Identifying Procedural Core Competencies for Undergraduate Emergency Medicine Education at the University of Zimbabwe College of Health Sciences

By

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DECLARATION

I, Sithembile Mtombeni, hereby declare that the work on which this dissertation/thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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Date: 27 February 2018……

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Abbreviations

AAMC	**Association of American Medical Colleges**
ACGME	**Accreditation Council for Graduate Medical Education**
AFEM	**African Federation for Emergency Medicine**
DALYS	**Disability Adjusted Life Years**
EM	**Emergency Medicine**
ENT	**Ear, Nose, and Throat**
HIV	**Human Immunodeficiency Virus**
HPCSA	**Health Professions Council of South Africa**
IFEM	**International Federation for Emergency Medicine**
LMICs	**Low and Middle-income countries**
SU	**Stellenbosch University**
UCT	**University of Cape Town**
UZCHS	**University of Zimbabwe College of Health Sciences**
WHO	**World Health Organisation**

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Chapter 1

Background and Literature Review

Introduction and Background

Each year more than 100 million people sustain injuries, while nearly five million people die of violence and injury related causes worldwide. Low and middle-income countries (LMICs) account for about 90% of this morbidity and mortality.[1] This high morbidity and mortality in LMICs is compounded by an overwhelming burden of acute medical and surgical conditions; including infectious diseases such as malaria, respiratory infections and HIV complications.[2] There is unmet need for emergency care especially in sub-Saharan Africa. Despite the obvious need, emergency care services are not well developed in Africa.

Critical determinants for effective emergency care have been highlighted by several research projects, country surveys and WHO deliberations and reports[1,2]. Streamlined emergency medical education, starting at undergraduate level, is among the universal components of a comprehensive Emergency medical service[3-6]. A common call to action arising from all needs assessment efforts, is to introduce streamlined Emergency medical education and training.

Emergency Medicine (EM) as a specialty in Africa, was first registered in South Africa in 2004. Since this pioneering achievement on the continent, South Africa has taken a stewardship role to sustain EM development across Africa, and other LMICs. Most efforts have been targeted at postgraduate program development.

In all countries, whose Emergency medical services are in early phases of development, provider skill deficits have been cited as major drawbacks. Existing medical curricula are deficient to address the skills gap, which is more apparent on emergency clinical procedures. Teaching emergency procedural skills requires guiding blueprints. Such benchmarks have not been formally established for Africa. Universities that have introduced undergraduate emergency medicine through informal processes face challenges in clerkship allocation, educational resource prioritisation and objective student assessment.

Zimbabwe experienced economic and political crises during the period 1999-2009. These challenges had negative impact on medical education delivery. The student intake decreased by 30% while the failure rate increased from 15% to 45%, amid critical staff and learning resource shortages.[3] The University of Zimbabwe College of Health Sciences' (UZCHS) regular curriculum review process was consequently abandoned during this difficult period. In 2012 the university

was awarded two grants through the Medical Education Partnership Initiative. Together with improved government funding, these resources created impetus for the urgently needed academic reform.

A situational analysis revealed gaps in curriculum, course design and teaching methods. Innovations to enhance the quality of health professions education were initiated. A new Health Professions Education department was established to support medical teachers, the clinical research support center was strengthened while faculty development programmes were formalised[3].

Partnerships were developed between the University of Colorado Denver and the UZCHS to deliver targeted programs on curriculum review, curriculum design and program evaluation. It was during these sessions that proposals were made to adopt competency based medical education, aligned to the CanMeds competency model[3]. The seven-domain patient centered model was endorsed by the university in 2013.The developments described above brought renewed interest in new specialties like Family Medicine and Emergency Medicine. Family Medicine is now a recognized specialty in Zimbabwe, leaving Emergency Medicine as the next inevitable step.

Learning from the challenges faced by early adopters of EM, UZCHS set out to formally identify core competencies, in preparation for introducing EM. Although the envisaged comprehensive EM curriculum will include cognitive and professional (attitudes) competencies as well, the procedural skills domain was selected as the first stage of the roadmap towards formalised undergraduate EM education. Incorporating this project into the current college-wide competency based curriculum review process, provides cost advantages.

Literature Review

Literature search strategy

A comprehensive literature search was conducted online with the assistance of an experienced librarian. Medline and Academic Search Premier databases were searched for the following Boolean operators and Mesh terms: Emergency medicine/ emergency medical care/ services, core competencies, clinical procedures or practical skills, curriculum development and medical students. An advanced search was further undertaken by combining Mesh terms (synonyms) such as undergraduate/ medical students, clinical procedures (skills)/ practical skills/ emergency medical skills, curriculum proficiency/ competencies. A separate search for consensus/

consensus building (process) and Delphi technique (method/ approach/ process) was targeted at methodology selection.

Multiple combinations of the above sub-searches using identified Mesh terms in progressively advanced online searches yielded just over a hundred possible research articles. The search was then refined by limiting to publishing period of 2000 to 2017. English language and original research articles with full text availability were individually accessed. A repeat search was conducted with the same Boolean operators and mesh terms for LMICs/ Africa using African Index Medicus. Five additional research articles were retrieved. A list of 47 original research items and published curriculum recommendations showed initial relevance to the topic or its objectives.

A brief browsing through abstracts and summaries yielded 31 relevant research articles. Five articles were later discarded as duplications.

Using a literature summary matrix to populate items with findings relevant to the research aim and objectives, a further two articles did not meet criteria, leaving 24 original research articles in the final list. The findings from the 24 relevant research articles and 11 curriculum guidelines/ consensus documents are synthesized in the section below per emerging themes.

Emergency Care and Health Systems

Acute medical illnesses and injuries will continue to claim many lives despite effective prevention efforts worldwide. Significant preventable morbidity and mortality arise from these medical emergencies[1]. Reactive approaches to morbidity reduction are costly and detrimental to population health advancement. Emergency medical care provides an integrated pathway to achieving fundamental functions of a health care system: population health improvement, meeting community expectations and protection against costs of ill health[4].

Studies suggest that efficient emergency care is a cost-effective means of secondary prevention, as early stabilization of acutely ill patients reduces the need for costly interventions[5]. The Disease Control Priorities Project estimates that 45% of deaths and 36% of disability adjusted life years (DALYS) in LMICs could be prevented or addressed by the implementation of effective emergency care systems.[6]

In developing countries, the first contact with emergency care is the hospital front room. Although overcrowding and lack of resources preclude appropriate emergency care delivery, lack of skills among providers is a persistent setback. For example, in Malawi lack of triage skills resulted in prolonged waiting times while in Mexico the death of more than half of 132 children studied, were

attributable to poor physician skills[6]. In Zimbabwe, a significant proportion of maternal mortality was traced to inability to identify and manage or refer serious complications by emergency providers[6.] Worldwide, poor procedure performance, especially during emergency care delivery, is a major source of stakeholder complaints and malpractice claims.[7]

Emergency Medical Care in Africa

Whereas countries like South Africa, Tanzania, Kenya and Ethiopia have established specialised emergency medical services, other Sub-Saharan African countries are still at planning stages. At its 60th World Health Assembly, having considered the report on emergency care systems, the WHO urged member states to 'ensure that appropriate core competencies are part of relevant health curricular, and to promote continuing education to providers of trauma and emergency care.'[1]

A regional survey in 2014 by the African Federation of Emergency Medicine (AFEM), established that a major barrier to successful intergration of acute care into health systems is 'lack of consensus on essential components[2]. Identified essential components include clinical competency and clinical decision making by frontline providers. Medical education and training are considered major determinants of the aptitude for effective clinical decision making.

Emergency Medical Care in Zimbabwe

Emergency medicine is not yet a recognised specialty in Zimbabwe. Despite the specialty's non-existence, EM care exists, but is currently provided in a fragmented manner. UZCHS is planning to rationalize EM education by introducing Emergency Medicine (EM) as a specialty. Training opportunities in undergraduate EM are currently spread across various surgical and medical departments. Current interdepartmental collaborations may find unification in formalised emergency care teaching.

Streamlined emergency medicine training is among innovative programs that are envisaged to add value to medical education at UZCHS. The Canadian physician competency framework has been adapted for the competency based education initiatives at UZCHS[3.]

Medical Education under review

In response to gaps identified between the taught medical curriculum and the health care needs of populations, there is a growing international adoption of competency based education[8,9,10]. After a detailed systematic review, a Canadian group defined Competency-based medical education as 'an approach to prepare physicians for practice that is fundamentally oriented to graduate

outcome abilities and organised around competencies derived from an analysis of societal and patient needs'[11].

They further emphasise that time-based training takes a lessor role, and learner centeredness should be prioritised. The set competencies are used to guide training, assessment of students and program evaluation. The UZCHS is currently introducing competency-based curricula in line with the Medical and Dental Council requirements.[12] Introduction of a dedicated EM block, based on set competencies will align well with current educational initiatives. This might be a challenge within the already time-constrained curriculum. Creative ways will be required to introduce an additional block into the already overwhelmed curriculum. MacFarlane and Green-Thompson report on the integration of emergency medicine into an existing clinical teaching block in a South African University by combining forensic medicine, emergency medicine, trauma and anaesthetics outcomes.[13]

Fundamentals for Competency based medical training

Substantial work has been done on establishing postgraduate EM core competencies in developed countries in the past forty years. Undergraduate EM has only received attention in the past 5-10 years. Formative assessments and on the job evaluation of medical graduates revealed worrying procedural skills gaps[14-18]. The Association of American Medical colleges (AAMC) published a recommended undergraduate skills curriculum in 2008, echoing the earlier recommendations in 2005 by the University of Washington. At around the same period, Australia, Germany and the rest of Europe also engaged in undergraduate practical skills program evaluations.[19]

The findings consistently confirmed curriculum gaps, significantly highlighted in the practical skills domain. Further afield, in Malaysia and Africa, the pattern persisted.[16,20] Competency based education was universally adopted as the solution to the perceived problems of lack of benchmarks for skills teaching. Medical students and junior doctors showed acceptable performance in other academic domains of knowledge, attitudes/ professionalism and communication[16,18]. At both undergraduate and postgraduate levels, competencies were founded on consensus building among experts. This is true for the USA (ACGME), Canada (Can Meds), Australia and others.

While individual countries were battling with the widespread dilemma of deteriorating quality of procedural skills of medical graduates, a multinational collaboration was established. In 2009, the International Federation for Emergency Medicine (IFEM) published a model worldwide curriculum

for undergraduate Emergency medicine. This generic curriculum guide is a comprehensive list of 18 outcome or competency areas.[21] They however caution users to adapt this generic curriculum to local contexts.

The African Federation for Emergency Medicine (AFEM) provides guidance on Emergency Care education in LMICs. Most emergency medicine curriculum work was done in South Africa, Botswana, Ethiopia, Ghana, Sudan and Tanzania, where Emergency Medicine is now established as a medical specialty. In all these countries Emergency education curriculum was developed for postgraduate levels, with no formalised curriculum or competencies for undergraduates. The AFEM curriculum, although listing some procedural competencies applicable to undergraduate level, was designed for postgraduate intermediate and specialist levels[22].

The starting point for most of the established African programs has been postgraduate (residency) training, which then paves way for undergraduate EM development. For example, Osei-Ampofo, Oduro, Onteng and others describe the founding of the specialist EM program in Ghana, with a brief mention of the introduction of undergraduate EM medical education through a one-week rotation. [23] In Botswana, Cox and Chandra describe experiences of problem-based learning as applied to Emergency undergraduate medical education, without details of curriculum competencies or pre-determined outcomes.[24]

Which undergraduate EM competencies are critical?

Society expects every physician to be able to respond to medical emergencies regardless of their chosen specialisation[25.] The fundamental skills required for basic emergency care are gained during undergraduate education. However, many undergraduate curricula, especially in Africa, do not emphasise emergency medicine competencies.

