's refreshing … ***acting in a way everyone expects you to, based on the position you have and the qualifications that you have*** 1(4.1).

Professionalism encapsulates the psychomotor, cognitive, affective and social-professional dimensions of ALS paramedic practice. The relevance of these dimensions to assessment in the clinical simulation context were addressed in Sections 5.3.3 to 5.3.5.

5.3.7 Theme 7: Case types and scenarios for integrated clinical simulation assessment: range, conditions and complexity

Identifying specific case types representing the authentic situation of ALS paramedic practice for replication in the integrated clinical simulation environment presented some difficulty to participants. The researcher associates the difficulty participants experienced in addressing the question of case types with the extensive range of possible scenarios, given the span of medical disciplines and innumerable contexts of ALS paramedic practice. Participants provided the following responses (cf. Section 5.3.2; 5.3.4.1):

I don't think there is any particular case type that you can highlight *that is going to allow you to definitely assess the capability of a paramedic.* ***Every case type has got very specific parameters. Every case type has got very specific questions you're looking at*** *…* ***I don't believe there is a specific case type*** 2(1.2).

it's emergency care … ***one should be able to treat a vast range of cases*** 2(2.5)

It's ***a difficult question*** *in the sense of* ***what you're going to present to your student in a simulation –*** *because* ***out of a training view you need to prepare that student for any type of case****, so you have to introduce him to trauma as well as medical and* ***the variety is so big*** 2(2.4).

5.3.7.1 *Category 7.1: Life-threatening conditions as a limitation of case type for integrated clinical simulation assessment*

Although ALS paramedics come into contact with patients with minor medical or trauma conditions, they are the cohort of EMS personnel exposed to the most critically ill or injured patients. The second focus-group interview question requested participants to identify case types that would best identify the ability of an ALS paramedic to address life-threatening emergencies (cf. Appendix C). There was explicit support by focus-group participants for the premise posed by the question that life-threatening emergencies form the basis of the clinical case selected for the integrated clinical simulation summative assessment (cf. Sections 3.4.1.2 and 3.4.1.3).

If you are ***thinking about the end which one they should pass****, I must say I don't know exactly which one I should go; I'm thinking do you go for a* ***life-threatening type of scenario*** 2(1.9).

so in simulations – ***all common life-threatening emergencies must be taught and every student must be able perform or treat****; so* ***simulations must be based on all*** 2(2.5)

but I think ***the simulation mission is to assesses the individual*** *to say* ***can he really treat that life-threatening emergency*** *… that can tell us if this individual can go out there and can he save lives or at least try to better the condition of the patient* 2(3.2).

5.3.7.2 *Category 7.2: Medical versus trauma categorisation of cases for integrated clinical simulation assessment*

Within the boundaries of life-threatening emergencies, participants broadly categorised these as trauma emergencies and medical emergencies (cf. Section 3.4.1.2). Each category was characterised as having its own unique features and seen as important to be assessed individually (cf. Section 5.3.7.5). Where the single, once-off clinical simulation was considered as the only option, then combining medical and trauma conditions was suggested;

So you ***have to introduce him to trauma as well as medical*** *and* ***the variety is so big*** 2(2.4).

trauma has got its own challenges *but with trauma* ***what you see is what you get****;* ***medical you must go look –*** *sometimes you spend 10 minutes taking a sample history, going through the patient – auscultating, percussion – the whole management to get to the answer –* ***but both is necessary****. You* ***can't only specialise in trauma or medical****, so I agree there is not one you can pull away, but* ***some people say trauma is easier, there's some who say medical is easier –*** *it depends on what your interests are* 2(2.6).

I don't think there is any particular case type that you can highlight *that is going to allow you to definitely assess the capability of a paramedic … if I was* ***forced absolutely with my back against the wall*** *then I would say* ***trauma with underlying medical*** 2(1.2).

The category of trauma and medical emergencies span the medical disciplines (cf. Section 3.4.2.2), as alluded to by one participant:

now some students are good at ***trauma*** *and some are good with* ***medical*** *…* ***both should be assessed in adult and paediatric*** 2(2.7).

5.3.7.3 *Category 7.3: Medical-discipline categorisation of cases for integrated clinical simulation assessment*

Medical disciplines as a means of categorising case types was identified by participants, who used terms such as “paediatric”, “adult”, “maternity”, “psychiatric”, “respiratory” and “cardiac” (cf. Section 3.4.2.2).

*As you say, in a **simulation** you **have to do all – adult, paediatric, trauma, medical** – you must be able **to see if the student can handle all of them** because ... You must get a, if I can use a word ... **holistic approach*** 2(2.6).

*It's a difficult question in the sense of you're going to present to your student in a simulation – because out of a **training view you need to prepare that student for any type of case**, so you have to introduce him to **trauma as well as medical** and the **variety is so big** if you are going to go **cardiac, respiratory or trauma with head injuries or femur fractures** – you need to get a student introduced to it. Personally I think it is **difficult to highlight one type of thing** that you need to introduce more* 2(2.4).

*Well if there are no limitations then the ideal situation would be to **test in each category** – in other words, a **paediatric simulation**, a **maternity simulation**, a **peri-arrest cardiac patient**, a **trauma patient*** 2(4.1).

*I fully agree with No 1.; **psychiatric patients in simulation** have always been a very dark and grey area especially when we bring it into the context of what we do outside on the road, ya no – I agree with that* 2(4.6).

It was also recognised that each medical discipline has its own body of knowledge (cf. Section 3.4.2.2). The dilemma of the traditional paradigm of single, final integrated clinical simulation was expressed with regard to the perceived impossibility of covering everything and the concern about leaving out what is important. Embedded in this dilemma was the idea that demonstrating success in one discipline did not mean generalisation of performance to clinical cases in other medical disciplines. A suggestion was made for using clinical simulation as an assessment instrument at the end of each module:

Every case type** has **got very specific parameters**. Every case type has got **very specific questions you're looking at 2(1.2).

So when it comes to a final assessment during a summative practical assessment – like a sim – now you see you're going to look at this area – let's say for instance, practical skills – now you need to look at the scenario and decide ***which one of these you are going to use****,* ***which combination*** *of these you're going to use that's going to fit the scenario. Now you come to your observation skills – now you need to decide* ***which ones*** *you've defined under this term "observational skills"* ***are you going to leave out****,* ***which ones are important and which ones are not****. This is the* ***problem – we are leaving out stuff****. If we are saying that the summative assessment –* ***the final simulation – should be an all-encompassing event****, we are running around like dogs chasing our tail because* ***there's no such thing****.* ***It cannot be all-encompassing*** *and that's the nature of the beast* 3(1.2).

the ***problem is this shot in the dark with one or two simulations that then represent what that person can do for all aspects and all categories*** *– a little bit* ***hit and miss*** *– you might have got them on a good day or on a bad day – it is very* ***difficult to take from that whether they do or do not know the rest*** *… if there are no limitations then the ideal situation would be* ***to test in each category*** *– in other words, a* ***paediatric*** *simulation, a* ***maternity*** *simulation, a* ***peri-arrest cardiac*** *patient, a* ***trauma*** *patient* 2(4.1).

there's no one scenario that's the perfect one, but for instance on ECT we only have 2 modules throughout the 2 years that have their own simulations. I mean ***why not make for every module a simulation, because in that way you test every aspect of care that you can do instead of doing one trying to test knowledge about everything*** 2(1.8).

5.3.7.4 *Category 7.4: Life-support interventions categorising cases for integrated clinical simulation assessment*

Medical and trauma emergencies may pose a threat to a patient’s airway, respiratory and circulatory functions, which require urgent intervention prior to determining the cause of the problem (cf. Section 3.5.2.2) and supports the event-driven approach as a clinical reasoning strategy used by clinicians in an emergency situation (cf. Section 3.5.2.3). As such, ALS paramedics should be able to identify the threat to life and implement appropriate life-support interventions. Such interventions may be those available across emergency-care-practice levels construed as basic life-support interventions. The importance of using the appropriate level of intervention strategy was raised by one participant and identified as an important element of assessment in clinical simulation.

A simple ***example is a simulation we had as a student****; all of us went in and* ***tried to treat this patient at an advance life support level****, but at the end of the day* ***the patient with the foreign body airway obstruction needed abdominal thrusts – a basic life support sim thrown in front of us and all of us missed it****, so even if we are teaching ALS* ***we sometimes need to do that basic life support, intermediate life support stuff*** *as well so that we are not only concentrating on advanced life support – because private and provincial services are being sent out to dyspnea; you get there and it is an asthma patient and its ILS level – as soon as you gave him a bit of Beta 2s his chest is open – sometimes an IV up; what ALS techniques did you do? If you don't get your mind round that;* ***you must be able to handle that as well. You might start overtreating your patients*** 2(2.4).

Airway, respiratory and cardiovascular complications requiring life-support interventions span both medical and trauma emergencies, and occur in patients across the medical-discipline categories. Life-support aspects of clinical cases are informed by the specific clinical case and the severity of the patient's condition and invoke the event-driven strategy of clinical reasoning (cf. Section 3.5.2.3).

5.3.7.5 *Category 7.5: Conditions and complexity of cases for integrated clinical simulation assessment*

Within the classification of emergencies into trauma and medical emergencies and medical disciplines, an important consideration by participants when deliberating case types was the conditions under which such patients should be treated and the complexity of the clinical case required for assessment of higher-order thinking expected of an ALS paramedic in practice. The use of routine emergency-care situations as uncomplicated, commonly occurring events was discussed in Section 5.3.4.3, and supports the use of rule-based thinking associated with well-defined clinical problems (cf. Section 3.5.2.3).

As an example of selecting a case based on its complexity, one participant identified the case of myocardial infarction (MI) from the discipline of cardiology as an appropriate case for use in clinical simulation assessment. This example supports the use of the hypothetico-deductive reasoning associated with more complex problem-solving in the clinical context (cf. Section 3.5.2.3).

I think the MI patient's is ***really a difficult type of scenario****, because* ***you really have to think –*** *does he have lung oedema because of the MI? Does he have hypoxia because of* *the MI or lung oedema – so the* ***medical patents is really testing your knowledge*** *– ya, so I think the multiple patients, paediatrics and MI type patients* 2(3.4).

In the categories of trauma and medical emergencies, a different emphasis for each was suggested, based on perceptions of differences between the two categories. Physical examination was remarked to have more importance in the trauma patient whereas history taking was seen as more important in a medical patient. A challenge to identifying this difference was the condition of loss of consciousness in a patient, which makes history taking difficult. The severity of the patient's condition in the clinical case adds to the complexity of the case. .

The approach to ***the medical patient is definitely your sample, your depth*** *– literally your* ***entire history taking*** *– and then you get your ECG, your 12-lead ECG, your vital signs, the meds that he's taking, your previous medical history, surgical history – I think* ***history taking, especially on the medical patient, is huge****, where you* ***do not have that in a trauma patient*** *– you don't always have that,* ***so you go on what you see*** 2(2.1).

I think your approach of bringing any trauma or medical into a simulation is still the same – ***whether medical or trauma –*** *because you are* ***doing the same history anyway****; it's just that* ***in the medical you are going a little bit deeper just to get a little bit more information from the patient****, but again it's* ***coming down to whether the patient is awake or not*** *– I mean you can have a medical patient and no one knows the patient and you can't get a medical history from the patient* 2(2.2).

Although participants were of the opinion that simulated paediatric emergencies tested similar concepts and understanding as those involving adult patients, challenges unique to the paediatric age group were cited by one participant to increase the complexity of such a clinical case and it could therefore be useful to evaluate student competence:

Ya, but I'm not sure if I'm understanding the question right, but my suggestion is ***paediatric tests for simulations****, cause paediatric, there you can* ***actually test that they can do calculations they can think outside the box because obviously paediatrics you need to think further than your adults*** 2(1.8).

The conditions of ALS paramedic practice that increase the complexity of clinical cases were discussed in Section 5.3.2.

5.3.7.6 *Category 7.6: Action-response mode of the Advanced Life Support paramedic as a determinant of case type for integrated clinical simulation assessment*

Another element for differentiating case types is the action-response mode to the presenting life-threatening emergency by the ALS paramedic. The nature of the emergency, the condition of the patient, and human interaction elements are identified by the researcher as determinants of the action-response required by the ALS paramedic. Such responses require deliberate conditioning through training, because the rare occurrence of some conditions disallows the effective development of such responses in practice with subsequent risk to patients.

Rapid intervention with limited time for deliberating the problem was identified by a participant, and understood as the time-critical patient:

you would like to ***see if the individual can perform under pressure and also time-critical*** *– if you give the learner or student an assessment* ***which you can just evaluate the approach*** *– I mean there different levels you can assess on simulation as well – but at the end you* ***need to also see if the individual can treat a time-critical patient under pressure*** 2(3.3).