Emergency Medicine (EM) competencies can be taught across four main domains: knowledge, communication, attitudes/ professionalism and procedural skills. The acquisition of knowledge, attitudes and communication skills is emphasised across all existing specialties where students rotate through. A review of undergraduate curriculum recommendations for emergency medicine shows general international consensus on knowledge, attitudes (professionalism) and communication skills. For example, all guidelines list core knowledge requirements for physical diagnosis, therapeutic interventions and disease prognosis. Professional and leadership skills required for ethical practice and teamwork as well as communication skills with patients, caregivers and other health professions, are also shared across countries. However, there is wide

variation on recommended core competencies for practical procedures. This disparity is observed even among universities in the same country.

Several factors influence the selected list of procedural competencies; program duration, epidemiology and job expectations or work requirements. The stakeholders deciding on this list may influence the final choices as well. For example, The AAMC lists 10 core practical skills, while most European colleges emphasise intermediate cardiac life support skills for their undergraduate students[25]. A Malaysian university has 22 core procedural competencies listed, and this list may be much longer for African graduates who practice in resource constrained settings, with added responsibilities.[20] Procedural competencies, unlike other educational domains, need more stringent adaptation for context fit.

In Zimbabwe, procedural skills required for effective emergency care are currently fragmented across different clerkship blocks in the departments of Internal Medicine, Surgery, Obstetrics and Gynaecology, Anaesthesia, Paediatrics and Psychiatry. Each department currently teaches procedures relevant to that specialty despite the obvious overlaps that may lead to inefficiencies through repetition and omissions.

The time-based block system for undergraduate clinical training in Zimbabwe dictates a set time of rotation in each clinical specialty. This arrangement may result in the deployment of junior doctors who are not confident to meet the skill demands of medical practice. This trend is a prevalent international dilemma. Even in countries with established Emergency medicine training, formalised undergraduate training is still under review[18,19].

A survey of 32 American medical schools in 2011 found that only 33% offered a mandatory third year emergency medicine clerkship, whereas 53% had a formal exit assessment[26]. In 2012 a national survey in the same country revealed that only 39-61% of students were consistently taught and assessed on procedural skills in comparison to 98% for cognitive skills [27.] A recent Germany exploratory study concurred with the American findings, 64% of the surveyed junior medical doctors felt inadequately prepared for practical skills[28.] This implies that most medical interns began their jobs ill prepared for procedural skills. Although this discrepancy has been addressed in recent years, it leaves LMICs without robust benchmarks or proven standards on which to anchor their undergraduate emergency medical training initiatives.

A similar survey of South African interns revealed lack of confidence, frustration and fear among interns who felt inadequately prepared to do the work expected of them[29.] Most distress related to emergency clinical procedures which must be performed with urgency and sometimes with no

senior supervision. The researchers suggested procedural guidelines to be published by the Health Professions Council of South Africa (HPCSA) to streamline skill acquisition. The interviewed junior doctors felt that learning of procedural skills during internship, with limited supervision was inferior when compared to the medical school environment[29].

In Zimbabwe, a survey conducted by Munongo et al in 2013 confirmed a similar scenario[30]. An earlier analysis of the factors leading to morbidity and mortality, after a soccer stadium stampede in Zimbabwe in 2003, had indicated that substandard skills played a major role in poor outcomes[31.] The most recent needs assessment done at UZCHS for Point of Care Testing sub-curriculum revealed notable skills gaps for point of care testing. Point of care testing is increasingly being utilised in emergency time sensitive diagnostic evaluation.

In all cases, key recommendations included formal procedural skills teaching. The teaching of emergency procedures in a streamlined approach will provide speedy improvement in EM care, as critically ill or injured patients frequently require these procedures in combination, for timely diagnosis and treatment.

Competency priority setting

Undergraduate EM core competencies have not been established in Africa, and at UZCHS. A consensus building survey to enable identification of undergraduate EM core competencies was undertaken at the UZCHS, to pave way for formalisation of EM training in Zimbabwe. Core competencies can be established through nominal group techniques, consensus conferences and survey methods. A common consensus approach used in determining training needs and curriculum content in health sciences education is the Delphi method[32.]

Achieving consensus through the Delphi method entails gathering opinions from expert panel members who complete questionnaires in iterative rounds/ stages in an anonymous way, guided by controlled feedback from preceding stages, to reach collective agreement[33,34.] The Delphi method is suitable for identifying, predicting, planning and policy development. It is well suited to research areas 'for which information is either insufficient or inconclusive'[33.] The original Delphi method starts off with open-ended questions whose responses guide the structure of subsequent questionnaires.

In this survey a modified Delphi technique was used since structured items on the topic were found in existing literature from different contexts[34, 35.] Starting off with this structured questionnaire saved participants time commitment by reducing the number of iterations required.

Although formal EM education is a novel undertaking in Zimbabwe, and still developmental in Africa, there exists an international body of experience which provided a structured point of departure[35].

Rationale and Intended Outcomes

Procedural skills are critical competencies that are poorly taught to medical students worldwide. The magnitude of life threatening injuries and medical emergencies in Zimbabwe requires competent frontline emergency doctors. Preventable morbidity and mortality has been partly blamed on lack of clinical procedural skills. Perceived procedural incompetence is a universal cause of anxiety among junior doctors.

AFEM provides postgraduate benchmarks for EM training in LMICs while IFEM has published a worldwide benchmark curriculum for undergraduate EM education. In the absence of a standardised African or LMICs undergraduate EM curriculum, the UZCHS had to adjust the AFEM postgraduate curriculum and adapt the IFEM undergraduate curriculum to suit the undergraduate level within the Zimbabwean/ African context. This adaptation was achieved through a consensus building process.

The modified Delphi technique is a recognized consensus building process in health sciences education research[33]. Delphi surveys can be conducted online without physically assembling participants. Alternative methods like consensus conferences and nominal group techniques were discarded, due to their inherent restrictive logistics. After three online Delphi iterations with controlled feedback, a locally appropriate list of procedural core competencies for undergraduate EM education at the UZCHS was established.

This study proposed a list of essential procedural skill competencies for undergraduate EM training, through formal consensus in African settings. The findings will act as a bench mark for curriculum development in Zimbabwe and possibly in other LMICs. They can also be used formatively to monitor skill acquisition, for summative assessment and program evaluation. Students aspiring to specialise in EM can use this list to ground their basic EM competencies in preparation for further EM training.

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Chapter 2: Journal Article

Identifying Procedural Core Competencies for Undergraduate Emergency Medicine Education at the University of Zimbabwe College of Health Sciences

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Abstract

Introduction: Low and middle-income countries account for over 90% of worldwide morbidity and mortality associated with injuries. While insufficient resources preclude appropriate care, suboptimal clinical skills, are a universal setback. Major curricula gaps have been identified as underlying this situation. In Africa, most training efforts are targeted at postgraduate level, relegating undergraduate Emergency Medicine (EM) education to a less formal undertaking. This study set out to delineate a list of locally appropriate undergraduate EM procedural core competencies for the University of Zimbabwe College of Health Sciences (UZCHS), through a consensus building process

Methods: A three-stage modified online Delphi survey was used to gain consensus among expert medical trainers at UZCHS, between July and August 2017. Opinion was sought on a five-point Likert scale, regarding agreement with items for inclusion on the procedural core competency list. The original survey list of 105 competencies was generated from literature. The second round included suggestions from panelists. The study was ethically cleared by the University of Cape Town, UZCHS and the Medical Research council of Zimbabwe.

Results: 19 expert medical teachers, representing seven clinical departments responded to the survey, with 15 completing all rounds. 79% had more than 5 years' experience in teaching and assessment of emergency procedures. Of these, 50% had at least 10 years' experience. The experts reached consensus (75% selecting agree or strongly agree) on 64 competencies (61%), on the first round. The second round yielded consensus on a further 33 items. Only one additional item reached consensus in the final round. A final list of 98 core procedural competencies was generated by three Delphi rounds. Qualitative comments are summarised per emerging themes.

Conclusions: A locally appropriate list of undergraduate procedural core competencies, was established. This process can serve as guidance for curriculum projects in Zimbabwe and similar settings.

Key words: Emergency medicine, Undergraduate Education, Curriculum Competencies**,** Consensus

African Relevance

- Many African countries are still in early stages of formalising Emergency Medicine education.

- Undergraduate Emergency medicine education is lagging, when compared to postgraduate program development in Africa.
- There is no published undergraduate Emergency Medicine curriculum for African settings
- Practical or procedural competencies among emergency doctors have been identified worldwide as critically deficient.

Introduction and Background

Each year more than 100 million people sustain injuries, while five million people die of violence and injury related causes worldwide (1). Low and middle-income countries (LMICs) account for about 90% of this morbidity and mortality (1). This high trauma related morbidity and mortality in LMICs is compounded by an overwhelming burden of acute medical and surgical conditions; including infectious diseases such as malaria, respiratory infections and HIV complications (2).

Critical determinants for effective emergency care have been highlighted by several research projects, country surveys and WHO deliberations and reports (2-4). Streamlined emergency medical education, starting at undergraduate level, is among the universal components of a comprehensive Emergency Medical system (5).

Emergency Medicine as a specialty in Africa, was first registered in South Africa in 2003 (6). Since this pioneering achievement on the continent, South Africa has taken a stewardship role to sustain EM development across Africa, and other LMICs. Most efforts have been targeted at postgraduate program development. Commendable country specific efforts at undergraduate EM are underway, though less formalised (7-9).

Although there are no published curricula or competencies for undergraduate emergency medicine for African settings, there is an International Federation for Emergency Medicine (IFEM) undergraduate curriculum. The IFEM model curriculum for undergraduate Emergency medicine contains a comprehensive list of 18 competency areas including core procedural skills (10). Examples of the procedural skills are managing the airway, cardiopulmonary resuscitation, shock, trauma and other emergencies. IFEM however cautions users to adapt this generic curriculum to local contexts.

Worldwide, procedural skill deficits have been cited as major drawbacks in emergency medical care. It is also a major source of stakeholder complaints and malpractice claims (5). Existing

medical curricula are deficient to address the skills gap, which is more apparent on emergency clinical procedures (4,5,8). Teaching emergency procedural skills requires guiding blueprints. Such benchmarks have not been established for Africa. The African Federation for Emergency Medicine(AFEM) emergency care curriculum offers postgraduate curriculum guidance, with items that could be adapted for undergraduate levels (11).

In developing countries, although overcrowding and lack of resources preclude effective emergency care delivery, lack of skills among providers is a persistent setback. For example, in Malawi lack of triage skills resulted in prolonged waiting times while in Mexico the death of more than half of 132 children studied, were attributable to poor physician skills (11,12). In Zimbabwe, a significant proportion of maternal mortality was traced to inability to identify and manage or refer serious complications by first line emergency providers (12).

A survey in 2014 by AFEM, established that a major barrier to successful intergration of acute care into health care systems is 'lack of consensus on essential components (2). One of the identified essential components included is clinical competency by frontline providers. The University of Zimbabwe College of Health Sciences (UZCHS) adopted a patient centred competency based approach to medical education in 2013 (13). This is inline with the growing international movement towards competency-based medical education (14,15).

In preparation for the introduction of streamlined emergency medical education, UZCHS conducted a consensus building process on the resources required and curriculum priorities, including the need to define the expected competencies. This study set out to delineate a list of locally appropriate undergraduate EM procedural core competencies to guide undergraduate emergency medicine curriculum development in Zimbabwe.

Method

A modified Delphi consensus process was conducted between June and August 2017, using an online survey tool (www.surveymonkey.com). Three questionnaires were sequentially administered to expert medical trainers. The expert panel consisted of 19 medical specialists appointed in senior lecturer positions at UZCHS. They were selected as they have the professional mandate to plan, oversee, teach, supervise and evaluate medical students in their practice of clinical emergency procedures, across seven academic departments including Anaesthesiology and Critical Care, Internal Medicine, Surgery, Paediatrics, Dentistry, Psychiatry and Obstetrics/ Gynaecology. In the absence of Emergency medical specialists, this sample of participants was considered appropriate due to both content and context expertise. UZCHS is

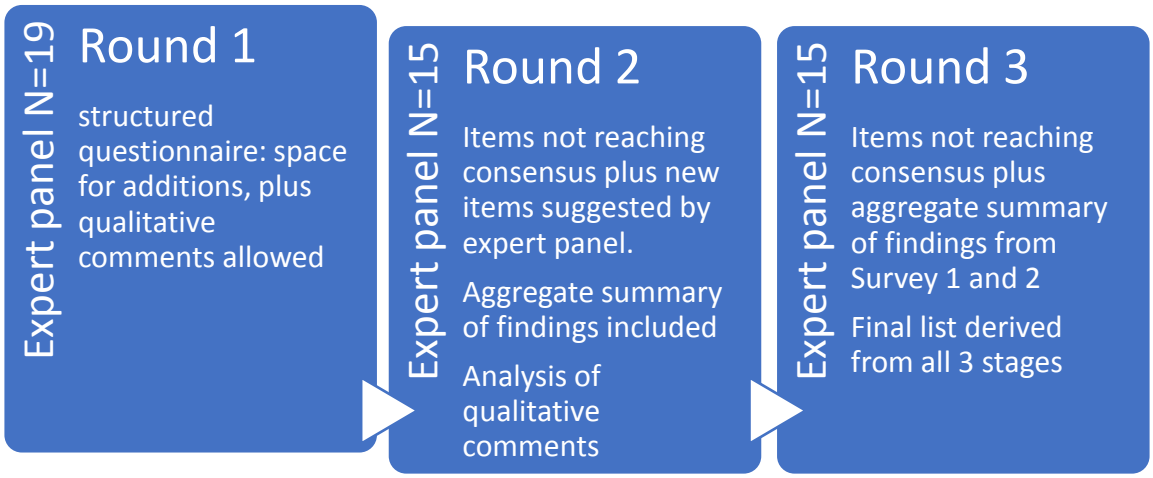
based in Zimbabwe's capital city of Harare. It is the oldest medical college in Zimbabwe after its establishment as an affiliate college of the University of Birmingham (United Kingdom) in 1963 (13). The college trains graduate and postgraduate doctors in several specialties as well as pharmacists, dentists, rehabilitation practitioners, nurses and laboratory scientists. With an annual intake of 300 medical students, the UZCHS is considered the premier medical college in Zimbabwe (13). Clinical training happens at three tertiary level hospitals of Parirenyatwa, Harare Central and Chitungwiza hospital. Additional clinical training occurs at satellite sites located at eight provincial hospitals, 23 general hospitals and over 100 district hospitals across the country.

A potential list of EM procedural competencies was compiled from the IFEM and AFEM curricula guidelines (attached as Appendix B and C). All items on these two reference documents that specify practical emergency procedures relevant to undergraduate level were included on the initial survey questionnaire.

Consensus was pre-set at 75% of 'agree and strongly agree' (4 and 5 points on Likert score). Similar studies used consensus levels on a wide range of 51-100%, with 75% commonly preferred (16-18). Data analysis and summarisation was performed after each iteration using Microsoft Excel spreadsheets per predetermined end points. For each stage, an item that generated an aggregate agreement score of at least 75% of participants (scoring 4 or 5 on the Likert scale) qualified for the final competency list. Items scoring a group aggregate score of less than 75% were carried over to the next iteration together with summarised and ranked scores. This was done to influence participants' final agree or disagree decision in subsequent Delphi iterations (18). Aggregate Likert scale consensus ratings were calculated as percentages and weighted averages for the group for each listed competency.

Figure B1

Modified Delphi Iterations



Iteration 1

As shown in Figure B1 above, the questionnaire (appendix D) was distributed electronically**.** Participants were invited to add comments to qualify their opinion. They were also encouraged to suggest additional competencies for Round 2. Quantitative analysis as well as thematic qualitative analysis of comments was done

Iteration 2

The suggested additional items from Round 1 were incorporated into the second Delphi iteration. Subsequent Delphi iterations included summarised and ranked data from preceding stages, with summary statistics for items that failed to reach a 75% aggregate consensus on a five-point Likert scale (17,18).

Iteration 3

Items not reaching consensus in Iteration 2 were recirculated together with summary statistics from Iteration 2 data analysis. This was the final Delphi stage that yielded the agreed list of procedural core competencies.

Ethical Considerations

Ethical clearance was granted by the Health Research Ethics Committee (HREC 320/2016) University of Cape Town, UZCHS/Parirenyatwa Group of Teaching Hospitals Joint Research Ethics Committees (JREC 295/16) and the Medical Research Council of Zimbabwe (MRCZ/B/1157).

Results

Table B1

Expert Panel Demographics

Gender	male	female						
	10	9						**19**
Years of experience	< 5 years	5 - 10	>10					
	4	6	9					**19**
Specialty / Department	surgery	Medicine	Paeds	Ob/ Gyn	dentistry	Psych	Anaesth	
	4	4	2	4	1	1	**3**	**19**

The first Delphi iteration yielded responses from 19 of the 25 invited participants, giving a response rate of 76%'. All seven clinical departments were represented, with 15 participants completing all three rounds. 79% (15) had more than 5 years' experience in teaching and assessment of emergency procedures. Of these, 50% (9) had at least 10 years' experience. The experts reached consensus (75% selecting strongly agree) on 64 of 105 competencies, on the first round.

Of the 19 experts, 15 completed the second round, leading to a dropout rate of 21%. The second round yielded consensus on a further 33 items while in the final round only one additional item achieved consensus. There was no drop out in participation between the second and final round. A final list of agreed procedural core competencies was generated by combining items reaching consensus in the three Delphi rounds (Table B2). By the third iteration, 15 items from the original

list did not reach consensus, while all eight items suggested by participants achieved consensus in the second iteration. Additional items suggested by panelists focused on trauma and obstetric haemorrhage control. These were cited as major drivers of preventable morbidity and mortality in Zimbabwe.

Table B2

Agreed Core Competencies list

Hazards control/ safety	**Emergency pharmacology**
1.use of personal protective equipment (aprons, gowns, goggles, face masks, gloves, boots) 2.correct handwashing and scrubbing 3.safe handling and disposal of biological waste 4.safe handling and disposal of sharps	26.Insulin dosage calculation and infusion set up 28. Administer glucose infusion as per calculated requirements 29.Administer correct doses of IV anticonvulsant medications
Patient assessment	**Resuscitation**
6.Apply monitors and interpret readings (BP, Sats, ECG) 7.Rapid focussed assessment of the critically ill/ injured patient	29.Basic life support: conduct of CPR 30.Bag mask ventilation technique 31.Basic paediatric resuscitation using protocols
8.Giving a concise informative patient handover/ referral	32. Break bad news to patient/ family 33.Peripheral venous cannulation
	34.Correct injection techniques (subcutaneous, intravenous, intramuscular)
Airway management 9.Relieve an obstructed airway 10.Demonstrate correct suctioning of airway 11**.**Bag mask ventilation 12.Correct insertion of airway adjuncts (OPA, NPA)	**Venous access and specimen sampling** 35.Venepuncture and correct specimen handling for lab assays 36.Peripheral arterial blood sampling 37.Perform lumbar puncture with precautions
Breathing/ Respiratory Therapy 13.Oxygen administration with various devices 14.Nebulised medication administration 15.Demonstrate correct use of peak flow meter 16.Demonstrate correct use of metered dose inhaler/spacer 17.Emergency decompression of pneumothorax 18**.**Intercostal tube insertion and removal	38. Nasogastric tube insertion and stomach contents aspiration **Trauma and Wound Management** 39.Wound irrigation/ wash out to reduce contamination 40.Local anaesthetic infiltration of traumatic laceration 41.Aseptic wound closure with sutures/ alternatives
Circulatory Emergencies **19.**External haemorrhage control using direct pressure **20.**Assessment and initial fluid resuscitation of a shocked patient	42.Assess a burn patient and initiate fluid resuscitation 43.Abscess incision and drainage 44.Animal and human bite wound management

21. Administer blood products safely **22.**Perform and interpret a 12 lead ECG to identify life threatening rhythms 23.Perform basic defibrillator/ monitor check 24.Perfom safe defibrillation **Point of care testing** 25.Interpret rapid point of care tests e.g. Hb, glucose, pregnancy test, HIV 26.Urine dipstix interpretation 27.Blood gas interpretation	45.Pressure bandaging techniques 46.Limb immobilisation with splints 47 Plaster cast application and removal 48.Interpretation of trauma x-rays 49.Interpretation of head CT scans 50.Eye irrigation post chemical contamination 51.Eye injury assessment 52.Epistaxis management with nasal packing **Psychiatry Emergencies** 53.Safe five-point restraint of violent patient 54.Verbal restraint to calm down aggressive patient 55.Suicidal risk assessment with checklists
Urology, obstetrics/ gynaecology emergencies	**Patient transport**
56.Urethral catheterisation	61.Safe transfer of patient from stretcher to bed
57.Speculum examination	62.Safe patient packaging for aeromedical transfer
58.Emergency vaginal delivery	63.Cervical spine immobilisation in trauma
59.Foetal assessment/ monitoring	64.Securing iv lines, tubing, catheters for transfer
60.Neonatal resuscitation: basic	65.Mobile monitoring equipment set up
Round 2 and 3	**8**1. Basic Ultrasound in Trauma
66.Perform endotracheal intubation and confirmation of tube placement (RSI)	82.Perform basic regional nerve blocks e.g. ring block
67.Set up and initiate non-invasive ventilation e.g. CPAP	83.Knee joint aspiration technique
68.Perform vagal manoeuvres for supraventricular Tachycardia (with precautions)	84.Abdominal paracentesis for ascites 85.Control of GIT bleeding with medications 86. Reduction of joint dislocations
69.Perform safe synchronised cardioversion	87.Manual reduction of displaced limb fractures
70.conduct brain stem testing	88.External auditory meatus foreign body removal
71.Certify and notify death	89.Nasal passage foreign body removal
72.Safe use of tourniquets to control exsanguinating haemorrhage	90.Reduction of para phimosis
73.Control of gastrointestinal massive haemorrhage with endocavitory pressure	91.Suprapubic catheterisation
74.Perform basic point of care emergency ultrasound	92.Manual removal of placenta/ retained products of conception
75.Perform equipment check and basic trouble shooting in the Emergency Department	93.Examination of sexual assault victims
76.Administration of emergency/resuscitation drugs	94.Safe use of blood product substitutes in shock resuscitation

78.Calculate and administer correct doses of intravenous anticonvulsants	96.Full spinal immobilisation techniques
79.Administer procedural sedation, with precautions	97.Safe procedural sedation outside the ED
80.Perform peripheral vein dilatation	98.Initiation of warming and cooling to control extremes of temperature

Competencies related to safe practice, patient assessment and resuscitation were unanimously adopted while invasive surgical procedures had reservations, especially dentistry, ophthalmology and urology related procedures (Table B3)

Table B3: **Items reaching consensus per subcategory**

Subdomain/ System	No. of Items on list	No. reaching consensus	% Acceptance
Hazards Control and Safety	4	4	100
Patient Assessment	5	5	100
Airway Management	8	7	87
Breathing/ Ventilation Support	8	7	87
Circulation Emergencies	9	7	78
Resuscitation	5	5	100
Point of Care Testing	4	4	100
Emergency Pharmacology	9	7	78
Vascular access, Specimen sampling and Injection therapy	11	11	100
Trauma care and Injury management	12	11	92
Ear, Nose, Throat and Eye Emergencies	7	4	57
Dental Emergencies	2	0	0
Urology Emergencies	4	3	75
Gynaecology/ Obstetrics emergencies	6	5	83
Psychiatry Emergencies	3	2	67
Transporting the critically ill/ injured	8	8	100
Items suggested by participants	8	8	100
Total items reaching consensus	**113**	**98**	**87**

Qualitative Findings

In addition to suggesting procedure competencies, panelists provided specific comments. During data analysis, the comments were categorised into three themes; reasons for item acceptance/ rejection, rationale for new item proposed and general suggestions or sentiments towards EM education in Zimbabwe. Panelists raised concerns of medicolegal risk and scope of practice as determinants of which advanced life support competencies they would be comfortable to let students perform. For example, *"I have disagreed with expected competence in procedures that result in high complication rate and increased morbidity/ litigation if done independently…*'' For this reason, aspects of critical care, some advanced airway skills, specialised urology and ENT as well as dental procedures were rejected by consensus.