Another participant suggested the cardiac peri-arrest condition as an example of a clinical case that would assess this type of response by a student in clinical simulation:

Cardiac peri-arrest *– what I mean by that is patients who are suffering a cardiac condition that* ***are in a critical condition and have not yet arrested but are peri-arrest in that it's immanent unless you intervene*** *– those in my experience will be the* ***most stressful and most testing*** *because of the* ***short space of time which you have to decide what you need to do*** *and because of the fact that* ***if your decision is wrong you may actually speed up the process of them going into cardiac arrest*** *because of your intervention as opposed to intervening and preventing it – so ya,* ***in my experience that has been the kind of patient one needs to utilise in a simulation*** *2(4.1).*

Human interaction elements that complicate patient treatment and require a different response by the ALS paramedic occurs in the context of difficult patients, for example, patients who are aggressive toward the practitioner, as identified in the following participant response:

***how you react to each will be different**. In some cases like the example I've just made, the **one is really aggressive and is fighting**, **how you approach that patient versus to someone who is just lying in bed and not doing anything** – those are two different situations and you must know what help you need or who can you contact in order for you to get the assistance you might need in case of the aggressive patient as well* 1(2.5).

The researcher suggests that, in addition to difficult human interaction situations, there are three ways a case can present or progress, and each requires a different response from an ALS paramedic, and each type should be included in case design for clinical simulation. The first case presentation occurs when there is a routine, uncomplicated emergency condition, such as asthma or acute myocardial infarction where, although the patient requires ALS intervention, there are no adverse events during the course of treatment of the patient by the ALS paramedic. In such cases, the ALS paramedic has ample opportunity to interact with the patient, obtain a thorough history, perform a thorough physical examination relevant to the presenting problem and initiate the full range of treatment required. This category of routine case is inferred from the contribution of one participant presented in Section 5.3.4.3.

The second case presentation occurs when the initial patient presentation is similar to the routine case, but during the course of engagement with the patient by the ALS paramedic the patient experiences an adverse (life-threatening) event that requires a change in direction of treatment and a rapid intervention by the ALS paramedic. An example would be where a sudden complication, such as sudden cardiac arrest, occurs with the MI patient.

The final case presentation occurs where immediate and time-limited intervention is required to save the life of the patient. Examples of such conditions include upper-airway obstruction and external arterial bleeding. The complexity of each of the three types of case presentations can be increased by setting the level of intervention required to address the problem successfully, having more than one life-threatening problem to address and where more than one possible cause of the presenting problem may confound diagnosis and treatment.

5.4 SUMMATIVE DISCUSSION OF FOCUS-GROUP ANALYSIS

The integrated clinical simulation as a summative assessment instrument was the main unit of analysis in this study in which assessment criteria and clinical case types or scenarios were embedded as subcases of the integrated clinical simulation (cf. Section 4.2.2). Perspectives and opinions offered by focus-group participants in response to the four questions posed by the facilitator in the context of group discussion provided a rich source of data and informed the answers to research questions (cf. Section 1.3). The framework of assessment criteria as provided by SAQA in an outcomes-based education and training paradigm was used to focus the study.

Perspectives expressed by participants provided the researcher with insight into the current participant understanding of simulation as garnered from their experience with simulation and influenced by the PBEC view of simulation. The researcher was able to interpret views of participants in the context of a broader understanding of simulation that the researcher had obtained through a review of scholarship. This review enabled the researcher to conceptualise the meaning of healthcare simulation, illuminate dimensions of fidelity in healthcare simulation and expound the social-construct nature of healthcare simulation. The support of healthcare simulation as a valid educational methodology for healthcare education and relevance to assessment was established from literature. This inductive and deductive process of analysis afforded the answer to Question 1.

Conceptualisation of case types was achieved through understanding of the nature and context of ALS paramedic practice, the knowledge framework of ALS paramedic practice and focus-group participants' understanding of case types as derived from their clinical experience. From this, the researcher identified elements for a case typology relevant to the selection of clinical cases and design of clinical simulation events to replicate vital aspects of clinical practice that meet conditions for an authentic situation. This elucidation of case types satisfies the answer to Questions 2 and 5.

The answer to Question 3 was provided by interrogation of the dimensions of ALS paramedic practice in the body of scholarship and viewpoints of focus-group participants on knowledge, skills and attitudes required by ALS paramedics for clinical practice. The use of integrated clinical simulation as an instrument to elicit and assess such knowledge, skills and attitudes was deliberated on.

The answer to Question 4 emerged from the outlook on clinical simulation design and use as an integrated assessment as expressed by focus-group participants. This outlook reflects the difficulties and complexities arising from the lack of simulation fidelity and the misunderstanding of clinical simulation as a social construct experienced by participants. Despite this outlook, participants supported clinical simulation as a valuable tool for facilitation of learning and a conditional assessment instrument. In conjunction with simulation fidelity and social-construct elements of clinical simulation, the conditions, contexts and complexities of the out-of-hospital emergency-care environment were discoursed for use in the clinical simulation assessment.

5.5 CONCLUSION

In this chapter, the results and discussion of findings from the focus-group interviews were presented. The contextual setting of the focus groups was discussed, including the demographic and professional profile of participants and the researcher. This was followed by a thematic presentation of qualitative data containing relevant responses of participants linked to the theoretical framework presented in Chapters 2 and 3. A discussion of results was then presented.

In Chapter 6, entitled **Conclusions and limitations of the study**, the final chapter, a synopsis of this study will be presented. This includes a brief overview of the study, followed by a review of the research questions and associated summary of findings. Conclusions from the study will be drawn and the limitations of the study identified and summarised.

CHAPTER 6

CONCLUSIONS AND LIMITATIONS OF THE STUDY

6.1 INTRODUCTION

The researcher conducted an in-depth study with a view to establish a range of appropriate assessment criteria and case types for application to integrated clinical simulation for summative assessment by ALS emergency-care-education programmes in South Africa.

Developments in healthcare simulation as an educational methodology together with innovative simulation technology have situated simulation as an appropriate instrument for integrated assessment in an authentic situation. In order for emergency-care educationalists in South Africa to employ integrated clinical simulation for the purpose of summative assessment, appropriate assessment criteria and case types are required to assess applied competence of learners to make judgements about their performance in emergency-care practice.

The aim of this chapter is to furnish a synopsis of the study and to offer comments and reflections on the findings of this study. A brief overview of the study is provided, followed by a review of the research questions and associated summary of findings. Conclusions from the study will be drawn and the limitations of the study identified and summarised.

6.2 OVERVIEW OF THE STUDY

Based on five research questions the research was conducted and concluded over the period January 2014 to June 2015. The findings of the research served as a foundation for constructing assessment criteria and a case typology framework for integrated clinical simulation as a summative assessment instrument for use by emergency-care-education programmes in South Africa.

The five research questions guiding the study were presented in Chapter 1 (cf. Section 1.3). The final outcome of the study was fashioned by these research questions. In order to answer the research questions a qualitative research design was used (cf. Section 4.2). The research strategy applied was an embedded, single-case-study design (cf. Section 4.2.2) and the method of data collection was the focus-group interview (cf. Section 4.2.3). Data analysis and interpretation were achieved through a process of inductive and deductive assay of focus-group discussions and perspectives from literature on aspects relevant to the research problem guided by research questions (cf. Section 4.3).

In this Section (6.2.1-6.2.5), the research questions and study objectives are reviewed and the main findings of each question summarised. Conclusions are drawn from the findings of the study, followed by deliberation of the limitations of the study. Contributions and significance of the study are then suggested together with recommendations and concluding remarks.

6.2.1 Research question 1: How is integrated clinical simulation conceptualised and contextualised as a summative assessment instrument?

The first objective of the study was to conceptualise and contextualise integrated clinical simulation together with assessment criteria employed by emergency-care-educational programmes in South Africa when using clinical simulation as a summative assessment instrument (cf. Section 1.4.3). This was achieved by this study as follows:

- The meaning of simulation and mandate for clinical simulation as a summative assessment instrument presented by PBEC documents and in emergency-care-education programme documents published by SAQA was examined (cf. Section 2.3; Figure 6.1);
- The meaning of healthcare simulation was extracted and deliberated, and the PBEC view of simulation critiqued against an informed understanding of simulation derived from scholarly work (cf. Section 3.3; Figure 6.2);
- Clinical simulation for use as a summative assessment instrument was contextualised in the outcomes-based education and training methodology stipulated by SAQA (cf. Section 2.4) and exposed in the light of educational theory applied to healthcare simulation by scholars (cf. Section 3.3); and
- The meaning of and framework for assessment criteria relevant to integrated clinical simulation as defined by SAQA was deliberated and clinical simulation, both as an integrated assessment and an authentic situation, was established (cf. Section 2.4; Figure 6.3).

A summary of key aspects informing research question 1 is provided in Figure 6.1-6.3. The objective was thus achieved and provided an answer to research Question 1.

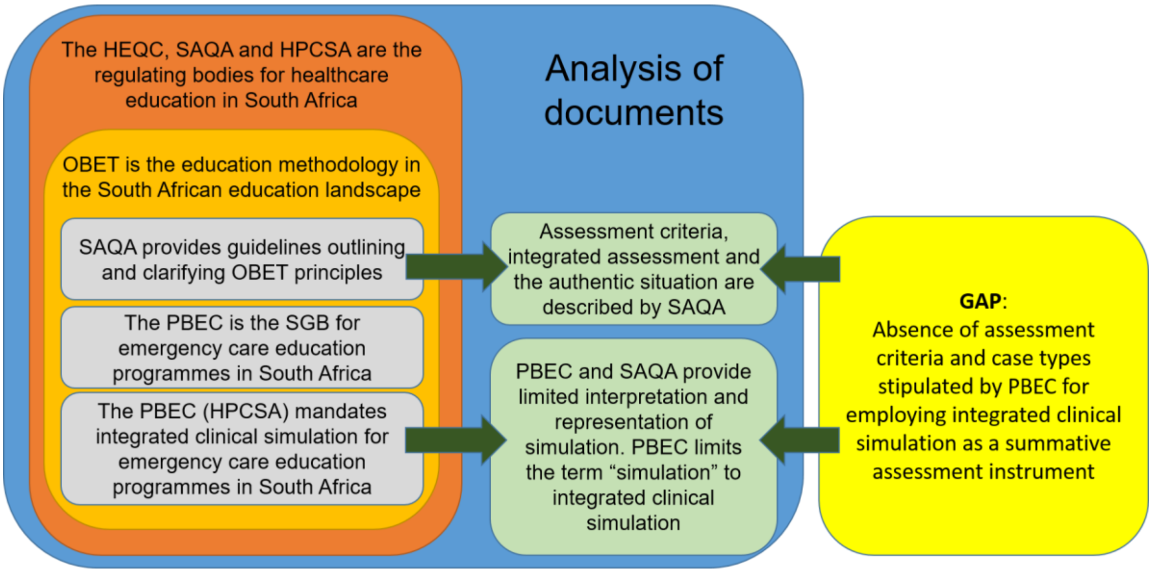

FIGURE 6.1: SUMMARY OF EDUCATION CONTEXT AND MANDATE FOR THE USE OF INTEGRATED CLINICAL SIMULATION IN EMERGENCY CARE EDUCATION PROGRAMMES IN SOUTH AFRICA