The tiered scope of practice as per licensure guidelines by the Medical and Dental Council of Zimbabwe, as well as staffing levels also influenced opinion. For example, "*Where I have disagreed it is because I feel the student or the junior doctor is highly unlikely to be responsible for taking the lead in that procedure in an emergency setting. So, a more senior doctor will be there to help them".* Participants were comfortable to allow high risk procedures to be performed only if potential to save life was perceived. "*Where failure to do the procedure may be extremely life threatening, the student should at least be able to do the procedure to save a life".*

The current epidemiology in Zimbabwe with a high prevalence of trauma, obstetric complications and infectious diseases emergencies influenced panelists' choices as well. Hence all eight new procedural competencies suggested by panelists reinforced the country's epidemiological profile. They also highlighted that many required competencies were currently not being taught across departments, for example, *"… this is an important curriculum with things (competencies) that have mainly remained in the hidden curriculum"* This concurs with our assertion that current emergency procedural skills teaching inefficiencies may be reduced by a stewardship role to be provided by streamlined Emergency medicine education.

Other participants believed that all items on the survey list were essential, but suggested that graded competency levels would be ideal. One suggested grading was student "knows how, shows how in simulated environment, and performs procedure on patient". This study targeted procedures which medical students would be able to perform on patients by the time they graduate from medical school to enter clinical practice. The UZCHS may subdivide the competency levels to suit their teaching approaches during curriculum implementation stages.

Of the 49 comments generated, about a third of them were sentimental towards the anticipation and approval of the introduction of EM in Zimbabwe. For example, "*I fully support this initiative and I am confident we are now seeing the birth of Emergency medicine as a discipline, in Zimbabwe"* Panelists also suggested possible collaborations or partnerships with external faculty to speed up EM education. For items deemed to be too advanced for basic undergraduate EM curriculum, participants suggested extending the curriculum through an elective module for final year students. This extended curriculum can also be completed during the first year of internship.

Discussion

Consensus was reached within two iterations, with only one additional item reaching consensus in the third round. This rapid consensus achievement possibly occurred due prior sensitization and background faculty discussions around this topic since 2012**.** Surgical subspecialty

procedures in Ear, Nose and Throat (ENT), Ophthalmology and Urology had the least consensus as panelists cited concern of high patient risk with minimal benefit if these procedures were performed by junior doctors. They further argued that these procedures were not immediately life threatening and could be attended at referral hospitals by senior doctors in specialist teams.

At the end of the consensus building process, a locally appropriate list of **98** undergraduate EM procedural skills core competencies was established. Three iterations of a modified Delphi survey were considered sufficient as the first stage involved a structured questionnaire. A modified Delphi technique was appropriate, as contextual and locally relevant consensus was being sought on well described concepts (16). The small changes in consensus ratings between round 2 and 3 implied that saturation had occurred and additional rounds would cause unnecessary time commitment and participant fatigue. Existing Delphi methodology guidelines recommend stopping the iterations when one of the following is achieved; when a satisfactory level of concordance or consensus is reached, when mean rankings between iterations yield no significant changes or when participants are no longer willing to continue (17,18).

From the first round, participants were encouraged to give qualitative input in the form of comments and suggestions. The reasons for disagreeing with certain procedural items were clarified by participants through comments. They grounded their decisions even after being informed of summary statistics. Subsequent iterations would therefore be redundant.

Only eight new items were suggested while the rest of comments were on cognitive and affective domains. Other comments were an expression of interest, as well as instructional design propositions. Because these comments were spontaneous, it is reassuring that panelists were already thoughtful about undergraduate EM curriculum and supported their inclusion as “experts”.

The definition of ‘experts’ for Delphi studies remains contentious; while some researchers prefer expertise by academic qualification, others argue that ‘expertise’ should encompass much deeper and broader criteria that include attitude, skills, experience, recognition in the local context in addition to knowledge or academic qualifications[19.] The level of ‘expertise’ that produces valid Delphi processes has not been established and heterogeneous samples have been shown to produce comparable outcomes to homogeneous ones (19).

Some of the procedural competencies which failed to reach consensus like surgical airway management and transcutaneous pacing, as well as infusion of anti-arrhythmic drugs, are priority competencies in developed countries[20]. Invasive procedures like central line insertion and management of shoulder dystocia did not reach consensus as they were considered too risky and

outside the permissible scope of practice. Participants emphasized that their decisions were also guided by local morbidity and mortality patterns. For example, use of tourniquets to control bleeding, peripheral vein dilatation instead of central line insertion, as well as evaluation of victims of sexual violence, were added to the proposed list by the panel to meet local needs. These added competencies subsequently reached consensus, validating the need for local decisions when setting curricula priorities.

Adopting a curriculum from the developed world context would not be responsive to the health care needs of the population served by medical graduates from the UZCHS. Curriculum review teams in various countries advise that, while generic global relevance should be built into EM undergraduate curricula, countries/ programs need to adapt core competencies to suit their practice contexts.

Conclusions and Recommendations

This is the first draft list of procedural core competencies for undergraduate EM training developed from medical trainer consensus in Zimbabwe. The expert panel focused on local health care needs. The suggestion of an elective module with more advanced skills being offered to first year interns, can be pursued with the involvement of a wider stakeholder group that includes junior doctors and medical students.

Repeating this survey with a sample of junior doctors may enrich the process as studies have shown that junior doctors wish to learn more advanced skills than what faculty recommend. This is influenced by the gaps they identify in their early years of clinical practice (20,21). Involving students as stakeholders in curriculum design is aligned with contemporary learner centered educational approaches. The findings may act as a discussion point for curriculum development in Zimbabwe and similar settings.

Study Limitations

This study was time constrained and could not engage all stakeholders in the consensus process.

The literature search was limited to English articles only, possibly excluding French and Arabic articles. The dropout rate of participants between round 1 and 2 may have impacted on the findings. The study is limited to consensus on procedural skills only with the hope that progress will be made to eventually include all EM educational domains through further consensus surveys.

Submission declaration and verification

This work has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis. It is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, this article has been submitted to Turnitin.

Conflict of Interest

This research project was not funded.

MMC is the current dean at the University of Zimbabwe college of Health Sciences.

To minimise potential conflict, MMC advised the primary investigator to seek a third independent ethical clearance from the Medical Research Council of Zimbabwe. This was granted.

Authorship

SM and MMC conceived the study idea. SM and HK designed the study questionnaire, SM collected and analysed data, drafted the article. HK and MMC critically reviewed the article for important intellectual content, and finally approved the version to be submitted.

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Supplementary data

Data associated with this article can be forwarded per request.

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AUTHOR INFORMATION PACK

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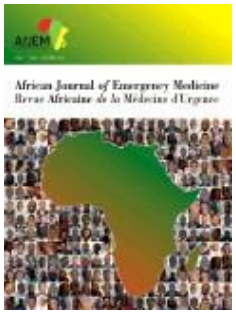

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DESCRIPTION

The *African Journal of Emergency Medicine* (*AfJEM*) is the official journal of the African Federation for Emergency Medicine. It is an Africa-centric, peer-reviewed journal aimed in particular at supporting emergency care across, you guessed it, Africa. *AfJEM* publishes original research, reviews, brief reports of scientific investigations, case reports as well as commentary and correspondence related to topics of scientific, ethical, social and economic importance to emergency care in Africa. Articles will be of direct importance to African emergency care, but may have originated from elsewhere in the world.

AfJEM publishes manuscripts of international quality. This is ensured through a process of rigorous peer-review (see below) where manuscripts are evaluated for accuracy, novelty and importance. It is however recognised that African researchers in emergency care are disadvantaged in the available range of journals into which they can publish their work. The editorial team is aware that this is due to many reasons, including that developing world topics are often considered too basic for western Emergency Medicine journals, or that topics are concerned with conditions which are largely irrelevant to those audiences. Furthermore, the quality of submitted manuscripts is often lower than acceptable international journal standards due to

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AfJEM is uniquely tailored to the needs and requirements of emergency care workers dedicated to improving emergency medicine in Africa. *AfJEM* specifically aims to address resource limitations as it pertains to the African continent. It will be ideal reading material for physicians, nurses and prehospital care workers wishing to improve their knowledge on general emergency medicine, trauma care, paediatrics, injury and disease prevention, service improvement, policy and ethics, disaster preparedness and response, and all other aspects of emergency care. In keeping with the African Federation for Emergency Medicine, it is our aim to be recognised as the international voice of quality emergency medical care in Africa.

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GUIDE FOR AUTHORS

INTRODUCTION

The African Journal of Emergency Medicine (AfJEM, ISSN: 2211-419X) is the official journal of the African Federation for Emergency Medicine. It is an international, peer-reviewed journal aimed in particular at supporting emergency care across Africa. AfJEM publishes original research, reviews, brief reports of scientific investigations, case reports as well as commentary and correspondence related to topics of scientific, ethical, social and economic importance to emergency care in Africa. Articles will be of direct importance to African emergency care, but may have originated from elsewhere in the world.

TYPES OF ARTICLES

Original Article: Original studies of basic or clinical investigations in areas relevant to emergency medicine. Reference to the relevance of the research in a resource poor setting is essential and should be alluded to in the discussion section. References and a structured abstract (see Preparation below) are required. Maximum length: 3,000 words, 5 tables and/or figures, plus the abstract (300 words) and references (max 50). The checklists found on the following websites should be used to structure your manuscript (a copy of the checklist indicating which elements of the reporting format you adhered to, a signed conflict of interest form and Additional material form- see below- should be submitted with your manuscript):

a. For randomised control trials: http://www.consort-statement.org
b. For cohort, case-control, and cross-sectional studies: http://www.strobe-statement.org/
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b. If your topic does not lean itself towards a resourced tiered review consider alternativereporting checklists for systematic reviews and meta-analyses such as Prisma checklist (http://www.prisma-statement.org) or similar. **Please check with the editor-in-chief before using a checklist other that the resources-tiered checklist.**

3. *Case Reports*: Brief descriptions of a previously undocumented disease process, a unique unreported manifestation or treatment of a known disease process, or unique unreported complications of treatment regimens. Case reports should be structured as follow: Introduction, Case report and Discussion. It should not contain an exhaustive review of the literature. Consider consent for patient identifiable information

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Appendix B: AFEM Curriculum

The African Federation for Emergency Medicine

Keystone Curriculum

General Principles of Emergency Care

Emergency Care

Triage theory and practice
Initial approach to the unstable adult: ABC, including shock
Initial approach to the unstable child: ABC, including choking and shock
Initial approach to the trauma patient: ABC (including immobilisation)
Approach to cardiopulmonary arrest
Approach to the paediatric trauma patient
Clinical reasoning in Emergency Medicine
Principles of acute care diagnostics
The emergency care team
Talking with patients
Pain management
General principles of multi-casualty incidents: field and facility-based
Principles of documentation
Principles of the patient transfer system
Handover
ED differential, preliminary, and final diagnosis
Introduction to local clinical protocols

Rapid Assessment of Common Life-threatening Complaints in Adults

Abdominal pain
Altered mental status and coma
Anaphylaxis and angioedema
Back pain

Burn
Chemical exposure
Chest pain (with sub-section on MI)
Difficulty in breathing (including pulmonary oedema)
Oedema
Emergency delivery
Fever
Headache
Seizure and status epilepticius
Syncope
Weakness (including stroke)
The ischaemic limb (including neurovascular extremity examination)

Rapid Assessment of Common Life-threatening Complaints in Children

Abdominal pain
Altered mental status and coma
Anaphylaxis and angioedema
Apnea
Approach to the crying or irritable child
Dehydration and volume resuscitation
Difficulty in breathing/Approach to respiratory distress in the child
Burn
Neonatal resuscitation
Oedema
Fever
Seizure and status epilepticius
Floppy baby / Weak child

Intro to Emergency Ultrasound

Ultrasound basics
Trauma
Hypotension: function and IVC

Dyspnoea: heart and lung

KEYSTONE SKILLS

Assessing airways patency
Airway repositioning manoeuvres
Approach to choking
C-spine immobilisation
Endotracheal intubation: procedure
Rapid sequence intubation: medications and methods
Cricothyroidotomy and tracheostomy replacement
Basic vascular access: IV, intraosseus
Advanced vascular access: central line, venous cutdown, arterial access
Pericardiocentesis
Defibrillation and cardioversion
ECG and Monitor Basics
Approach to the pulseless patient (basic life support)
Basic XR interpretation: cervical spine
Basic XR interpretation: chest
Basic XR interpretation: pelvis
Basic Ultrasound: dyspnea
Basic Ultrasound: trauma
Basic Ultrasound: hypotension
One-sentence patient summary
Handover

AFEM Emergency Care Curriculum

BLOCK	DIDACTIC CORE	CORE INTERACTIVE MODULE	EXPANDED INTERACTIVE MODULE
***Skills presentations are identified by BLUE text**			
1: CARDIOVASCULAR			
I	Functional anatomy of the cardiac system, including conduction system	Bradycardia and tachycardia cases	Bradycardia and tachycardia cases
	Diagnosis of circulatory failure: Physical exam, labs, ultrasound	Hypertension cases and acute management	Hypertension cases and acute management
	Circulatory resuscitation: Fluids, pressors, and inotropes	Ischaemic limb cases	Ischaemic limb cases
	Introduction to bradyarrhythmias and tachyarrythmias	Advanced mitral valve disease	Advanced mitral valve disease
II	Congestive cardiac failure: Acute exacerbation	Etiologies of cardiomyopathies	Aetiologies of cardiomyopathies
	Congenital heart disease	Cardiac tamponade	Cardiac tamponade
	Valvular heart disease	Essential cardiac pharmacology	Essential cardiac pharmacology
	Peri-myocarditis and endocarditis	Self-study ECG cases	Self-study ECG cases
III	Hypertension		Endomyocardial fibrosis
	Ischaemic heart disease: Angina and myocardial infarction		Wide-complex tachycardia
	Aortic aneurysm and dissection		Evidence and risk in the treatment of pulmonary embolism
	Deep venous thrombosis/Pulmonary embolus		Aortic valve disease cases Pulmonary hypertension

	Skills Block:	Cardiovascular system: Physical exam	Cardiovascular system: Physical exam Synchronized cardioversion Thrombolysis for MI and PE Advanced cardiac ultrasound Ultrasound-guided vascular access Pacing Advanced ECG interpretation DVT US Transcutaneous pacing

2: DERM/HEME/RHEUM

	Didactic Core	**Core Interactive Module**	**Expanded Interactive Module**
Dermatology (I)	How to describe a skin lesion	Skin lesions in adults	Skin lesions in adults
	Differential for types of lesions: Ulcerative, plaque, papular, vesicular, exfoliative (excluding purpura)	Skin lesions in children	Skin lesions in children
	Treatments for dermatologic conditions: Anti-bacterials, antifungals, immune modifiers, mechanical therapies	Approach to breast lesions	Approach to breast lesions
	Dermatologic manifestations of systemic disease		
Haematology (II)	Life-threatening rashes	Disseminated intravascular coagulation	Disseminated intravascular coagulation
	Purpura	Anti-platelet and anti-coagulation agents	Anti-platelet and anti-coagulation agents
	Anaemia	Emergency complications of malignancies and chemotherapy	Emergency complications of malignancies and chemotherapy
	Sickle cell disease	Controversies in the treatment of sickle cell disease	Controversies in the treatment of sickle cell disease
Rheumatology (III)	Bleeding disorders		
	Blood products in the ED and transfusion reactions		
	Approach to the inflamed or painful joint		
	Lupus and vasculitidies		
	Skills Block:	Physical examination: Shoulder	Physical examination: Shoulder

		Physical examination: Back	Physical examination: Back
		Physical examination: Knee	Physical examination: Knee
		Arthrocentesis	Arthrocentesis
		Advanced ultrasound: Joints	Advanced ultrasound: Joints

3: TRAUMA (6 weeks)

	Didactic Core	Core Interactive Module	Expanded Interactive Module
I	Approach to the trauma patient: Priorities in poly-trauma	Crush syndrome and rhabdomyolysis	Crush syndrome and rhabdomyolysis
	Special considerations in the paediatric and geriatric trauma patient	Abdominal injury cases	Abdominal injury cases
	Approach to the patient with head trauma	Thoracic injury cases	Thoracic injury cases
	Facial trauma	Hand injury and infection cases	Hand injury and infection cases
II	Eye trauma	Lightning and electrical injuries	Lightning and electrical injuries
	Neck trauma	Aortic injuries	Aortic injuries
	Spinal injuries	Blast injuries	Blast injuries
	Peripheral vascular injuries	Mammalian bites	Mammalian bites
III	Thoracic trauma	Diagnosis and management of strains and sprains	Diagnosis and management of strains and sprains
	Abdominal trauma	How to describe a fracture	How to describe a fracture
	Pelvic trauma		Radiation injuries
	Genitourinary trauma		Wrist fracture
IV	Burns and smoke inhalation		Advanced lower limb fracture
	Drowning		Strangulation injuries

	Approach to paediatric fractures Non-accidental injury patterns			Evidence based volume resuscitation in trauma
V	Upper limb fractures Lower limb fractures Upper extremity dislocations Lower extremity dislocations			
		Skills Block:	Examination of the injured knee	Examination of the injured knee
			Examination of the injured hand	Examination of the injured hand
			Dislocation reduction techniques: Shoulder and elbow	Dislocation reduction techniques: Shoulder and elbow
			Dislocation reduction techniques: Hip and knee	Dislocation reduction techniques: Hip and knee
			Dislocation reduction techniques: Ankle, phalanges, other	Dislocation reduction techniques: Ankle, phalanges, other
			Wound management & suturing	Wound management & suturing
			Stabilization of pelvic fracture	Stabilisation of pelvic fracture
			Splinting	Splinting
			Escharotomy	Escharotomy
			Advanced wound repair	Advanced wound repair
			Burr holes	Burr holes
			XR interpretation: Upper extremity	XR interpretation: Upper extremity
			XR interpretation: Lower extremity	XR interpretation: Lower extremity
			XR interpretation: Spine	XR interpretation: Spine

		XR interpretation: Skull CT interpretation: Head trauma	XR interpretation: Skull CT interpretation: Head trauma CT interpretation: Chest trauma Ultrasound of fractures and tendon injuries Thoracotomy

4: INFECTIOUS DISEASE

	Didactic Core	Core Interactive Module	Expanded Interactive Module
I	Approach to the patient with sepsis	Adult with fever cases	Adult with fever cases
	Malaria	Child with fever cases	Child with fever cases
	Fever in the immunocompromised patient	Malaria diagnostics and treatment guidelines	Malaria diagnostics and treatment guidelines
	HIV/AIDS emergencies	Other childhood viral infections: Varicella, mumps, mononucleosis	Other childhood viral infections: Varicella, mumps, mononucleosis
II	Age-based evaluation and empiric treatment of the child with fever	Septic joint	Septic joint
	Approach to the child with skin lesion or rash	Strep throat	Strep throat
	Meningitis	National burden of disease	National burden of disease
	Extra-pulmonary TB	Current national vaccination schedule	Current national vaccination schedule
III	Infectious diarrhoea and complications		Controversies in the management of sepsis: volume, steroids, EGDT
	Parasitic infection of gastrointestinal tract		Kawasaki's disease
	Typhoid and cholera		Controversies in the treatment of meningitis
	Hepatitis		Post-exposure prophylaxis in the health care worker
IV	Spinal infections		Polio and botulism
	Urinary tract infections, including renal and schistosomiasis		Tick-borne illness

	Soft tissue infection: Cellulitis and abscess		Toxic shock syndrome
	Dermatoparasites		Haemorrhagic fevers
V	Rabies and tetanus		Outbreak control
	Post-infectious inflammatory conditions		Nosocomial infections: Pneumonia, CSF, joints, skin, blood
	Rheumatic fever		Local anti-microbial resistance patterns and rational antibiotic use
	Influenza, SARS and global epidemics		National and WHO treatment guidelines
	Emergency facility response to highly communicable pathogens **Skills Block:**		
		Incision and drainage	Incision and drainage
		Recognition of cutaneous infections	Recognition of cutaneous infections
		Ultrasound of skin and soft tissue infections	Ultrasound of skin and soft tissue infections Ultrasound for TB and HIV

5: PAEDS/PSYCH/ HEENT

	Didactic Core	**Core Interactive Module**	**Expanded Interactive Module**
Paediatrics (I)	Foreign bodies in children: Ears, nose, aspiration, and ingestion	Special considerations in the paediatric physical examination	Special considerations in the paediatric physical examination
	Approach to the child with abnormal gait or limp	Paediatric medical resuscitation	Paediatric medical resuscitation
	Approach to the malnourished child	Paediatric trauma resuscitation	Paediatric trauma resuscitation
	Positive pressure ventilation in the child	Neonatal resuscitation	Neonatal resuscitation
	Common problems in neonates		SIDS

	Skills Block:	Paediatric vascular access, including umbilical lines	Paediatric vascular access, including umbilical lines
Psychiatric Emergencies(II)	Approach to the agitated patient: Acute psychosis and mania	The psychiatric H&P	The psychiatric H&P
	Evaluation of the suicidal or homicidal patient	Physical and pharmacologic restraint cases	Physical and pharmacologic restraint cases
	Medical clearance of the psychiatric patient	Management of acute anxiety	Management of acute anxiety
	Diagnosis and treatment of depression		Anti-depressant medications
	Management of acute anxiety		Toxicologic syndromes associated with psychiatric medications
			Somatisation and relationship to depression
			Medico-legal aspects of psychiatric care
			Assessing competence
HEENT(III)	Life-threatening ENT and oral infections	ENT infections cases (including PTA, RPA, mastoiditis, mediastinitis, sinusitis)	ENT infections cases (including PTA, RPA, mastoiditis, mediastinitis, sinusitis)
	Epistaxis	Acute visual loss	Acute visual loss
	Approach to the patient with stridor (adults and children)	Cavernous sinus thrombosis	Cavernous sinus thrombosis
	Differential diagnosis of head and neck mass (adults and children)	Acute otitis and its complications	Acute otitis and its complications
	Evaluation of the red eye	Dental pain	Dental pain
		Dental injuries	Dental injuries
		Salivary gland problems	Salivary gland problems
		Orbital and peri-orbital cellulitis cases	Orbital and peri-orbital cellulitis cases
		Vertigo: Diagnostic and therapeutic manoeuvres	Vertigo: Diagnostic and therapeutic maneuvers
			Head and neck mass cases
			Management of nasal and oral bleeding in the setting of mass
			The changing epidemiology of epiglottitis Glaucoma