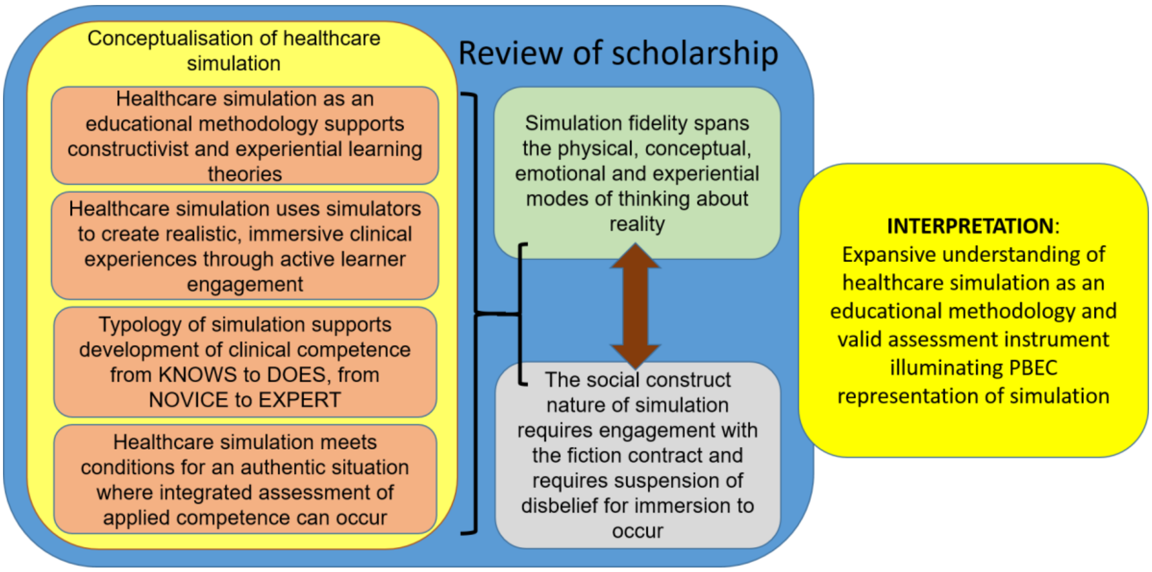

FIGURE 6.2: SUMMARY OF KEY HEALTHCARE SIMULATION CONCEPTS DERIVED FROM A REVIEW OF SCHOLARSHIP

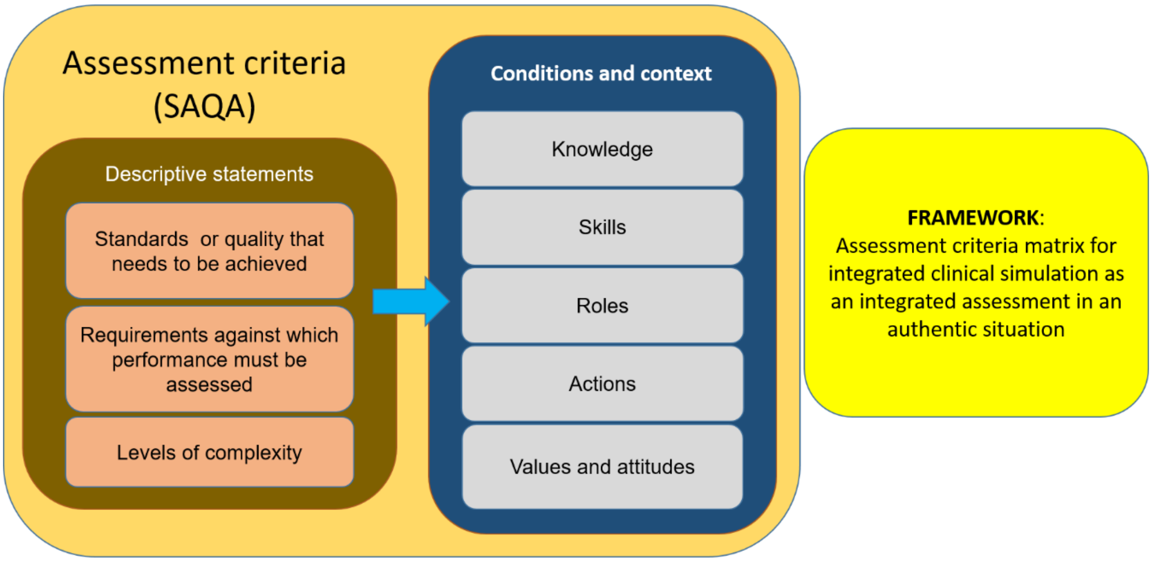

FIGURE 6.3: SUMMARY OF SAQA-DEFINED ASSESSMENT CRITERIA (SAQA 2001:21)

6.2.2 Research question 2: How are emergency case types conceptualised and contextualised for application in integrated clinical simulation?

The second objective of the study was to conceptualise and contextualise case types for replication in integrated clinical simulation assessment by ALS emergency-care-education programmes in South Africa. This was achieved by this study as follows:

- A contextual understanding of a matrix for case type selection for replication in integrated clinical simulation was provided by deliberating the context and conditions of ALS paramedic practice, the knowledge framework and dimensions of ALS paramedic practice (Sections 2.5; 3.4.2 and 3.5);
- A conceptual understanding of case types for replication in integrated clinical simulation was derived from analysis of focus-group discussions and presented in Section 5.3.7; and
- Enhanced conceptual and contextual understanding of case types was achieved by extrapolating facets of case types embedded in SAQA emergency-care-education programme documents (cf. Section 3.4.2).

The summary of research Question 2 is encapsulated in Figure 6.4 and Figure 6.6. The objective was thus achieved and an answer to research Question 2 provided, informing the answer to Question 5.

6.2.3 Research question 3: What competencies should be assessed when using integrated clinical simulation as an assessment instrument by ALS emergency-care-education programmes in South Africa?

The third objective of the study was to identify and elucidate competencies that should be assessed when using integrated clinical simulation as an assessment instrument by ALS emergency-care-education programmes in South Africa. This objective was achieved by this study as follows:

- Competencies for effective ALS paramedic practice were extracted from and illuminated in the light of the roles and functions of ALS paramedic practice (cf. Section 3.4.1), the context and conditions of ALS paramedic practice (cf. Section 2.5), the knowledge framework of ALS paramedic practice (cf. Section 3.4.2) and dimensions of competence for ALS paramedic practice (cf. Section 3.5);
- Competencies for assessment in integrated clinical simulation were deliberated and deduced from the focus-group discussions in collaboration with perspectives from scholarly work (cf. Section 5.3); and
- Competencies extracted and deduced, as stated, informed elements of assessment criteria as defined by SAQA and relevant to the integrated clinical simulation (cf. Section 2.4; Figure 6.3).

A summary of the competency framework for assessment criteria for integrated clinical simulation is provided in Figure 6.4. The objective was thus achieved and provided an answer to research Question 3.

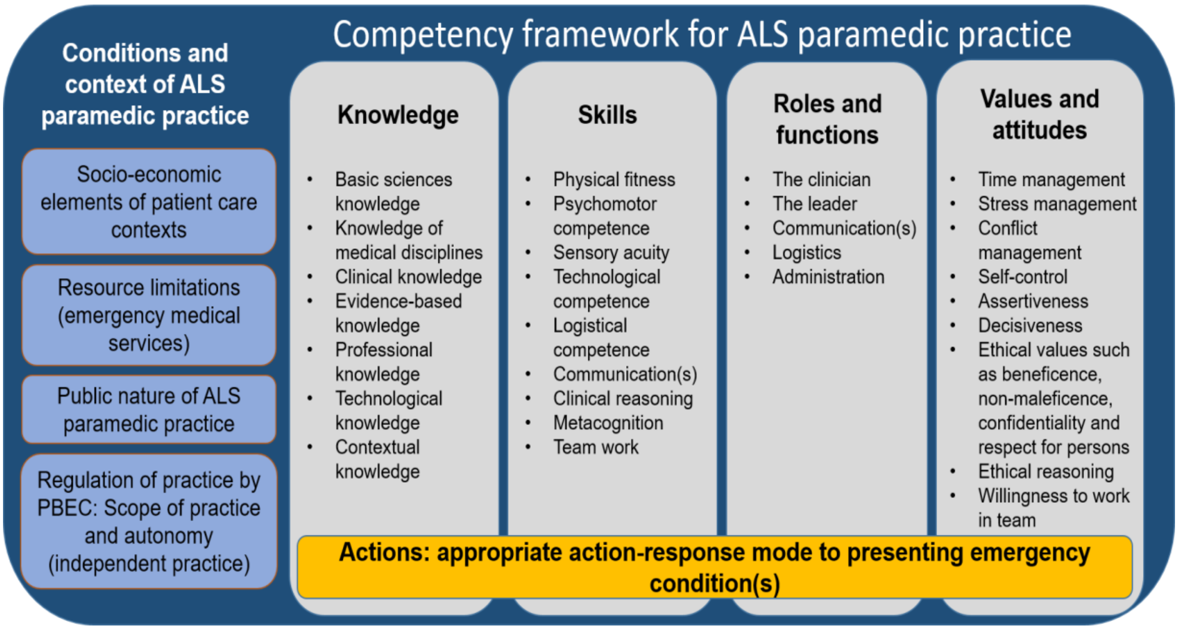

FIGURE 6.4: SUMMARY OF COMPETENCY FRAMEWORK OF ALS PARAMEDIC PRACTICE AS ASSESSMENT CRITERIA FOR INTEGRATED CLINICAL SIMULATION

6.2.4 Research question 4: What factors should be included in the design of integrated clinical simulations that are used for the purpose of summative assessment?

The fourth objective of this study was to qualify factors that should be encompassed in the design of integrated clinical simulations for the purpose of summative assessment. This objective was achieved by this study as follows:

- Simulation design was framed by the conceptual understanding of healthcare simulation deduced from the body of scholarship (cf. Section 3.3.1);
- Simulation design elements were identified and deliberated from scholarly viewpoints on dimensions of simulation fidelity and the social construct nature of simulation use in healthcare (cf. Section 3.4.1); and
- Simulation design applicable to integrated clinical simulation as a summative assessment instrument for emergency-care-education programmes in South Africa was deliberated and inferred from focus-group discussions (cf. Section 5.3).

The factors that should be included in the design of integrated clinical simulation is summarised in Figure 6.5. The objective was thus achieved and provided an answer to research Question 4.

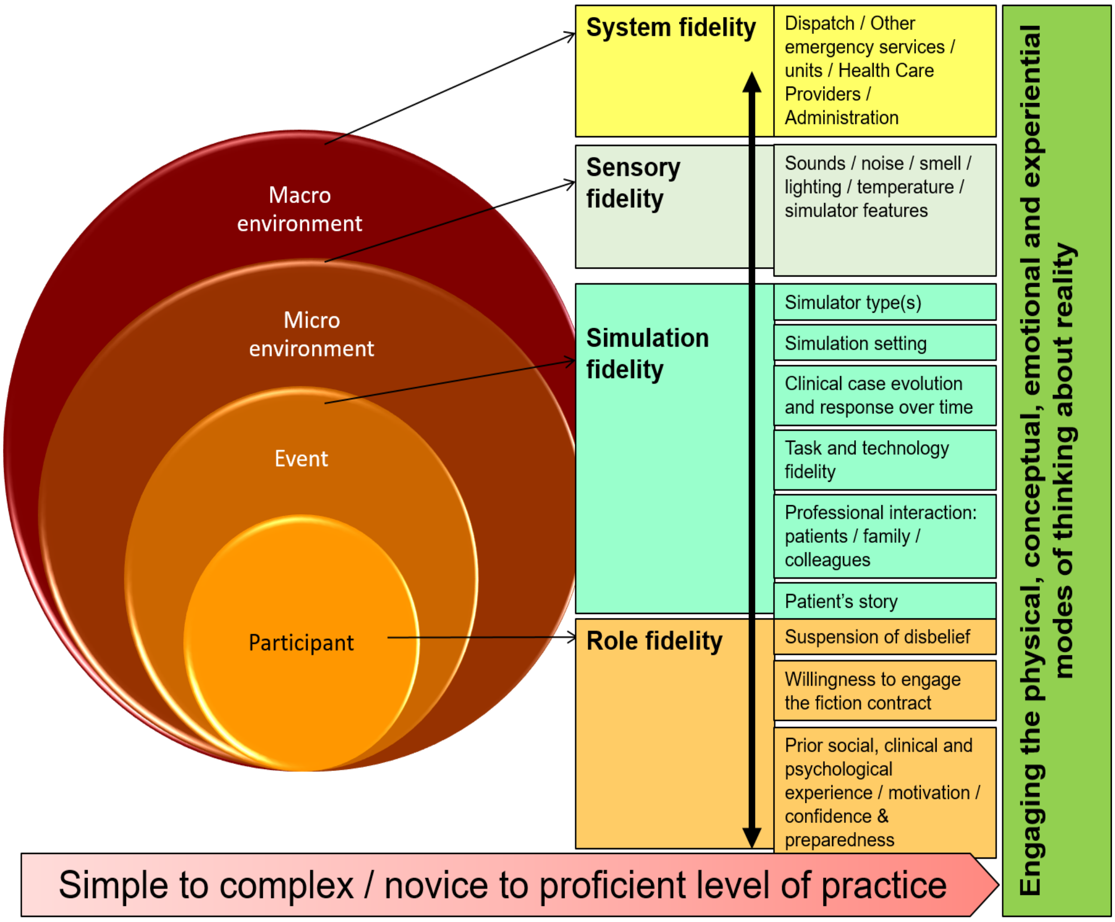

FIGURE 6.5: SUMMARY OF FACTORS FOR INCLUSION IN THE DESIGN OF INTEGRATED CLINICAL SIMULATION

6.2.5 Research question 5: What case types and classification should be employed when using integrated clinical simulation as an assessment instrument?

The fifth and final objective of the study was to qualify factors that should be included in the design of integrated clinical simulations for the purpose of summative assessment. This objective was achieved by this study as follows:

- Case types relevant to clinical simulation emerged from the deliberation in focus-group discussions on the characteristic features of the conditions, context, complexity and dimensions of ALS paramedic practice for replication in the clinical simulation context (cf. Section 5.3.7); and

- Case design for integrated clinical simulation for emergency medical care is based on consideration of the following elements: the conditions and context of ALS paramedic practice, the medical and trauma categorisation of cases across the range of age groups and medical disciplines with a focus on life-threatening emergencies, life-support interventions from basic to advanced levels of care and the action-response mode required to effectively address the nature of the emergency. A matrix of case characteristics were identified from perspectives offered by focus-group participants as a means to classify cases for use in integrated clinical simulation (cf. Section 3.5.7).