	Skills Block:	Physical examination of the HEENT system, including fundoscopy Dental procedures Nasal packing Incision and drainage of peri-tonsilar abscess Foreign body removal: pharynx, ear, nose, eye	Physical examination of the HEENT system, including fundoscopy Dental procedures Nasal packing Incision and drainage of peri-tonsilar abscess Foreign body removal: pharynx, ear, nose, eye
		Repair of ear and nose wounds, including septal haematoma Dislocation reduction techniques: TMJ Ocular US	Repair of ear and nose wounds, including septal haematoma Dislocation reduction techniques: TMJ Ocular US Slit lamp examination Advanced airway management Lateral canthotomy

6: RESPIRATORY

	Didactic Core	**Core Interactive Module**	**Expanded Interactive Module**
I	Functional anatomy of the respiratory system Acute respiratory failure, including ABG, indications for ventilations Approach to the mechanically ventillated patient Approach to haemoptysis	Ventilation settings: Cases Foreign body aspiration Approach to choking Pleural effusion	Ventilation settings: Cases Foreign body aspiration Approach to choking Pleural effusion
II	Pulmonary TB (diagnosis and therapy, including TB med complications) Pneumonia and its complications in adults, including empyema and effusion Pneumonia and other pulmonary infections in children Approach to the child with cough		Understanding TB diagnostics Altitude and diving cases

III	Approach to the wheezing child Approach to the wheezing adult Nontraumatic pneumothorax Altitude and diving-related illness		
	Skills Block:	Physical examination of the pulmonary system XR interpretation: Chest (Advanced) CT interpretation: Chest (non-traumatic) Nebulisation and assessment of peak flow Thoracentesis	Physical examination of the pulmonary system XR interpretation: Chest (Advanced) CT interpretation: Chest (non-traumatic) Nebulisation and assessment of peak flow Thoracentesis

7: GENITOURINARY and METABOLIC

	Didactic Core	**Core Interactive Module**	**Expanded Interactive Module**
I	Urological stone disease Approach to testicular pain STD in men, including complications Approach to the patient with decreased urine output	Sodium abnormalities Endocrine cases Approach to the acute scrotum Potassium abnormalities	Sodium abnormalities Endocrine cases Approach to the acute scrotum Potassium abnormalities
II	Acute kidney injury Electrolyte disturbances: Diagnostics and therapeutics Acid-base disorders Hypoglycaemia in adults and in children	Calcium abnormalities	Calcium abnormalities Magnesium abnormalities Penile or vaginal discharge in children Acute indications for dialysis: Cases
III	Diabetic ketoacidosis and other hyperglycaemic conditions in adults Diabetic ketoacidosis in children		Chronic kidney disease Goals of care workshop

	Thyroid and adrenal disorders Hyperthermia and hypothermia		
	Skills Block:	Interpretation of ABG and VBG ECG changes in metabolic conditions	Interpretation of ABG and VBG ECG changes in metabolic conditions
		Interpretation of urinalysis: Dip and microscopy	Interpretation of urinalysis: Dip and microscopy
		Bladder catheterisation, including suprapubic	Bladder catheterisation, including suprapubic
		Ultrasound of the bladder	Ultrasound of the bladder
		Ultrasound of the kidneys	Ultrasound of the kidneys

8: OBGYN/TOX

	Didactic Core	**Core Interactive Module**	**Expanded Interactive Module**
OB/GYN (I)	Trauma in pregnancy	Approach to the non-pregnant patient with pelvic pain	Approach to the non-pregnant patient with pelvic pain
	Pregnancy-related vaginal bleeding (excluding ectopic)	Approach to the non-pregnant patient with vaginal bleeding	Approach to the non-pregnant patient with vaginal bleeding
	Diagnosis and treatment of ectopic pregnancy	Hyperemesis	Hyperemesis
	Eclampsia and hypertensive disorders of pregnancy	Ovarian torsion	Ovarian torsion
OB/GYN (II)	Infections in pregnancy	Management of UTI in pregnancy	Management of UTI in pregnancy
	STD in women, including PID and other complications		Hypertensive disorders of pregnancy

	Evaluation of sexual assault victims		Comparison of surgical and medical interventions for ectopic pregnancy Foetal monitoring in pregnancy Classification of vulval and labial lesions Special considerations in the exam of sexual assault victims Assessment of foetal viability Drugs to avoid in pregnancy
		Skills Block: Physical examination of the pregnant patient	Physical examination of the pregnant patient
		Bimanual and speculum exam	Bimanual and speculum exam
		Emergency delivery: Normal	Emergency delivery: Normal
		Emergency delivery: Abnormal	Emergency delivery: Abnormal
		Ultrasound in first and second-trimester pregnancy	Ultrasound in first and second-trimester pregnancy
		Ultrasound in third-trimester pregnancy	Ultrasound in third-trimester pregnancy
		Adnexal mass: Ultrasound	Adnexal mass: Ultrasound
		Caeserean section	Caeserean section
Tox (III)	Approach to the patient with suspected toxicologic syndrome	Toxidrome cases	Toxidrome cases
	Cholinergic and anticholinergic poisoning	Acetaminophen and salicylate overdose	Acetaminophen and salicylate overdose
	Sympathomimetics and opioids	Alcohol intoxication and withdrawal	Alcohol intoxication and withdrawal
	Corrosive and caustic agents	Sedative hypnotics: Barbiturates and benzodiazepines GHB (gamma-hydroxybutyrate)	Sedative hypnotics: Barbiturates and Benzodiazepines GHB (gamma-hydroxybutyrate)
	Toxic bites and stings	Antidotes: Sodium bicarbonate	Antidotes: Sodium bicarbonate
		Other antidotes: Naloxone, Flumazenil, chelating agents, Digibind	Other antidotes: Naloxone, Flumazenil, chelating agents, Digibind

Beta-blockers, calcium channel blockers, digoxin Beta- Carbon monoxideCarbon monoxide Toxic bites and sting casesToxic bites and sting cases Organic alcoholsOrganic alcohols Iron and lead poisoningIron and lead poisoning Toxic plants and mushroomsToxic plants and mushrooms Local rodenticidesLocal rodenticides INH toxicityINH toxicity Quinine toxicityQuinine toxicity Methaemoglobinemia Seafood toxins Theophylline and other xanthenes	blockers, calcium channel blockers, digoxin	overdose overdose

9: NEUROLOGIC

	Didactic Core	Core Interactive Module	Expanded Interactive Module
I	Functional neuroanatomy, including brain, spine, peripheral and cranial nerves	Cranial nerve palsies	Cranial nerve palsies
	Approach to the patient with weakness	Peripheral vs central vertigo	Peripheral vs. central vertigo
	Ischaemic stroke syndromes and management	Elevated ICP management	Elevated ICP management
	Spinal lesions	Stroke cases	Stroke cases
II	Dizziness, ataxia, and vertigo	Headache cases, including subarachnoid	Headache cases, including subarachnoid
	Approach to the paediatric neurologic exam	Headache in children	Headache in children
	Intracranial lesions in children		Spinal cord syndromes
	New onset seizure		Localising intracranial lesions based on neurologic exam
III	Syncope		Localising spinal lesions based on neurologic exam
	Delirium and dementia		V-P shunt evaluation and care
	NMJ and peripheral nerve disorders		
	Principles of analgaesia and procedural sedation		
	Skills Block:	The neurologic exam	The neurologic exam

		Brain death exam	Brain death exam
		Lumbar puncture	Lumbar puncture
		Interpretation of CSF analysis	Interpretation of CSF analysis
		Regional blocks	Regional blocks
		CT interpretation: Cranial (non-traumatic)	CT interpretation: Cranial (non-traumatic)
		Local anaesthetic nerve blocks	Local anaesthetic nerve blocks Principles of MRI interpretation

10: GASTROINTESTINAL

	Didactic Core	Core Interactive Module	Expanded Interactive Module
I	Approach to the abdominal pain	Mesenteric ischaemia	Mesenteric ischaemia
	Age-based approach to the child with abdominal pain	Gallbladder disease	Gallbladder disease
	Approach to the patient with abdominal mass	Chronic liver disease, cirrhosis and portal hypertension	Chronic liver disease, cirrhosis and portal hypertension
	Gastrointestinal bleeding	GI bleeding in adults	GI bleeding in adults
II	Approach to vomiting with and without diarrhoea in adults	GI bleeding in children	GI bleeding in children
	Approach to vomiting with and without diarrhoea in children	Oesophageal emergencies	Oesophageal emergencies
	Bowel obstruction in adults and children	Anal and rectal disorders	Anal and rectal disorders
	Hernia diagnosis and treatment		Diverticular disease
III	Pancreatitis		Acute liver failure and hepatitis
	Acute jaundice		Inflammatory bowel disease

Appendicitis		Abdominal pain in the elderly
Peptic ulcer disease		Diagnostic considerations with Ascites and SBP Stuffers and packers GI foreign body cases Isolated emesis cases
	Skills Block: Physical examination of the GI system	Physical examination of the GI system
	Gastric tube placement: NGT, OGT, and GT replacement	Gastric tube placement: NGT, OGT, and GT replacement
	Paracentesis	Paracentesis
	XR interpretation: Abdomen	XR interpretation: Abdomen
	CT interpretation: Abdomen	CT interpretation: Abdomen
	Understanding hepatitis diagnostics	Understanding hepatitis diagnostics
	Peritoneal fluid analysis	Peritoneal fluid analysis
	Ultrasound for biliary disease	Ultrasound for biliary disease
	Advanced ultrasound: Abdominal	Advanced ultrasound: Abdominal
	Appendectomy	Appendectomy

11: OUT-OF-HOSPITAL and DISASTER MEDICINE

Didactic Core	Core Interactive Module	Expanded Interactive Module
General principles of pre-hospital care	Pre-hospital disaster response	Basic emergency first responder kit
General principles of disaster medicine	Hospital-based disaster response	Aero-medical services
Transfer medicine (including inferfacility communication)	Mechanical and structural collapse	Ethics in disaster response

Mass gatherings		Complex humanitarian emergencies Chemical and biological incidents Recovering from a disaster

Appendix B: IFEM CUrriculum

International Federation for Emergency Medicine

INTERNATIONAL FEDERATION FOR EMERGENCY MEDICINE MODEL CURRICULUM FOR EMERGENCY MEDICINE

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RUNNING HEAD: IFEM Model Curriculum

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INTERNATIONAL FEDERATION FOR EMERGENCY MEDICINE
MODEL CURRICULUM FOR EMERGENCY MEDICINE

ABSTRACT

There is a critical and growing need for emergency physicians and emergency medicine resources worldwide. To meet this need, physicians must be trained to deliver timesensitive interventions and life-saving emergency care. Currently, there is no internationally recognized, standard curriculum that defines the basic minimum standards for emergency medicine education. To address this deficit, the International Federation for Emergency Medicine (IFEM) convened a committee of international physicians, health professionals and other experts in emergency medicine and international emergency medicine development, to outline a curriculum for foundation training of medical undergraduates in emergency medicine. This curriculum document represents the consensus statement of this committee. The curriculum is designed with a focus on the basic minimum emergency medicine educational content that any medical school in the world should be delivering to its students during the undergraduate years of training. The curriculum is designed not to be prescriptive, but to assist educators and emergency medicine leadership in advancing physician education in basic emergency medicine content. The content would be relevant not just in communities with mature emergency medicine systems, but also in developing nations or in nations seeking to expand emergency medicine within current educational structures. We anticipate that there will be wide variability in how this curriculum is implemented and taught reflecting the existing educational milieu, the resources available, and the goals of the institutions' educational leadership.

INTRODUCTION

This curriculum establishes an international consensus on the core content of undergraduate level emergency medicine training with the goal of elevating the quality of acute care worldwide through an expansion of basic emergency medicine education. This curriculum further reflects the level of establishment of emergency medicine as a medical profession worldwide. The document is organized sequentially, as a framework rather than a comprehensive plan for educators. Educators using this curriculum should utilize the framework to develop educational programs that are contextualized and specifically fit to the local context and educational deficits. This model allows easy adaptation of any of the features and provides an example of an expanded 4-year curriculum for a single learning objective.