A matrix of case characteristics for selection of case type and design of integrated clinical simulation is summarised in Figure 6.6. The objective was thus achieved and provided an answer to research Question 5. The answer to Question 5 also supports the answer to Question 2.

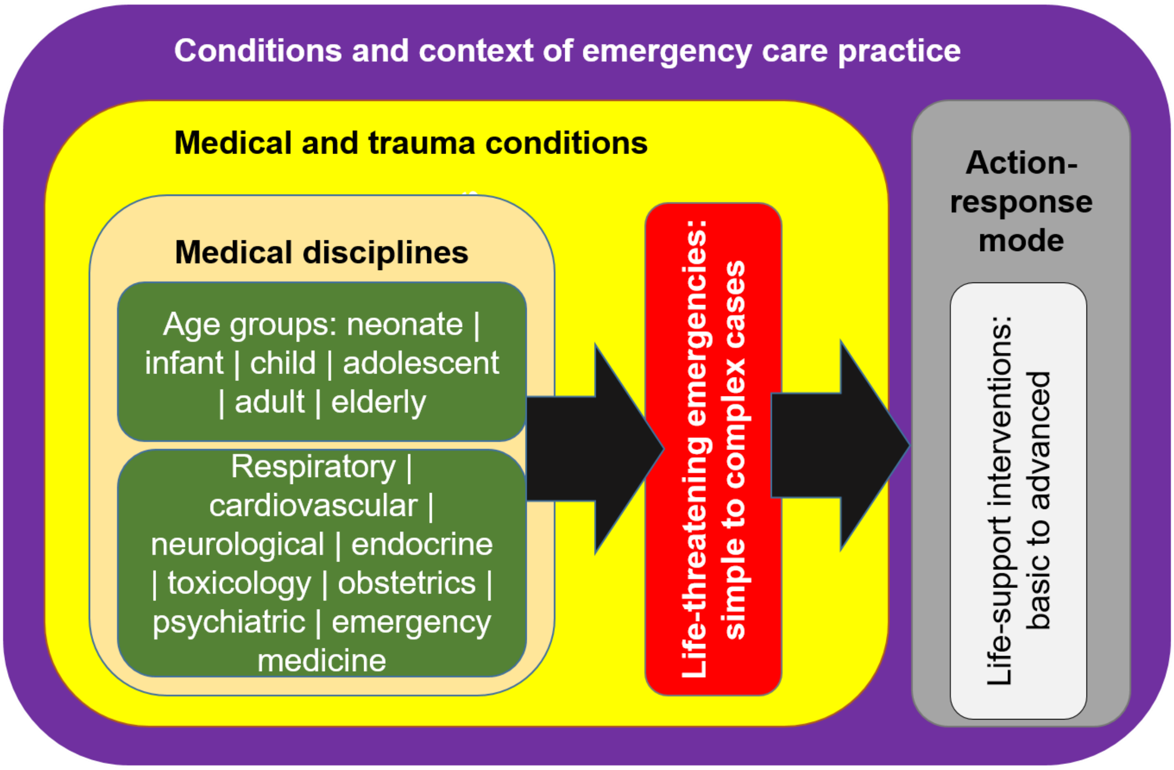

FIGURE 6.6: MATRIX OF CASE CHARACTERISTICS FOR THE SELECTION OF CASE TYPE AND DESIGN OF INTEGRATED CLINICAL SIMULATION

6.3 CONCLUSION

This study originated from the recognition by the researcher of the absence of a published set of assessment criteria and associated case types for the use of integrated clinical simulation for summative assessment by emergency care programmes in South Africa (Chapter 1). Integrated clinical simulation has been mandated by the PBEC as a summative assessment instrument for use by such programmes and specified by SAQA as a valid integrated assessment in the authentic situation (Chapter 2). Despite this mandate, no guidelines on how clinical simulation should be used as an assessment instrument have been published by either PBEC or SAQA. Such guidelines should include assessment criteria and case types or scenarios that would elicit such criteria.

Assessment criteria were positioned in the OBET paradigm informing education practice in South Africa. Assessment of applied competence and the meaning of integrated assessment were situated within this OBET education paradigm (Chapter 2). A conceptualisation from literature of healthcare simulation was provided by the study that informs the validity of clinical simulation as an integrated assessment instrument within an educational methodology, where clinical competence relevant to emergency-care practice can be demonstrated (Chapter 3).

The empirical phase of the study employed a qualitative research design using an embedded, single-case-study methodology, where data informing the research questions was obtained through focus-group interviews (Chapter 4). Perspectives induced from focus-group discussion of the clinical experience and educational background of participants in answers to questions posed, provided insight into assessment criteria and case types deduced as appropriate to integrated clinical simulation as a summative assessment instrument (Chapter 5).

A range of possible assessment criteria were abstracted from the conditions and context of ALS paramedic practice and extrapolated from the knowledge framework and dimensions of ALS paramedic practice in South Africa (Chapters 2 and 3). The knowledge framework of ALS paramedic practice includes basic sciences knowledge, medical discipline knowledge, clinical knowledge, evidence-based knowledge, technological knowledge, professional knowledge and contextual knowledge. The dimensions of ALS paramedic practice include the physical, cognitive, affective and social professional dimensions.

The conditions of fidelity in clinical simulation for effective student engagement were highlighted as necessary to achieve the authentic situation. In order to assess true clinical competence that correlates with performance in clinical practice, accurate replication of the context, conditions and complexity elements of emergency care in the out-of-hospital environment should occur across dimensions of fidelity that enable suspension of disbelief by students and promote an immersive simulation experience.

The focus of ALS paramedic practice on life-threatening emergencies, where trauma and medical conditions occur amidst the collection of medical disciplines, suggests employment of a range of integrated simulation assessment events rather than a once-off integrated clinical simulation summative assessment. Using a range of integrated clinical simulation assessments across the scope of medical disciplines allows judgements about competence to be generalised to emergency care practice.

Case types and scenarios for use in integrated clinical simulation are determined by multiple factors, including the focus of ALS paramedic practice on life-threatening emergencies, the life-threatening emergency as a medical or trauma condition (or containing aspects of both conditions), the medical domain of knowledge informing the life-threatening emergency, the conditions, context and complexity of the clinical case, the requirement and level of life-support intervention, and the response mode of the ALS paramedic to address the condition and severity of the patient.

6.4 LIMITATIONS OF THE STUDY

The following limitations are identified by the researcher:

The demarcation of the study clearly identified two topics of focus relevant to integrated clinical simulation as an assessment instrument. Each topic expanded the focus of the study. Although assessment criteria and case types were perceived by the researcher as inseparable elements of the study, in retrospect the researcher humbly concedes that each constitutes a research topic in its own right. Consequently, neither topic is addressed in the detail that could be achieved by such a study; however, the topics can be pursued further as new research topics, or developed as publications using this study as a foundation.

Data from the empirical phase of this study was limited to that collected by a single method. Data from focus-group discussions could have been augmented by using an additional method, such as semi-structured interviews, to obtain more detailed perspectives of selected participants informing the two sub-units under discussion. Further studies are required to standardise a set of assessment criteria for use by emergency-care-education programmes when employing integrated clinical simulation as an assessment instrument.

Although assessment criteria were one aspect of focus clearly identified, the range of elements of assessment criteria as defined by SAQA broadened the spectrum of study. By adequately covering relevant elements of assessment criteria in the theoretical and empirical phase, an inadvertent lengthening of the study occurred. Specific assessment criteria, such as psychomotor skills, require further study to clarify uncertainty about aspects, such as how detailed the performance needs to be in the summative integrated clinical simulation.

This study focused on integrated clinical simulation as a summative assessment instrument. This study did not compare other integrated assessment instruments with clinical simulation that may be valid for assessing the same criteria.

This study only focused on clinical simulation using full-body mannequins and not other simulator types, such as hybrid simulators and standardised patients for use in integrated clinical simulation. Use of other types of simulators by emergency-care-education programmes in South Africa for integrated clinical simulation assessment is a topic for further research.

Although assessment criteria relevant to integrated clinical simulation were identified in this study, incorporating these assessment criteria into a method of assessment to grade integrated clinical simulation events was not included in the scope of this study, but is suggested as a subject for future studies.

Although the principle of constructive alignment was identified, the focus in this study on clinical simulation as a summative assessment instrument where final judgements about competence are made, inadvertent downplay of clinical simulation employment for learning and formative assessment may have occurred. The emphasis of simulation as a summative assessment instrument may reduce the true value of clinical simulation as an educational methodology for student-centred learning as the precursor for clinical simulation as an assessment instrument. This misrepresentation may suggest continuation of an assessment-focused use of clinical simulation prevalent in emergency-care-education in South Africa fuelled by the PBEC mandate of clinical simulation as a summative assessment instrument, at the expense of developing clinical simulation for facilitation of learning.

A unique facet of tertiary emergency-care-education programmes in South Africa is the inclusion of medical rescue in the curriculum. Each rescue discipline provides a unique set of conditions and contexts for patient care that exclude an ALS paramedic not trained in technical rescue from some of these contexts, and these technical rescue conditions and contexts are not covered in this study. The integration of patient care and technical rescue expands the domains of practice of the medical rescue practitioner. This integration of technical rescue and patient care is a topic for further research.

6.5 CONCLUDING REMARKS

The truly immersive, high-fidelity clinical simulation must encapsulate relevant conditions, contexts and complexity of out-of-hospital emergency care. Such simulation should test the gamut of competencies across a range of clinical cases and dimensions of ALS paramedic practice, to provide sufficient evidence of applied competence so that credible judgements that qualify learners as independent ALS paramedics for entry into the community of practice can be made.

In employing healthcare simulation in such a manner, the true knowledge, skills and attitudes of the learner are likely to be demonstrated. An iterative process of emergency-focused healthcare simulation from simple to complex scenarios enables student development of self-awareness through formative assessment (feedback on performance against standards of practice) and reflection on knowledge, skills and attitudes. Confident competence is thus enabled, with progression from conscious incompetence and conscious competence to unconscious competence necessary for effective ALS paramedic practice.

In conclusion, a thick meaning of assessment in education is captured in the following rhetoric:

If we wish to discover the truth about an educational system, we must look into its assessment procedures. What student qualities and achievements are actively valued and rewarded by the system? How are its purposes and intentions realised? To what extent are the hopes and ideals, aims and objectives professed by the system ever truly perceived, valued and striven for by those who make their way within it? The answers to such questions are to be found in what the system requires students to do in order to survive and prosper. (Rowntree,1977, in Mothata, Van Niekerk & Mays 2003:82).

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APPENDIX A

REQUEST TO PARTICIPATE IN A FOCUS-GROUP INTERVIEW

Date: 15 January 2014
Time:
SESSION 1: 12H30-14H00
Venue: EMC Simulation Lab (DCE 005)

Dear Colleague

This is a letter to request you to participate in a Master's study entitled

INTEGRATED CLINICAL SIMULATION ASSESSMENT CRITERIA FOR EMERGENCY CARE EDUCATION PROGRAMMES IN SOUTH AFRICA

I am **inviting you to take part** in the **focus-group interview**. The **purpose** of the focus-group interview is to investigate personal opinions and attitudes concerning the assessment criteria that should be used when using integrated clinical simulation as a summative assessment instrument in emergency medical care.

The focus-group interview will take a maximum of 120 minutes. Please note that by taking part in the focus-group interview you are voluntarily agreeing to participate in the research study. The opinions and perspectives expressed by you will be included in the research data and will be treated confidentially at all times. You may withdraw from this study at any given moment during the focus-group interview process. Should you be willing to participate, you will not be held responsible for any decisions or conclusions made from the study. Kindly note that the results of the study may be published. Refreshments will be provided after the interview is concluded and your personal travelling costs will be reimbursed at the current per km rate as stipulated by the Automobile Association of South Africa.

Should you be willing to participate, please fill in the accompanying consent form and return it to me electronically or by fax or hand it to me in person.

Should you have any concerns about the research project, feel free to contact the study leader, Dr Mathys Labuschagne at **051-4053721**. You may also contact Ms H Strauss from the UFS Ethics Committee at **051-4052812**.

Thank you very much for your consideration of this initiative; I am looking forward to hearing from you.

Yours sincerely

____

Mr R.G. Campbell
Lecturer/ALS paramedic
Department of Clinical Sciences
Emergency Medical Care
Central University of Technology, Free State
Bloemfontein, South Africa.

ECUFS 204\2013

A SUMMARY OF THE RESEARCH

The title of the research is*:*

"Integrated clinical simulation assessment criteria for emergency-care-education programmes in South Africa"

Where the study will be conducted
The focus group interviews will be held in Bloemfontein at the Central University of Technology, Dirk Coetzee West Wing, room 005 (EMC Simulation Lab) at a prearranged time which will be communicated to you in advance.