EXECUTIVE SUMMARY

Vision: To create an international model curriculum for foundation training in emergency medicine.

Rationale: There is critical, overwhelming and growing need for emergency physicians and other administrative, professional, clinical and academic emergency medicine resources worldwide. Currently, there exist a small number of national curricula for emergency medicine, but no standard, widely recognized international curriculum.

Demand: Currently worldwide, there are roughly 50+ countries involved in the processes of emergency medicine development. Internationally, a consensus is building regarding the demand for an international minimum basic standard for emergency medicine curriculum content.

Goal: To establish, develop and maintain an international curriculum for foundation training in Emergency Medicine. The curriculum should be developed by an international consortium of physicians, health professionals and other experts in Emergency Medicine and international emergency medicine development; and be approved, amended and maintained by an international collection of such experts.

Endpoint: To further train and educate physicians, medical professionals and other experts in Emergency Medicine, in order to provide the best quality emergency care in the multiple and growing number of nations where it is currently practiced, and to further establish Emergency Medicine as a medical profession worldwide.

MISSION STATEMENT

The International Federation for Emergency Medicine believes that:

Society has a right to expect that at the completion of their undergraduate training all physicians possess the basic knowledge of emergency care and the skills to manage common acute problems.

Emergency medicine is a core medical discipline and should be a required portion of the curriculum for every medical school, and every medical student, in the world.

Every physician, and graduating medical student, should be able to provide care in an emergency situation, without any faults or lack of confidence and independent of the location of the emergency.

Every physician, and medical student, should be able to manage clinical decisionmaking under pressure of time when it is essential to save lives.

Competence in basic emergency medicine should be an outcome measure for all medical students and represent a criteria required for conference of the degree.

PROFESSIONAL DEVELOPMENT

The clinical settings and environmental context for medical education varies widely throughout the world. To attain minimum basic competency in emergency medicine core learning objectives medical students must have a variety of opportunities for professional development. These opportunities should be longitudinal in nature, begin early in the pre-clinical years, and extend into clinical contexts that allow focus on acute and emergency conditions. The following basic guidelines should structure the educational process of achieving core competencies in minimum emergency medicine knowledge and skills.

During undergraduate and early training every medical student should:

- Acquire a fundamental knowledge of basic sciences as applied to emergency medicine and the assessment and immediate treatment of common emergencies.
- Develop existing clinical examination skills and apply them in clinical practice to develop differential diagnoses and provisional management plans for acute medical conditions and undifferentiated patients.
- Acquire expertise in a range of commonly used emergency procedural skills, including basic life support.

- Perform allocated tasks, manage time on the shop floor within the shift, and meet clinical deadlines.
- Teach informally on the shop floor and in specified circumstances in a more formal setting.
- Develop an understanding and basic awareness of clinical management issues when applied to acute care situations.
- Select and perform simple audit projects and understand the audit cycle to monitor care delivery and improve care quality.
- Understand the principles of critical appraisal and research methodology and apply these to acute care situations.
- Demonstrate the capacity to work in multi-professional teams.
- Learn to recognize their own limitations in the provision of emergency care.

EDUCATIONAL OUTCOMES – LEARNING OBJECTIVES:

These learning objectives are designed to allow easy modification to the local needs and are written such that objective measures of performance and competency can be designed to measure attainment of the learning objective.

The Student should:

1. Acquire basic life support skills, including the diagnosis and treatment of shock and the related basic procedural skills, and demonstrate the basic application of these principles in real or simulated patient care scenarios.
2. Demonstrate the capacity to differentiate and treat common acute problems.
3. Provide a comprehensive assessment of the undifferentiated patient.
4. Demonstrate proficiency in basic life support skills and cardiopulmonary resuscitation.

5. Recognize and initiate first aid for airway obstruction.

6. Recognize and be prepared to intervene, in any age group, for all causes of shock etiology.

7. Be able to provide rapid stabilization with intravenous access and fluid/blood administration.

8. Understand the principles of cerebral resuscitation in brain illness and injury.

9. Demonstrate proficiency in the use of an automatic external defibrillator (AED).

10. Understand principles of wound care.

11. Demonstrate basic wound care techniques.

12. Understand the principles of trauma management.

13. Demonstrate basic trauma management skills such as initial assessment using the ABC approach and full spine immobilization.

14. Demonstrate mastery of basic procedural skills, such as airway management and venous access.

15. Recognize life-threatening illness or injury and apply basic principles of stabilization to the early management of these entities.

16. Demonstrate the capacity to prioritize attention to those patients with more urgent conditions.

17. Describe the importance of the ED as a key link between the general population and the health care system.

18. Understand the role of the situations which are unique to Emergency Medicine: acute critical illness, intoxicated patients, media, out–of–hospital personnel, death notification for sudden unexpected death, disaster, language barriers, environmental illness/injury, injury prevention, assessment of complex and undifferentiated patients, ability to synthesize multiple and often incomplete sources of information to develop a management plan.

Unique Content Areas for Emergency Medicine in Foundation Training

Undifferentiated patient presentation

Time constrained decision making

Environmental illness and injury

Pre-hospital care

Transition point between community and hospital

Focused history and exam

Prioritized differential diagnoses

Lead Role Areas for Emergency Medicine in Foundation Training

Acute illness

Acute injury

Disaster management

Death notification

Injury prevention

Medical decision making

Resource utilization

Toxicology

Example Curriculum Format

To assist educators in crafting a curriculum that fits local needs, we have provided an example of a four year plan for a single learning objective. Educators may use this as a guide to construct individual, national, and institution specific models for content delivery. This method is not intended to be prescriptive, but to provide a simple model for tailoring content to the unique educational models that exist throughout the world.

Learning Objective # 5: Recognize and initiate first aid for airway obstruction

Curriculum Year 1:
Readings – Basic life support manuals, basic first aid manuals [e. g. American Heart Association Advanced Life Support Manual, Dallas, TX USA or equivalent manuals of the local community.] Performance indicators:

1. Obtain BCLS certification
2. Demonstrate chin lift
3. Demonstrate bag – valve mask ventilation
4. Demonstrate ability to clear an obstructed airway

Curriculum Year 2
Readings – Pathophysiology of respiratory failure

Curriculum Year 3 and/or 4
Readings – Introduction to anesthesia, Introduction to airway management Performance indicators:

1. Demonstrate endotracheal intubation
2. List indications for intubation
3. List contraindications for intubation
4. Describe medications used for rapid sequence intubation
5. Describe the physiology of artificial ventilation

Outcome Measures

At time of graduation, student will demonstrate the ability to:

- manage an obstructed airway,
- manage a basic airway, and
- perform an endotracheal intubation.

This will be assessed by simulation on a mannequin or using direct observation of student skills by trained faculty during clinical situations.

UNDERGRADUATE EMERGENCY MEDICINE CURRICULUM CONTENT

Skills curriculum

1. Clinical care skills
   - 1.1. History and examination
   - 1.2. Documentation
   - 1.3. Decision making
   - 1.4. Time management
   - 1.5. Safe prescribing
   - 1.6. Continuity of care
   - 1.7. Therapeutic interventions
2. Communication skills
   - 2.1. With colleagues
   - 2.2. With patients and caregivers
   - 2.3. Breaking bad news
   - 2.4. Working with a team
3. Maintaining good medical practice - life long learning
   - 3.1. Audit and clinical outcomes
   - 3.2. Critical appraisal
   - 3.3. Information management
4. Professional behaviour and probity – professional attributes
   - 4.1. Career and professional development

5. Ethics and Legal
   5.1. DNAR and advanced directives
   5.2. The competent adult
   5.3. Informed consent
6. Education – developing learning for others
   6.1. Basic educational information delivery
   6.2. Assessment and appraisal
   6.3. Feedback
7. 7.1: Maintaining good clinical care - risk management
   7.1. 7.2: Medico-legal issues
   7.2. 7.3: Confidentiality

Speciality Specific Curriculum

1: Generic Objectives for Resuscitation

1.1: Resuscitation - Airway

1.2: Cardiac Arrest / Peri-arrest

1.3: Shock - all varities (varieties?)

1.4: Coma

2.1: Anaesthetics and Pain Relief - Pain Management

2.2: Local anesthetic techniques

2.3: Safe conscious sedation

3.0: Wound Management

- 3.1: Basic wound debridement and closure
- 3.2: Identification and treatment of infected wounds

4.0: Generic Objectives for Trauma

- 4.1: Major Trauma
- 4.2: Head Injury
- 4.3: Chest Trauma
- 4.4: Abdominal Trauma
- 4.5: Spinal Injury
- 4.6: Maxillo-facial Trauma
- 4.7: Burns
- 4.8: Orthopedic Trauma

5: Generic Objectives for Musculoskeletal Conditions

- 5.1: Upper limb disorders
- 5.2: Lower limb and pelvis disorders
- 5.3: Spine and spinal cord conditions

6.0: Vascular Emergencies

- 6.1 Arterial limb threat
- 6.2: Venous - Deep Venous Thrombosis (DVT)

7.0 Abdominal Conditions

7.1: Undifferentiated abdominal pain

7.2: Haematemesis / malena

7.3: Anal pain and rectal bleeding

7.4: Diverticulitis

7.5: Abdominal aortic anurysm

8: Urology

8.1: Acute urinary retention or bladder obstruction

8.2: Nephrolithiasis and colic

9: Sexually Transmitted Diseases

9.1: Identification and initial treatment for endemic diseases

10: Eye Problems

10.1: Acute conjunctivitis - bacterial and viral

10.2: Acute vision loss

10.3: Acute eye trauma including globe rupture

11: ENT Conditions

11.1: Epistaxis

11.2: Infections of the head and neck

12: Dental Emergencies

12.1: Dental abscess

12.2: Dental fracture

13: Gynecology

13.1: Pelvic pain

13.2: Dysfunctional uterine bleeding

14: Obstetrics

14.1: Ectopic pregnancy

14.2: Uncomplicated emergency vaginal delivery

15: Cardiology

15.1: Basic electrocardiographic analysis

15.2: Recognition and initial treatment of acute myocardial infarction

15.2: Recognition and initial treatment of life threatening arrhythmia

16: Respiratory Medicine

16.1: Airway obstruction

16.2: Respiratory failure

16.3: Asthma and restrictive airway disease

16.4: Acute pneumothorax

16.5: Pulmonary embolism

17: Neurological Emergencies

17.1: Acute stroke

17.2: Spinal cord lesions

17.3: Peripheral neuropathies

17.4: Acute mental status change

17.5: Migraine

17.6: Meningitis

17.7: Vertigo

18: Hepatic Disorders

18.1: Acute hepatitis

18.2: Liver failure

18.3: Acute cholecystitis and cholangitis

19: Toxicology

19.1: Treatment of acute ingestions

19.2: Identification of basic toxidromes

20: Acid Base and Ventilatory Disorders

20.1: Identification of acid base disorders

20.2: Initial management of the mechanically ventilated patient

21: Fluid and Electrolytes

21.1: Basic principles of fluid administration

21.2: Dehydration

21.3: Hyperkalemia

21.4: Hyponatremia

22: Renal Disease

22.2: Acute renal failure

23: Diabetes and Endocrinology

23.1: Disorders of glucose metabolism

23.2: Thyroid disorders

24: Haematology

24.1: Anemia

24.2: Disorders of red cell function

24.3: Disorders of clotting

25: Infectious Diseases and Sepsis

25.1: Endemic infectious diseases

25.2: Sepsis

25.3: Common infectious diseases or conditions (e.g. pneumonia)