What population will be included in the study?
Focus-group interviews will be conducted separately with groups of ALS paramedics from in and around Bloemfontein, and medical doctors from in and around Bloemfontein. All participants must have at least 2 years clinical experience of working either on frontline ALS response units or in Emergency Centers or Trauma Units respectively. Teaching experience is not essential to participate in the study.

What method will be used?
A qualitative research design will be used for this study. Focus group interviews will be used to collect information from participants' perspectives of what criteria are important when assessing competence in patient care which can be applied when conducting medical simulations. These criteria will be drawn from clinical experience of what is needed to manage emergency situations in the out-of hospital context as well as within the Emergency Centre and/or Trauma Unit.

Risk and adverse effects of participating in the study
There are no risks to participating in the focus group interview. Participation is voluntary and participants can withdraw at any point during the interview. The identity of the participants will be kept confidential and will not be disclosed at any point in the data analysis and reporting of results.

Expected outcome of the research.
Integrated clinical simulation assessment criteria will be identified and formulated which can then be included in the assessment method and used for summative assessment of student performance during integrated clinical simulation. Programmes in Emergency Medical Care in South Africa could use these criteria in their assessment method when conducting summative assessment of integrated clinical simulation. These criteria could be used by quality assurance bodies such as the HPCSA: PBEC and the HEQC as part of the programme review (assessment)

APPENDIX B

CONSENT FORM: FOCUS-GROUP INTERVIEW

Date ___________________

Hereby I, the undersigned, consent to participate in a focus-group interview, which is scheduled to take place on _________________, time _________, venue __________.

My full particulars are as follows:

Surname: ____

Full names: ____

Telephone number: ____

E-mail address: ____

____

Signature

I wish to confirm that the information will be treated in highly confidential manner and that there will be no reference to any names. Thank you in advance for your kind cooperation. Please note that the results of this research will be published.

Yours sincerely

____

Mr R G Campbell
Lecturer/ALS Paramedic
Department of Clinical Sciences
Emergency Medical Care
Central University of Technology, Free State
Bloemfontein, South Africa. ECUFS 204\2013

PLEASE COMPLETE THE FOLLOWING INFORMATION ESSENTIAL FOR THE QUALITY OF REPORTING AS PART OF THE RESEARCH PROCESS:

AGE:____________	GENDER: M ☐ F ☐	ETHNIC GROUPING: B ☐ C☐ I☐ W☐ OTHER_____	
QUALIFICATION(S)	**WHERE OBTAINED (COLLEGE /TECHNIKON/UNIVERSITY OF TECHNOLOGY**	**YEARS OPERATIONAL EXPERIENCE AS ALS**	**YEARS TEACHING EXPERIENCE AS ALS**
CCA ☐ _______ (yr)			BLS _____
N.Dip: EMC ☐_____ (yr)			ILS _____
B.Tech: EMC ☐ ______(yr)			ALS ______
HAVE YOU HAD EXPERIENCE WITH THE FOLLOWING: designing a patient simulation Y☐N☐ presenting/narrating a patient simulation Y☐N☐ assessing students who are treating a simulated patient Y☐N☐			

APPENDIX C

FOCUS GROUP INTERVIEW SCHEDULE

ALS GROUP GP N0:_______ DATE:________

Facilitator:

____

Independent observer: ____

Welcome: Introduce facilitator and observer

The topic is: ***"Integrated clinical simulation assessment criteria for emergency care education programmes in South Africa"***

You have been selected because you are an ALS paramedic with a CCA, N.Dip: EMC or B. Tech: EMC qualification with at least 2 years clinical experience.

Guidelines:

- No right or wrong answers, only different points of view.
- We are voice recording the interview session, so only one person can speak at a time.
- We will be using the number in front of each participant to identify you; mention your number when you speak, for the sake of confidentiality and to distinguish voices in the recordings.
- You do not need to agree with others, but you must listen respectfully while others share their views.
- We ask that you turn off your cellular phone during the interview.
- My role as facilitator is to guide the discussion.
- Talk to each other.

Interview questions:

Q1: What behaviours and attitudes are required by an ALS paramedic to effectively manage a critical patient in the out-of-hospital context? Can you explain why?”
Q1 PROBES: Such as assertiveness, confidence, good communication skills, good clinical reasoning skills, organizational skills, initiative & improvisation
Q2: What case types or scenarios present the best opportunity to see the ability of an ALS paramedic in effectively dealing with a life-threatening condition and are essential to use in simulations? Can you explain why?”
Q2 PROBES: This could include routine, easily identifiable emergencies (eg non-life threatening conditions such as mild-moderate asthma) or complex ill-defined emergencies (cause), where immediate intervention is required or a sudden event while treating a “routine” patient (second hit/complication).
Q3: What competencies should be assessed when using integrated clinical simulation as an assessment instrument for emergency medical care in South Africa? Can you be more specific?
Q3 PROBES This could include communication skills, history taking, clinical assessment, clinical reasoning, patient safety, protocol & compliance with “rules” (algorithms), leadership, delegation, use of resources, etc
Q4: What factors should be included in the design of integrated clinical simulations for the purpose of summative assessment? Can you give examples to help clarify?
Q4 PROBES: This could include aspects of clinical presentation, patient position, environmental factors such as noise, poor lighting, interference of members of public/family, emotional factors

Conclusion:

- Summarise with confirmation,
- Review the purpose and ask if anything has been missed,
- Thanks and dismissal.

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APPENDIX D

MASTERS: HEALTH PROFESSIONS EDUCATION

"Integrated clinical simulation assessment criteria for emergency care education programmes in South Africa"

R G CAMPBELL

ALS/2: FOCUS GROUP 6/2/2014

14H00-15h30 [DICTAPHONE: PHILIPS VOICE TRACER – total recorded time 1hr12min]

[OLYMPUS DIGITAL VOICE RECORDER]

PARTICIPANT	TRANSCRIPTION
Researcher	Welcomes participants/affirms confidentiality (not anonymity)/clarifies participant criteria/explains rules for discussion/requests participants to state number/introduces facilitator
Facilitator	I think we can start with the very **first question**, and the question I'm putting on the table **"What behaviours and attitudes are required by an ALS paramedic to effectively manage a critical patient in the out-of-hospital context"**... what do you think…No 1?
1	I'll start - always a positive attitude and very very, very - lots of discipline; I'll start with those two…
Facilitator	Right, No 6…
6	Be able to make a plan on the spur of the moment - you have to be open the whole time, clear minded.
Facilitator	No 4, you want to say something?
4	Leadership I think as well because you are working with personnel with or under you that you will be able to manage - I think leadership is also important
Facilitator	Ok no 6, you do agree with him
6	Yes
Facilitator	No 2…
2	I think you have to be conscious from the time you get the call till the time you have finished with the call. I think that is the priority in terms of dealing with a critical patient. Conscious all the time - you cannot in terms of…
Facilitator	That's what I want to - can you elaborate a little bit?
2	yea, you just have to be conscious all the time - you have to be alert from the time you get the call to the time you are on the scene till you've handed over the patient
Facilitator	That makes sense …No 7… [laughter]
7	Well he should be confident, he should like what he's doing, he shouldn't be judgemental as well
Facilitator	Judgemental? … Well, give examples from your experience…
7	Ethically, situation wise if the person's under the influence, he should still be able to keep your - let's say cool attitude - professionalism
Facilitator	No 5

5	By judgemental it means you might find yourself having to treat a criminal, for one, and one should not take a side - additional one must be focused and more objective, not to take sides - and do what you have to as a medical emergency care practitioner and treat your patient accordingly despite what they would have done at the time.
Facilitator	No 3…
3	I think he should also have like be a bit aggressive in your treatment - or the person should be a bit aggressive, not physically aggressive but make a decision and stick with his decision
	Aggressive in the decision making process…
3	Ya [agrees]
Facilitator	Ok, anything else…?
	[someone says] There should be something…
Facilitator	Any other behaviours and attitudes?...No 6 please
6	You have to have a sense of humour, meaning that you're trying to see the best in the situation - when you finished with your shift and you go home don't take the things that you saw and experienced home in that case. Sometimes also you get to a patient - as you said the ethical - was he sick, patient's in predicaments that they got themselves into and on the inside you want to break yourself open and laugh, but you have to keep a calm exterior and be professional...ya
1	…that's sensitive [6 agrees], I almost want to say to be a paramedic you should have multiple skills - with a couple of personalities
Facilitator	Just elaborate; why don't you think they should take it home [directed at no 6]?
6	because, some of the things you see out there is the worst of mankind that you sometimes see and you don't want your wife and children to be exposed to it - or your loved ones - whoever they are
Facilitator	Right…right
5	Self-control, one must be able to - take for example if you encounter a psychotic patient who ends up either hitting you, one should be able to control themselves and not hit back [laughter]...there are some situations that require one to be sympathetic and empathetic with your patients, so as part of the behaviour one must also have those qualities to empathize and sympathize with whoever you are treating and the family members of whom you are treating as well…
Facilitator	Right, you were mentioning the one type of patient - the psychotic patient - don't you think the type of patient will determine your behaviours and attitudes? How do you think this will affect them?
5	Most definitely …as you said, patients differ
	Most definitely …as you said, patients differ; trauma situations you must be able to respond accordingly and when you get a medical patient as well - how you react to each will be different. In some cases like the example I've just made, the one is really aggressive and is fighting, how you approach that patient versus to someone who is just lying in bed and not doing anything - those are two different situations and you must know what help you need or who can you contact in order for you to get the assistance you might need in case of the aggressive patient as well
Facilitator	No 7…
7	It also depends where you are in your personal life at the moment - so you should be strong enough to put that aside, because if you had a bad day at home, it really influences your [someone says "judgement"] ...not your judgement, but your attitude when you are on a scene - to

	someone who's drunk, to someone who's nagging ... it can influence it - if you're having a bad day, the patients can suffer
	No 1…
1	I think it definitely the need to adapt emotionally and physically - one needs to adapt to every scene you encounter, each one is different, literally, each one is different...ya, definitely
	No 6…
6	What I've found is - first of all you must be willing to learn every day - the day you walk out of university is not the day you stop learning, and it's nice to have a good friend or a mentor that you can talk to about cases you had and he or she can give you advice and say "no, maybe try that next time or you should have done this" - it helps immensely, it's...
Facilitator	…talking about life-long learning
6	Yes
	No 2…
2	I think what you experience, if you've been working quite some time - 24 hours a day, 7 days a week - on your first day of work, when you come towards a critical patient, your attitude and behaviour will be different to the one on day no 7 because you'll be tired, and you'll frustrated in terms of treating this patient - I've had enough now I just need a break. So I think it will be quite difficult to say that every single patient will have the same attitude and behaviour throughout the day. you can start off on a Monday, or even if you are working a 12-hour shift you will start off with a bang, you're all nice and fresh and towards the twelfth hour you are already frustrated, seen enough, and I think that the traumatization and all the emotional things that you have seen during the day - by hour no 11 your attitude and your behaviour is going to be changing - your focus toward that patient is going to be; you know what, I'm so tired now I just want to go home - I just need a break. I think your attitude and behaviour toward each and every patient differs
Facilitator	Anything else...it looks like we do agree on the behaviours and attitudes - there's no disagreement we can discuss. Right, anything else? Can we move onto the next question? I think now we are going to discuss some interesting stuff! **Question 2: What case types or scenarios present the best opportunity to see the ability of an ALS paramedic in effectively dealing with a life-threatening condition and are essential to use in simulations?**
	No 4, you are smiling … [chuckling in the background]
4	It's a difficult question in the sense of you're going to present to your student in a simulation - because out of a training view you need to prepare that student for any type of case, so you have to introduce him to trauma as well as medical and the variety is so big if you are going to go cardiac, respiratory or trauma with head injuries or femur fractures - you need to get a student introduced to it. Personally I think it is difficult to highlight one type of thing that you need to introduce more.
Facilitator	So you don't think we should focus on one specific area or type of case…?
4	No, personally I don't think so - overall
	No 6…talk to no 4
6	In one sense I agree, but I disagree also; trauma has got its own challenges but with trauma what you see is what you get; medical you

	must go look - sometimes you spend 10 minutes taking a sample history, going through the patient - auscultating, percussion - the whole management to get to the answer - but both is necessary. You can't only specialize in trauma or medical, so I agree there is not one you can pull away, but some people say trauma is easier, there's some who say medical is easier - it depends on what your interests are.
Facilitator	No 1…
1	I definitely agree with no 6 and no 4 - we're not doctors, we're not there to treat and discharge the patients on scene, but my personal opinion is definitely we can go more towards the medical side of things, cause as you said, um trauma trauma - what you see is what you get - except if there's comorbidities, but then it falls under the medical side - so you definitely need a lot of work on both sides, but I think simulation wise if you can go more to the medical side. get the wheels turning, get the guys thinking, like the process of managing all that kind of stuff, so ya...
Facilitator	No 4…
4	I agree what they say, but shouldn't we then rather concentrate more on the section of history taking on the medical side?...because history taking is going to have an influence on the medical treatment
1	True… and I think that is the entire process - the approach to the medical patient is definitely your sample, your depth - literally your entire history taking - and then you get your ECG, your 12-Lead ECG, your vital signs, the meds that he's taking, your previous medical history, surgical history - I think history taking, especially on the medical patient is huge, where you do not have that in a trauma patient - you don't always have that, so you go on what you see - which is at the end of the day, I'll say, is easy in a sense - broken femur, ok let's put a line up - IV, splint the leg, make sure the patient's pain free, you take him; but if he's got a broken femur, he's anaemic or something like that then your approach starts to change. So I think the medical side is a bit more important.
Facilitator	No 2, then no 7…
2	I tend to disagree, I think your approach of bringing any trauma or medical into a simulation is still the same - whether medical or trauma - because you are doing the same history anyway; it's just that in the medical you are going a little bit deeper just to get a little bit more information from the patient, but again it's coming down to whether the patient is awake or not - I mean you can have a medical patient and no one knows the patient and you can't get a medical history from the patient. So for me, you will treat every single patient, whether medical or trauma, on the road - towards a simulation as well - the same way. You are still having the same approach towards the same patient.
Facilitator	No 7…
	I want to disagree with no 2, agree, sorry ...agree, um - I don't think a medical or trauma- one shouldn't be more elevated than the other one, they should be constant, because I mean you are assessing the student's thoughts now - now some students are good at trauma and some are good with medical - you get those two types of students as well, so both should be assessed in adult and paediatric - some people are good with paeds, some people are good with adults. You get some people who are very good with medical but can't do trauma, and you get opposite as well.

2	[interjects] That's why I'm saying your approach towards medical or trauma should be almost the same way because you are approaching the patient asking the same questions to get to your same diagnosis
Facilitator	No 5 then no 6
5	Well, I agree fully with no 2 and no7, it is very important that one - I mean you don't just lean on to one side; one has to teach students about everything, I mean we are emergency care of which it covers a whole range - whether trauma or medical - you might find a patient who is just complaining of a sore thumb only to realize that - eish! - this patient is having an infarct, so one cannot just say one is going to focus on one and not focus on the other - I mean they're both, medical and trauma, for me they are exactly the same- one should be able to manage both. One must just teach students...what is of importance to me is just how to approach each situation
Facilitator	No 6…
6	As you say, in a simulation you have to do both - adult, paediatric, trauma, medical - you must be able to see if the student can handle both, or all of them because ...it's like if you go to the gym you don't only do bicep curls with your right arm - you will end up being this muscular on the one side and the other side is like atrophy and that's the way everything should be in life. You must get a, if I can use a word ...holistic approach...
Facilitator	No 7…
7	I think the question...the question is very broad as well, because it depends what you want to assess from the students as well; do you want to assess his practical skills, do you want to assess his clinical thoughts, his critical thinking? ...What do you want to assess?
Facilitator	What do you think? What should be assessed?
7	Well - everything! That's why I say that both adult medical and trauma - you want to make sure he's covering all grounds ...but I also want to say with no 1 medical wise with the history taking, I mean I work on the road and I can see; trauma: everyone seems to be there with what they should do, but with the medical one there's always the medical patient with the little snag tricks that comes with experience later which um makes it a bit more challenging
1	[interjects] Ya, I think it's difficult to literally in one simulation to test everything. If one can almost go and create 7 simulations it would be better but time wise it's always a problem, but to put it into one simulation that's always going to be difficult - to put all that information in one simulation and then run it through all the students and continue on that process
Facilitator	What do you think? What are the important cases that should be…?
1	Well, I agree with no 2 right through to no 7 - you have to have knowledge of both sides and I think the most difficult thing in the entire process is time wise is to create simulations for each and every student to be able to have knowledge on all sides, and I think that's where critically the work on the road comes where they work with us and see what's happening and so on and so forth, and ya ...anyone else has any suggestions?
2	Ya, I think personally that with experience coming from the road that if you brought the [chair mechanism drops - laughter]...my chair... if you brought the trauma scenario to the simulation you tend to finish off the sim quite quicker, but when you come with the medical simulation we tend to say we've got 15 minutes and now we need to get as much information so we tend to focus more on the scenario itself that's been

	given to you, so that's what I think - you know, you can walk in with a trauma and can whack that simulation within 5 minutes, but the medical you take quite some time to diagnose your patient
4	I agree with them what they say cause as no 1 and a few of the other guys have said with a trauma case you go in and see what you've got - you immediately get that information; but with the medical case you need to do your information gathering - it's time consuming and may have an influence on getting to the point where you need to get to your treat your patient. So information gathering on the end of the day - doesn't matter if it's trauma or medical stays important and we need to pay attention to that, but the amount of what type of simulation you are going to give the students, you can't really make a difference - you can't say more medical, more trauma because it doesn't matter if you give a medical because you can have a medical condition leading to the trauma – asthma attack falling down the stairs; you get there you've got an open femur fracture, but an underlying medical condition - you still need to gather the information. So information gathering on any type of simulation or patient treatment I think is important and I think we need to pay attention.
	No 6…
6	Is this applicable to us giving classes where we are as well? like [facilitator - ya, please share...], because I'm facilitating intermediate life support classes in the military and in that case , if the students - but I never tell them that - but if they think about it there are about 4 medical cases they can get in a simulation; so if they go home and they practice 4 simulations they will be able to do it - also within 5 minutes - it's either MI, asthma, hypoglycaemia....what's the other one?...anyway, there is four they can focus on and they walk into the sim - it looks like a duck, it quacks like duck, it is a duck - whichever one it is they get.
2	You are categorizing them from basic life support to intermediate life support, but when you come towards an ALS level, that's a whole different ball game and 20 minutes is actually-you can't only focus on those four, you've got a broader picture to look at…
6	[agrees with no 2] I'm just saying from my perspective where I work currently - we do have advanced life support training as well, but ya...
Facilitator	Thanks no 2
1	I think - no 3 I think you would agree- particularly in the private sector when you talk about minutes wise - 15 minutes, 20 minutes - you are almost bound to the medical aid, the ALS patient you've got 20-25 minutes max, then you've got to start justifyng why are you still with the patient - so you need to have all those questions almost worked out on your fingertips to make that decision and get it done
Facilitator	No 3
3	To go with no 1, I think we in the private sector have a problem - not really a problem - we are so bound to what the medical aid say; if you don't go in with a specific plan, these are the questions you are going to ask and these are the answers or results you are expecting, if you go more than 25 minutes, the medical aids start becoming a problem - they are on your neck; why are you still on scene
Facilitator	Right, because you all mentioned now an important aspect - that the student needs, but what type of cases do you think would be appropriate to put in a simulation for the students [laughter]...it's like you are talking all around the topic. You have mentioned a few...ya. no 5

5	What is of importance, what we always need to remember, especially in a teaching situation - it's emergency care - one has to be able to have a few emergency care related scenarios, whether it is medical or trauma. I made an example of a painful arm, left arm - whatever - but one should be able to treat a vast range of cases with different books for one which all are about medical and trauma emergencies, so one can take any type of life-threatening emergency - whether one has a pneumothorax, that's a life-threatening emergency, or one has a severe asthma, it can also be life-threatening so one could take any scenario classified as life-threatening and give it - we cannot unfortunately say, this particular one or that one - I mean out of the whole range of life-threatening scenarios that are there that have been studied and classified as life-threatening, one should be able to give a paramedic student for one saying, this is the condition that you as a paramedic student on this level are supposed to be able to manage and manage it.
Facilitator	No 2…
2	I think the question is actually quite broad, I think first of all you need to as an institution - university or college - you need to decide on what you want to bring into the college, what to actually teach the students; and I think that as an institution it is important to do your research properly and say, ok - if I'm going to bring...if I'm going to leave out cardiac scenarios, is that really relevant to what's the community that's what really happening there, is it an important focus or important scenario we are leaving out, so yes - as an institution it is important to do your homework quite well and then introduce it towards your students. So it could be either be medical or trauma, but if you looking at it how we are doing it - if you look at it from CUT's side - we focus more on the tension pneumothorax, the cardiac most of the time - it wasn't more like TB patients where you're going to have to go out there - there's nothing to do, I mean what are you going to treat with a TB patient? You can't basically do that. So we are doing emergency stuff only and that's what we are introducing to the students - the emergency stuff, medical or trauma. We are looking at statistics on what are we seeing every single day in South Africa.
Facilitator	No 4…
4	I want to disagree and agree; disagree in the sense of -we can't focus on, let's say CUT focuses on the Free State because where is CUT students going? There are some CUT qualified students that's worldwide…
2	[no 2 interrupts] ... no what I am saying is throughout South Africa, because we are licensed...so we need to look at the statistics for what cases we are actually getting most so we can introduce it to our students in our faculty [simulation]
4	… that's why I want to say I want to disagree because there are students working Australia, Qatar - all over, ok. Where I want to agree with him (no 2) is the fact that we have to think about the more common cases we get like the TB, like the HIV - a simple example is a simulation we had as a student; all of us went in and tried to treat this patient at an advance life support level, but at the end of the day the patient with the foreign body airway obstruction needed abdominal thrusts - a basic life support sim thrown in front of us and all of us missed it, so even if we are teaching ALS we sometimes need to do that basic life support, intermediate life support stuff as well so that we are not only concentrating on advanced life support - because private

	and provincial services are being sent out to dyspnea; you get there and it is an asthma patient and its ILS level - as soon as you gave him a bit of Beta 2s his chest is open - sometimes an IV up; what ALS techniques did you do? If you don't get your mind round that;...you must be able to handle that as well. You might start over treating your patients.
Facilitator	No 7…you have something to say?
7	According to the type of scenario I think we are off the question again [Facilitator: that's why I am trying to bring it back – that's the purpose of this session]. Of any of the scenarios, you should be able to run a resus, because in any type of scenario, if you make a bugger-up you may end up resussing - so if you make a mistake there you should be able to resus according to the guidelines... it comes back to the question; what do you want to assess? What's your timeline? How many students you have? It all depends on that. If you've only got 4 students then in a year the assessment would be a certain way, but at least you know you could run FFAs through the year teaching them more scenarios - burn wounds, head injuries, asthma - including giving a P1 patient who should be intubated and ventilated - and a patient with TB who is a P3 and should be monitored.
Facilitator	Ok no 1
1	[picks up discussion] I was kind of agreeing with that - if you, especially on the FFA side - if you can run more scenarios. I think time-wise it will save you a lot. In SAs you come in, do your 20 minutes, pack up then leave. FFA wise if you can almost do it, um - you come in, you do your sim, but the entire class is around you - they still see what are you doing - the facilitator is there, he is guiding you if necessary and I think through that entire process - I can just remember when we were practicing even; the guys sitting around you, you are doing your sim; you are getting used to a crowd around you, you are getting input, you are arguing, you are interactive through the entire sim - it's not going to take you 20 minutes to do the sim, but I think FFA wise if they can get the theoretical part through it and then start with simulations it can create a bit more - how can I put it? ... skilful paramedics at the end of the day
Facilitator	Ok, happy? No 7? No 5 not happy yet
5	No, I am happy; I just want to say; what is of importance is researching on all types of common emergencies, I mean all common life-threatening emergencies - whether it's an emergency that mainly affects people in America or wherever - as long as it is a life-threatening emergency, I believe that a paramedic has to be trained to manage that emergency...
Facilitator	… then you should go to the lab for that simulation
5	so in simulations - all common life-threatening emergencies must be taught and every student must be able perform or treat; so simulations must be based on all
Facilitator	Do you think that s a concluding statement for this question, because I see no 7 was telling us we were moving from the point, now we have raised the next question...right and the next question is ...especially for no 7 ... **[Question 3] What competencies should be assessed when using integrated clinical simulation as an assessment instrument for emergency medical care in South Africa?** You've mentioned simulation assessment, do you have any ideas?

5	Are you asking me what should be assessed [affirmed by facilitator; ya competencies] - well critical thinking, you should be able to have critical thinking; clinical reasoning and [facilitator asks why] he should be able to do the skill. If he decides to be able to do a skill he should be able to perform
Facilitator	Why the clinical reasoning?
5	...well, you want him to get to a diagnosis - if you see the patient's blood pressure is low you know you should give fluids, but you should also know to stop where his bleeding and think forward to which hospital can see this patient, how far is my ambulance - I would say the thought process and the practical process - you've got to be multi-skilled in all areas. I think that comes back to question no 1 - attitudes - all that stuff should be tested because you get students who can pass their skills, pass their sims but they lack things like map-reading, driving - it all comes down to being part of a paramedic - people skills, you should be able to communicate with someone..
Facilitator	Will you be able to do that in simulation? Map reading…
5	...well, it's difficult, it's something - well let's ask the question around the table [facilitator "ya please - what do you think?" someone says "not a bad idea"] - some paramedics out there, do they lack some [someone says "skills"] critical areas...
1	[No 1 interjects] ...in the simulation I won't necessarily include it in the simulation - map-reading, driving - but it's a very critical skill as you said. I think if there can be time spent on a student - let's say 5 minutes before a simulation, give them an area, give them a map - yes we all drive with GPS, but technology can only take you that far, so try to get that in action because that is part of the thinking process of getting that call - I'm busy responding but I'm thinking about the patient, what is wrong with him, what's my management options going to be and all the while you still need to get to the patient to treat, so ya I think definitely that can be integrated quite well.
Facilitator	No 7…
7	One thing is delegation as well, which on the road teaches the student a lot because when you do a simulation, you have one assistant - when they work outside on the road they are used to one assistant and now there are 6 EMS personnel standing around them and he wants to do everything…
Facilitator	…because he should do everything in a simulation
7	Yes, that's the way he is taught so, I've got my one assistant, so 6 there - it's working as a team
Facilitator	No 2…
2	Coming back then, should we be assessing students in a simulation or actually going out and assessing them on patients' that are real? For me, when we did our CCA, although we passed our main simulation, that wasn't the pass mark. Your pass mark was after that where you actually - what you did in the simulation was you are practicing, you know your stuff a little bit, but now you are going into reality and we are going to assess you on what we taught you in that ten months and now we are going to assess you in reality and not what's compared to simulation.
Facilitator	No 5, then no 7…
5	In terms of competencies or abilities to be assessed, what is of importance is a student's ability to recognize a life-threatening emergency and treat it within a certain time. That I feel is very, very important - I mean one can be able to use a certain tool or intubate a

	patient within 2 minutes but yet missed something else that could have caused harm to the patient, but it is very important that students must be able to pick up a problem and mange it. So their ability to use every other instrument and their ability to think and reason, that is also of importance as no 1 has already mentioned - you look at how your student thinks holistically and how they approach that scenario and how they apply that knowledge that they have learned to that particular scenario whether it's in a real type of patient situation that can be used as a simulation as no 2 has already mentioned or a patient simulated in a controlled environment
2	[interjects] I tend to disagree…
Facilitator	…Right let's hear no 7 and then we will come back to no 2…
7	I wanted to comment on the CCA - that is not a simulation at all, because it's real life management - ya you are being assessed - the good thing about that is you don't know what you are going to get [no 2 agrees "yes"], you don't know - it's not someone setting a sim with outcomes, it's like you're going out to a chest pain and you get there and it's a broken femur or - do you understand what I'm saying?...there is no way of knowing what you are being assessed on, so that actually...
Facilitator	…but in simulation [interrupted by 2]
2	but ya but...sorry...[Facilitator; "please no 2"],...ag nee...[laughter - the chair again], you also don't know what you are going to be assessed on and you don't know what your outcomes are going to be when you are actually going to do a simulation, so it is still the same thing, but the differences between a simulation and reality is that reality is a person can either talk to you, you can see and you can visualize what is actually wrong with the patient, but when it comes to simulation you have to go beyond looking at this as a simulator and you have to - what can I say?... dream, or have to imagine that this patient is bleeding or is perfusing - do you understand what I am trying to say?... so for me personally, I don't think that a simulation is actually a way to assess the final assessment of any student and should be after your assessment you have a guidance toward that student and say, ok, yes, this I a prerequisite for you to pass is that your simulation should be - if you for instance do well in the simulation, we are now going to take you out to reality and then assess you in what we have taught you in the year before you came to your final assessment, but your final assessment shouldn't be on a simulator, it should be on reality, because you have 3 years to train yourself, to get use of a simulator but in reality in order for you to be a lecturer or facilitator it's different - as an AEA lecturer I can see a difference because you can train these guys and you can tell them this is what the patient looks like but as soon as you go on the road it is no more a simulator, it's reality and you cannot be thinking of a simulator because you are expecting things to be done in a simulator, ok if I do this then this changes, but in reality it is not going to happen, so that's what I [trails off]...
Facilitator	Right, I see people like to talk to you, let's start no 5 [no 2 clears throat…]
5	First of all, I don't know if I've missed it or not, but I recall no 2 saying that he was agreeing with what I said, but I didn't hear him, and secondly, I agree with what no 2 says. Simulations should not be the be all and end all when the student is now assessed at the end and based on the simulation a student can be failed - I don't know if that's part of the questions that are still coming or not; should simulations be

	used as a final tool, but they can be used as a teaching tool, however not be the final thing that says right the student at the end of an assessment - the student is incapable of treating just this one patient
2	I also tend to disagree, because if you are now going to compare us to MBCHB level you are never going to get a student that's going to go and say, now I'm going to do a blood pressure on a manikin - they don't do that - first they get taught how to do that and then they go a patient and say this is how you do it and your final assessment is going to be on a real patient because you are sitting there in your final assessment and you are not having a simulator you are having a real patient and you need to go and diagnose that patient.
Facilitator	Ok no 3, then no 6 and then 4…
3	I agree with no 2 and no 5 I think, we've all qualified here and we've all worked on the road and have got some sort of experience, we've all worked as students and I think, being in a simulation environment, you walk in - it's quiet - you've got the simulator, you basically do what you see there. Once you get on the road there's a difference there, cause there's traffic, there's noise, it's raining - the students start reacting differently - their thought process is different - what they might have passed here they forget the stuff they have to do on the road - you know even walking into a house and they have to - there's dogs barking, there's family fighting - all those kind of things that you don't find when doing a simulation.
Facilitator	Ok, no 6 …
6	I agree, and to some extent with all of you, but the problem is when you look at now at a training institution where you have to have four assessments, fairness and all those other principles that has to come in today, so how can you - you were assessed like that I can appreciate that - but I don't agree with it because if - we talked about it earlier - some people prefer trauma, others medical. If you love trauma and in your final CCA assessment now you are evaluated on a trauma patient you'll get a distinction - give you a medical patient you might not do so good and visa versa. With the fairness, you are being assessed - also again you love trauma, you get a trauma patient; your friend also loves trauma - he gets a medical patient, then I don't feel it's fair.
	[No 1 interjects] Just a question…
Facilitator	Ok no 4…
4	I agree totally with no 6, and in the sense of what no 2 said as well. I think evaluation on the road is important but unfortunately out of a training institution you have to finalize your final mark with a simulation. The reason exactly what no 6 said is - I can go out on the road, you can even do assessments on the road for a certain percentage of the total mark; but I can go on the road and work 30 shifts and never have a resus, so I'm going to get assessed on medical, trauma, whatever, but he might go out for 30 shifts and on 4 of his shifts he's getting resusses - and he's getting assessed on a resus - where's the fairness now coming in? So yes, I agree, road assessment must play a vital role, but not the final. Simulations, where everyone's getting the same or more-or-less the same - where there's fairness, transparency - simulation plays a vital role in the final mark.
Facilitator	No 7…
7	I just want to ask the question, why can't you bring what's out on the road into the simulation?
	No 2 [meaning no 3?], then no 5 I'm coming back to you, don't worry…

3	Like no 7 said, to make a simulation more life-like, more real because that's what you're actually getting out on the road - you are not walking into a house and it's quiet - you have a simulator and you have somebody talking or giving information, there's dogs barking, it's raining - you've got all kinds of different stuff in the environment around you.
	No 5, then no 7
5	It's not an issue; you could have given no 7 first...
7	I want to go back to my question, I don't think there's anything out there that you can't bring into a sim, because all the windows is dark - the students have to wear headlamps, simulating night time - dogs barking, we had noises of cars responding - students can't hear that ... so the question is what can't you bring from outside into the sim?...if you understand what I'm saying, because most of it you can bring into a sim to make it realistic...ya, I mean we brought smell into the simulation - we actually put the chemicals there - but I still understand what you are saying no 2 about the old days - it was the practical you had to be the BAA, you had to be AEA - so you had the road knowledge, you already had behind you [in the context of then coming to do the CCA course] - you couldn't do CCA without going through your steps which you gained that knowledge there, where over here you don't have to have the road - you can come from school and it' a different type of assessment for a different type of course...
Facilitator	No 5…
5	I do feel again, we have started drifting away again [Facilitator: exactly, that's why…] from the topic because of all our different experiences, but I just wanted to comment on from what has been said by no 2 and no 4. With simulations, I mean, if you have 20 students, let's say you are taking them out and assessing them on the road, the fairness of it I don't see because you cannot be consistent in what you are assessing cause each student is going to be getting a different patient every time - how they think and how they react to the situation is going to be the same every time, so unfortunately now I do understand especially with the national diploma or any other type of qualification we are training our students, there are certain requirements from the council of which one of them is said to be an exit simulation or exit-level simulation so one has to do it because it is a requirement from the council, however in my opinion, that should not be the exit - simulation should be continuously happening throughout the years - but it should not be a determinant of whether a student fails or passes the year. Now going back again to the topic, or the question - what competencies as already indicated - a student must be able to think, reason and apply themselves according to what is being presented to them. So thinking, their ability to think and to manage a life-threatening emergency - recognizing it, treating it - is what is of importance. So if you can have your students being able to walk into the house and see that this what I'm presented with or what I'm seeing in front of me is a life-threatening emergency and treat it then you have got what you want.
Facilitator	Ok, happy with that concluding remark? Can we move on then to the last question [**Question 4**] **What factors should be included in the design of integrated clinical simulations for the purpose of summative assessment?** You have already started…you have already talked about fairness…no 7…

7	The most important factor is reality, you should make it as real as possible
Facilitator	How?...
7	Like I said, by means of tinting the windows make it pitch dark, put background noises, smell - if it's a motorbike accident put a motorbike in...
Facilitator	No 6…
6	If it is possible and budget allows it, like the sprinkler systems for rain or like a piece of tarmac - a tarpaulin you can throw out here and put real oil there so if a guy doesn't look where he walks he slips and falls - then he didn't check for hazards - if in a wind tunnel or aircon system - makes wind...
Facilitator	No 1…
1	To go with what [no 7] said is "what can't you bring outside in?" is rather, if you can swop that around and say what can't you take inside out? Do the simulations outside, if it's sunny outside - there's your simulation - if it's rainy outside, it's your simulation - it's what's happening on that day. I think we focus on what we can do in the classroom - instead we are primarily prehospital, we are outside, so take the simulation outside and see what happens. Take it for a trial run - and if you're talking about aircons, get a big fan - you can throw oil, you can throw petrol - you can do anything - you can clear up the scene after you are done...ya...
Facilitator	No 4…
4	I personally agree with what he is saying, can't we take what's inside out, but to go and do a simulation with a R120 000 manikin out on the road in the rain - oops! I don't want to be your boss - understand? I agree, bring what's outside in and if we can, take what's inside out - take the manikin and put it on the tar road, let the students get on their knees on the tar road and do CPR while treating a patient - there is limits, unfortunately.
Facilitator	No 1…
1	I do understand that there are limits to taking this manikin - close to R1 million - and taking it outside and doing...putting it in the rain and so on and so forth, but once again you are playing with students' imagination if I can put it like that. You are taking this manikin - it can blink, have different pupil sizes...it can do whatever [referring to SimMan 3G], but rather take rescue randy and do exactly the same - yes, as I said, you are playing a lot with the student's imagination, but I think the most critical is - rather than coming in here, aircons on - yes you have speakers with cars going around, you can put a bucket there for smell - you can do that, but I think it's just more realistic when you do it outside where there are cars, where there are real smells, where you can't hear what's happening.
Facilitator	No 6…
6	I agree with no 1, yes, we want to take them outside - but again, fairness and consistency is what is bothering me - where sims normally run over two or three days - the people who do the sim today; today it rains, tomorrow the sun is shining - then it's already not the same as the people from the previous day. In a controlled environment inside [no 7 interjects "fairness"]...it's more controllable,...ya, we can't tell God today, tomorrow and the day after we want the same.
Facilitator	No 4…
4	I hear what no 6 is saying, and all of us went through it. You practice sims right through the year and how many of your practice sims are in

	the class - there I totally agree, take them out because everyone is anyway sitting in the class - do it outside, get them that experience. When it comes back to no 6, when it comes to the physical assessment and you need to be consistent then you can bring it back to the classroom, switch off the aircons, put off the lights, put a bucket there with the smell and try to bring in what you can bring in
Facilitator	No 5 then no 7…
5	I think no 7 said the most important thing when he started saying that we just need to bring reality into our simulations, like I said, if you take students out - if you do simulations throughout the year, and every time introducing them to different environments - not necessarily as an assessment - but as a training tool, that is a good thing, because they are getting exposed to all types of situations and not necessarily playing with real patients - they can make mistakes, they can make changes and they are doing it in a different area every time; however if it is to be used as an assessment tool it has to happen in an environment that is controlled where one can be consistent with all individuals being assessed and that fairness is continuously being applied. So what is of importance in simulations is reality, if one has to say the patient is bleeding he must be able to see blood flowing out of his patient; if this patient has stopped breathing you should be able to see the patient is not breathing at all and that you will be able to react accordingly. If you are told the patient has a femur fracture when you walk in there and you don't even see any fracture, I mean it does even get you geared up to doing something about it. You can even miss the fracture and treat everything else and even forget that, well I was informed about the fracture when I came into the simulation, however if you can see a fracture when you walk in that will ring a bell immediately that a femur fracture is definitely a life-threatening emergency that has to be attended to as well, so reality is of importance
Facilitator	No 7…
7	It's fairness, reality, consistency - the factors that should be in a simulation - and then what the students are also doing, because this is a controlled environment - you have put in fairness and all those criteria. But he also works practical shifts on the road where he applies what he learns on the road into the sim lab, I mean when he works on the road he walks into a house - he gets the idea of his approach to a patient - there they do the outside, I almost want to say - I mean all of us went through it, you had to have both to make one. So what you did outside with experiential learning doing that you brought to class with you, that little bit of...how can I say it...play, you're coming in and you're thinking, ya they've got to imagine it, but if the simulation isn't close to reality and the student fails to pick up the guy is not breathing because it's not set as it would be in reality then I mean there's no fairness toward the student
Facilitator	…any other comments?...factors?...no 5
5	In addition to what no 7 said one of the ways as well is to - well students are going out for their clinical practice learning, working integrated learning, or experiential learning - the situation can be used as a simulation, or in other words if one has to assess them it has to be an informal type of assessment, where they're not going to be penalised on what they are doing, however they can get to properly reflect on their correct treatment or incorrect management of the patient, then whatever results they get on the road can then be

	brought in for discussion in class and that can be used as well as simulations and you are affected in both reality as well as simulation or a simulated scenario
Facilitator	Any other comments…I see you are very good at making conclusions [no 5 laughs] from the discussion, great! Right any other comments on these factors…so then just my last question. So **what do you think about simulation? What is your opinion, to conclude?** No 5 [laughter], you can be the first one and may
5	Like I said initially, simulations are a good teaching tool - I mean being in a teaching environment myself, I feel they are excellent. I mean it is one way preventing students from learning with real patients and making huge mistakes that can cost somebody else's life, so thy are good tools to teach students with. However for the last five years that I have been in a training environment myself, I have seen that they are not 100% what I would say...they should not necessarily be used as the overall assessment that determines whether one is going to go out onto the road and practice or fail the year. I feel they should be used to train students with and should not be a determiner of whether a student finishes their qualification or not, because one might find that one on the day of their simulation had a huge fall-out with either their parents or their spouse and they have to still do a simulation and when they get there they mess it up so bad that they end up failing and not getting their qualification so - they can be use, as I said, simulations are good but they should not be used as a make-it or break-it
Facilitator	Right, any other comments on the simulation?...
7	In today's training environment where the simulation is the closest to what you are going to get and you can't pass the simulation which is not even the real environment, then it means you are not ready to be out there. Coming back to the "I had a bad day", if me and my wife gets divorced today and I'm working tonight - so if you had a bad day on your sim, it's reality. When you're working outside as a paramedic and you get a bad day, you must be able to deal with it. The ending is I think simulation is the closest in today's training environment, I mean the best would actually be to the old way with practicals [is the participant referring to road evaluations?] but there is not fairness and consistency like in a simulation.
Facilitator	No 4, are you going to conclude this for us? [laughter]
4	I agree what they say - I also believe a simulation is an important teaching tool as well as assessment tool - but adding to that I also want to bring no 2's previous remark in as well; bring in a small percentage of the paramedics on the road that's working with the students to do a type of informal assessment on the road with the students which on the end of the day - if I can repeat no 5's point - did have a bad day - he can't do good in the simulation - you take that road evaluations to see what did you do overall in the year? Due to the comments or - I can't say marks - but something that you can work it out; the paramedics that you worked with gave a good overall report, for example, and now maybe this one day he had a worse time. Can this maybe have an influence and let him continue, or no he had a bad report from the paramedics and bad simulation - let's keep him back. I think a small percentage of road evaluation must come in, the simulation must definitely stay.
Facilitator	No 5…give us the conclusion
5	I believe no 4 has said exactly what I wanted to say now, which is - and as I have said - simulations are good teaching tools - I mean I

	don't see them being taken out for whatever reason, however I was saying just they should not be used as an all and be all assessment and - adding onto no 4's point - once there are multiple assessments one should not determine one's pass or fail based on one simulation so with those road practical assessments that are done out there, even though they are informal, as my initial example, they can still then be used then to say "how has this person been performing?" One can say out of the ten simulations on the road you find that there has been a consistent pass overall one can say at the end of the day this final simulation in addition to these one's gives the student a pass. So one can look at it that way and say, right we are taking five simulations from the road plus the one - then 6 or 4 plus 1, five - if you get 4 out of 5 then you pass. If you get 2 that means you fail, so it also shows that this person has not really been performing well anyway, whether outside or inside.
Facilitator	Right, do you think that's a good conclusion of this discussion? It seems closeness of reality and part of the entire assessment of the student. Right, thank you very much for this interesting discussion; I hope you've enjoyed it.

APPENDIX E

November 2013
Prof D Hay
Vice Rector
University of the Free State
Bloemfontein

Re: Application for permission to perform a research project and collect data from selected Faculty personnel who have at least 2 years clinical experience of working in emergency centres or trauma units.

Dear Prof Hay,

I have registered for a structured master's degree in Health Professions Education, for which I must conduct a research study related to Health Professions Education. I am currently involved in conducting summative assessment using integrated clinical simulation as the assessment instrument in the Emergency Medical Care programme offered by the Central University of Technology, Free State. Taking into account the lack of validated assessment criteria for use in an assessment method for this purpose, I would like to investigate the opinions and perspectives of medical doctors with experience in managing critical patients in the emergency care context for the purpose of identifying relevant case types and performance criteria appropriate to this context.

Consequently, for the purposes of the M.HPE degree, I decided to use focus group interviews to provide an in-depth exploration of the views, opinions and recommendations of Faculty members who are on a position to provide valuable input in this regard. I write this letter to courteously ask for your permission to continue with this research project and to collect the data that are required for this study.

The title of my research project is:

"**INTEGRATED CLINICAL SIMULATION ASSESSMENT CRITERIA FOR EMERGENCY CARE EDUCATION PROGRAMMES IN SOUTH AFRICA "**

My study leaders are:
Dr M Labuschagne (Clinical Simulation Unit, Faculty of Health Sciences, UFS)
Dr J Bezuidenhout (Division of Health Sciences Education, Faculty of Health Sciences, UFS)

The overall goal of this study is to identify appropriate integrated clinical simulation assessment criteria and case types that will inform the development of appropriate assessment methods for programmes in emergency care in South Africa.

The aim of the study is to identify appropriate integrated clinical simulation assessment criteria together with case types when using integrated clinical simulation as a summative assessment instrument for emergency care education programmes in South Africa.

The objectives of the study (with the research methods that will be used to achieve these objectives) are as follows: To identify assessment criteria for conducting summative assessment using integrated clinical simulation as the assessment instrument for emergency care programmes in South Africa.

In order to achieve this, the following objectives will be pursued:

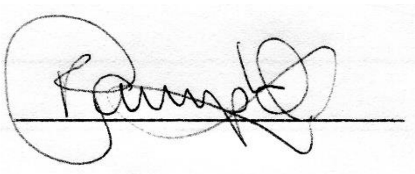
- To gain a deeper insight into the history, development and current status of the types of clinical simulation and assessment criteria employed by emergency care, emergency medicine and acute-care educational programmes by using clinical simulation as a summative assessment tool by conducting an in-depth discussion of the relevant issues, questions, challenges and needs relating to the growing body of knowledge and experience in the domain of clinical simulation **(literature review and document analysis).**

- To identify assessment criteria that can be used when integrated clinical simulation is employed as a summative assessment tool by emergency care education programmes in South Africa **(focus group interviews).**

The researcher will conduct focus group interviews, which will include available Faculty personnel who fulfil the inclusion criteria of the study. The qualitative information and literature review will be correlated and integrated in order to inform further research in this regard. The qualitative findings will be analysed and interpreted (in correlation with the literature review) by myself, with the guidance of the study leaders.

I attach a copy of the protocol and interview schedule that will be used. I would like to sincerely thank you (in advance) for your attention and consideration of this request.

Yours faithfully,



Mr Rod Campbell
Magister student in Health Professions Education
University of the Free State
Student number: 2006032946

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APPENDIX F

November 2013
Prof GJ van Zyl
Dean of the Faculty of Health Sciences
University of the Free State
Bloemfontein

Re: Application for permission to perform a research project and collect data from selected Faculty personnel who have at least 2 years clinical experience of working in emergency centres or trauma units.

Dear Prof van Zyl,

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Dr J Bezuidenhout (Division of Health Sciences Education, Faculty of Health Sciences, UFS)

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The aim of the study is to identify appropriate integrated clinical simulation assessment criteria together with case types when using integrated clinical simulation as a summative assessment instrument for emergency care education programmes in South Africa.

The objectives of the study (with the research methods that will be used to achieve these objectives) are as follows: To identify assessment criteria for conducting summative assessment using integrated clinical simulation as the assessment instrument for emergency care programmes in South Africa.

In order to achieve this, the following objectives will be pursued:

- To gain a deeper insight into the history, development and current status of the types of clinical simulation and assessment criteria employed by emergency care, emergency medicine and acute-care educational programmes by using clinical simulation as a summative assessment tool by conducting an in-depth discussion of the relevant issues, questions, challenges and needs relating to the growing body of knowledge and experience in the domain of clinical simulation **(literature review and document analysis).**

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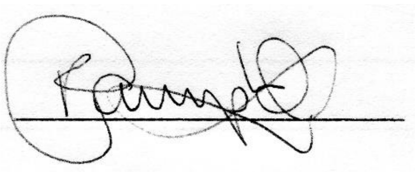
I attach a copy of the protocol and interview schedule that will be used. I would like to sincerely thank you (in advance) for your attention and consideration of this request.

Yours faithfully,



Mr Rod Campbell
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University of the Free State
Student number:2006032946

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e-mail address: rcampbel@cut.ac.za

APPENDIX G

Dear Rod

Permission to use the simulation Lab for Focus group discussions is herewith granted.

I wish you all the best with your Masters.

Prof L de Jager
Dean: Faculty of Health and Environmental Sciences

Tel: +27 51 507 3111 | Fax :+27 51 507 3355 |

E-mail:**ldejager@cut.ac.za**

Central University of Technology, Free State (CUT)
Private Bag X20539, Bloemfontein, 9300, South Africa

From: Campbell Rod
Sent: 13 January 2014 11:37 AM
To: De Jager Linda
Cc: Friedrich-Nel Hesta; LabuschagneMJ@ufs.ac.za; Johan Bezuidenhout (bezuidj@ufs.ac.za)
Subject: Permission to use EMC Simulation Lab DCE 005 for focus group interviews

Dear Prof de Jager,

I hereby request to use the EMC Simulation lab (DCE 005) as a venue to conduct focus group interviews in gathering data for my masters research. The times scheduled will not interfere with program activities scheduled in the venue. The venue is ideal as it provides one-way glass behind which I, as the researcher, and the independent observer can sit without risk of distracting the participants.

I trust you find this in order.

Regards,

Mr. Rod Campbell
Lecturer

Third Year Head & WIL Co-ordinator

Researcher ID : I-5906-2013

Emergency Medical Care
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APPENDIX H

Hi Rod

Fine with me.

Regards

Willem

____

Prof Willem H Kruger
Head of Department, Department of Community Health Faculty of Health Science, University of Free State P.O Box 339 (G52) Bloemfontein 9300 South Africa Room 229, Block E, F. Retief Building
Tel: (+27)51 4053136
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>>> Campbell Rod <rcampbel@cut.ac.za> 2014/02/17 07:28 AM >>>

Dear colleagues,

Attached is the transcript of the focus group held on 15 January 2014. Please provide feedback as to the accuracy of what was said. Should I not receive any feedback within 10 working days I will assume the content is an accurate representation of the discussion. A REMINDER that the contents of this discussion remains confidential as discussed at the focus group interview and stated in the information letter.

Regards,

Central University of Technology, Free State

Mr. Rod Campbell
Lecturer
Third Year Head & WIL Co-ordinator
Researcher ID : I-5906-2013
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APPENDIX I

Declaration

18 June 2015

Hester Sophia Human
18 C Ben Tindall Street
Heuwelsig
Bloemfontein
Hettie.human@gmail.com
072 137 8991

Client: Rod Campbell

I declare that I edited the dissertation entitled, *Integrated Clinical simulation assessment criteria for emergency-care-education programmes in South Africa*, submitted in fulfilment of the requirements for the degree Magister in health Professions Education (M. HPE).

HSHuman

Hettie Human
SKRYWER | TEKSVERSORGER | VERTALER | PROEFLESER

072 137 8991 | hettie.human@gmail.com