25.4: Cellulitis and gangrene

26: Dermatology

26.1: Blistering and exfoliative diseases

26.2: Differential diagnosis of rash

26.3: Parasitic conditions and infestations

27: Rheumatology and Immunology

27.1: Crystal arthropathy

27.2: Arthritis

27.3: Immune disorders

27.4: Anaphylaxis

28: Child Protection and Children in Special Circumstances

28.1: Child abuse signs and symptoms

28.2: Legal rights of parents to refuse care

29: Neonatology

29.1: Neonatal resuscitation

29.2: Hyperbilirubinemia

29.3: Disorders of feeding

29.4: Neonatal fever

30: Environmental Emergencies

30.1: Hyperthermia

30.2: Hypothermia and frostbite

30.3: Envenomation and environmental toxin exposure

31: Oncology

31.1: Acute leukemia

31.2: Neutropenia and neutropenic fever

31.3: Solid tumors

31.3: Complications of chemotherapeutic agents

32: Pediatrics

32.1: Basic management of pediatric airway

32.2: Basic pediatric resuscitation

32.3: Common infectious diseases of childhood

32.4: Fever in the first 6 months of life

32.5: Common injury patterns for normal children

33: Psychiatry

33.1: Acute psychosis

33.2: Mood disorders

33.3: Personality disorders

33.4: Acute suicidal and homicidal ideation

33.5: Substance abuse

34: Major Incident Management

34.1: Concepts and application of triage

34.2: Field to hospital communication and chain of command

35: Legal Aspects of Emergency Medicine

35.1: Refusal of care

35.2: Informed consent

36.3: Malpractice

36: Research

36.1: Formulating a research question

36.2: Review of the medical literature

36.3: Basic research design

36.4: Basic preparation of manuscripts and written publications

37: Management

37.1: Leading teams and giving orders

37.2: Basic concepts of debriefing and giving feedback

37.3: Time flow management

Appendix D: Survey Questionnaire

Round 1 Delphi Proposed Survey Instrument

Topic: Identifying Procedural Core Competencies for Undergraduate Emergency Medicine (EM) Education at the University of Zimbabwe College of Health Sciences (UZCHS)

The full consent document is attached, Please click link below.

Informed consent to research participation (CLICK HERE)

Proceeding to survey serves as implied consent.

For Each emergency procedure listed below please indicate the degree to which you disagree or agree that it should be listed as core procedural competency for medical students.

Gradual competence is aimed to progress from third to final year of medical school

SURVEY MONKEY EMAIL INTRO

The UZCHS is working towards introducing streamlined emergency medicine education. There is currently no published curriculum for undergraduate Emergency Medicine (EM) in Africa. To develop a comprehensive and contextually appropriate curriculum, we need to set core competencies across three domains: knowledge, attitudes/ professionalism and procedural skills.

Although emergency clinical procedures are currently taught across all departments, a rational approach will allow students to utilise the multitudes of missed learning opportunities presented by the emergency department (casualty), and improve coordinated skills acquisition. The ED is well suited to take the custodian role, so that students who struggle to get sufficient exposure to emergency clinical procedures during various rotations have a backup mechanism. They also get a chance to experience the comprehensive approach as 'casualty' patients frequently require concurrent emergency procedures. This scenario typically occurs in the ED. Currently undergraduate students do not rotate through the Emergency department due to lack of formalised teaching arrangements, expertise and agreed upon competencies. A set of agreed core competencies will guide the subsequent setup of a conducive clinical teaching environment. In this first survey, we focus on clinical procedures. We therefore need your opinion in producing a set of core competencies in the clinical procedures domain to inform curriculum development at the University of Zimbabwe College of Health Sciences

Each statement below describes a procedural skill which we propose to be included in the Undergraduate Emergency Medicine curriculum. The skill set is supposed to be progressive so that by the time they graduate from medical school to become juniour doctors, they are ready to provide acceptable emergency care.

Please indicate your level of agreement or disagreement on whether you think it is a required core competence in undergraduate Emergency Medicine education in procedural skills

Emergency Procedure	Not Sure	Strongly disagree	Disagree	Agree	Strongly Agree
HAZARDS CONTROL/ SAFETY					
Use of personal protective equipment (aprons, gowns, goggles face masks, gloves, boots)					
Correct handwashing and scrubbing					
Safe handling and disposal of biological waste					
Safe handling and disposal of sharps					
Other: Specify					
EMERGENCY MEDICINE PRACTICE					
Rapid focussed assessment of the critically ill/ injured patient					
Giving a concise informative patient handover/ referral					
Focussed Emergency department case presentation					
Analgesia and procedural sedation administration					
Emergency/ Resuscitation drugs administration: 1. Adenosine					
2. Adrenaline					
3. Amiodarone					
4. Calcium chloride/ Carbonate					
5. Potassium Sulphate					
6. Magnesium Sulphate					
7. Antivenom					

8. Fibrinolytics eg streptokinase, rTPA					
9. Insulin infusion					
10. Glucose infusion (neonate, child, adult)					
Major Incident Triage Management					
Practical Teamwork skills in the EM Dept					
Other: Specify					
AIRWAY MANAGEMENT					
Relieve an obstructed airway (choking child or adult					
Correct Insertion of airway adjuncts (OPA/ NPA)					
Demonstrate correct suctioning of airway					
Endotracheal intubation technique and confirmation of placement (RSI)					
Awake extubation technique					
LMA insertion and insertion of other alternative devices (Tracheoesophageal combi tube)					
Difficult airway management and surgical cricothyrotomy					
Other: Specify					
BREATHING/ RESPIRATORY THERAPY					
Demonstrate use of peak flow meter					
Demonstrate to patient the correct use of inhaler or spacer device					
Oxygen administration with various devices					
Nebuliser administration					
Needle decompression of a tension pneumothorax					
Intercostal tube insertion and removal					
CPAP administration					

Set up and initiate mechanical ventilation					
CIRCULATION					
External haemorrhage control					
Assessment and treatment of shock					
Preform and interpret a 12 lead ECG(recognition and management of life threatening rhythms)					
Vagal manoeuvres for Supraventricular Tarchycardia					
Basic defib/ monitor functional status check					
Preform safe defibrillation and Electrical cardioversion					
Transcutaneous pacing technique					
Pharmacological cardioversion-antiarhythmics administration/ infusions preparation					
Other: Specify					
RESUSCITATION					
Basic life support: conduct of CPR					
Bag mask ventilation technique					
Advanced life support procedures and drugs					
Paediatric resuscitation using protocols					
Certify and notify death					
Break bad news to patient/ family					
Other: Specify					
POINT OF CARE TESTING					
Finger prick HB					
Rhesus blood group testing					

Blood glucose measurement					
Pulse oximetry					
Urine pregnancy testing					
Urine dipstick and interpretation					
Blood gas interpretation					
Point of care/ limited ultrasound					
Other: Specify					
INTRAVENOUS ACCESS AND Injection Therapy					
Peripheral venous cannulation					
Central venous catheterisation					
Administer IV fluids and medication infusions					
Administer blood products safely					
Intraosseous needle insertion					
Subcutaneous injection					
Intramuscular injection					
Regional blocks eg ring block, penile block					
Other: Specify					
SAMPLING EMERGENCY SPECIMENS					
Venepuncture					
Arterial blood sampling					
Blood culture and pus swab sampling					
Lumbar puncture					
Joint injection/ aspiration					
Needle thoracocentesis					
Abdominal paracentesis					
Other: Specify					

CATHETERISATION					
Nasogastric tube insertion					
Urethral catheterisation					
Suprapubic catheterisation					
Other: Specify					
TRAUMATIC WOUND MANAGEMENT					
Wound irrigation/ wash out					
Wound infiltration with local anaesthetic					
Aseptic wound closure with sutures, staples and alternatives					
Abscess Incision and drainage/ debridement					
Animal and human bites wound management					
Haemorrhage control with pressure techniques					
Other: Specify					
MUSCULOSKELETAL INJURIES AND FRACTURE CARE					
Bandaging or pressure dressing techniques					
Limb immobilisation with splints (eg Thomas splint)					
Fracture/ dislocation manual reduction					
Plaster cast application and removal					
Interpretation of trauma imaging: plain xrays and head CT					
Other: Specify					
EAR , NOSE INJURIES					
Epistaxis management with nasal packing					
External auditory foreign body removal					

Nasal passage foreign body removal					
EYE Injury assessment					
Eye irrigation					
Fluorescein staining of cornea					
Eye padding					
Eye Foreign body removal					
Other: Specify					
OBSTETRICS/ GYNAECOLOGY EMERGENCIES					
Speculum examination					
Manual removal of retained products of conception					
Emergency vaginal delivery					
Emergency breech vaginal delivery					
Emergency management of shoulder dystocia					
Foetal assessment/ monitoring					
Neonatal resuscitation: Basic					
Other: Specify					
EMERGENCY PSYCHIATRY					
Verbal restraint (talking/ calming down aggressive patient					
Safe Physical restraint technique					
Pharmacological restraint					
Protocol based suicidal risk assessment					
TRANSPORT OF THE CRITICALLY ILL / INJURED PATIENT					
Safe transfer of patient from stretcher to bed					
Cervical spine immobilisation in Trauma					

Full spinal immobilisation technique					
Securing IV lines, tubing, catheters for transfer					
Basic monitoring equipment set up/troubleshoot					
Safe procedural sedation					
Warming and cooling techniques and equipment usage					
Other: Specify					
OTHER CATEGORY					
Specify/ suggest procedures					

Demographics

What is your gender	female	male	Prefer not to say	
What is your involvement in teaching/ evaluating/ assessing emergency procedures? (Please select all items that apply to you)	Curriculum design/ approval		Teach students	Evaluate/ grade students
For how long have you been performing the above role (s)	Less than 5 years	5-10 years	More than ten years	

Please state the primary clinical department in which you work/ teach ; For example	Anaesthetics	Gynae/ Obs	surgery	Paeds	specify	specify

Appendix E: Informed Consent

CONSENT TOPARTCIPATE IN RESEARCH (UZCHS JOINT HREC)

Project Title: Identifying Procedural Core Competencies for Undergraduate Emergency Medical (EM) Education at the University of Zimbabwe College of Health Sciences (UZCHS)

Principal Investigator: Sithembile Mtombeni, MBChB, MBA, MSc

Registrar, Division of Emergency Medicine, University of Cape Town

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Supervisors

1. Dr Heike Geduld :
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2. Prof Midion Chidzonga:
   Email Address: mtmchidzonga@yahoo.com
   Contact Number: +263 4 708127

Introduction:

- Please read this form. The purpose of this form is to provide you with information about this project study, and if you choose to participate, document your decision.
- You are encouraged to ask any questions that you may have about this project, now, during or after the project is complete. You can take as much time as you

need to decide whether or not you want to participate. Your participation is voluntary.

Why is this study being conducted?

This study is being conducted to establish core competencies in Emergency medicine for undergraduate medical students. Currently there is no formal training in this area and junior doctors have displayed lack of competency in managing critically ill patients. This area has been identified as a training gap in the undergraduate training program considering the responsibilities given to interns.

Dr Mtombeni is conducting this project study in part fulfillment of the requirements for the Master of Medicine in Emergency Medicine at the University of Cape Town, South Africa.

There are no external sponsors or any additional beneficiaries of this project.

Why am I being asked to participate?

You have been identified through the Human Resources administration as one of the expert trainers based on your continued appointment in teaching posts that involve Emergency medical education within your specialty. It is expected that your participation will enable the UZCHS to produce an evidence based list of core competencies for future implementation.

What will I be asked to do?

You will be asked to complete an online survey in three separate rounds to give your true opinion on listed items. This will happen over a period of six weeks.

What are the possible risks of taking part in this study?

- There are no foreseeable risks associated with participating in this project survey

What are the possible benefits of taking part in this study?

- Information for planning a formal Emergency medicine training program at undergraduate level will be gathered

What will it cost me?

There are no financial costs expected to be incurred by you for participating in this study.

How will my privacy be protected?

No identifying information is required on the questionnaire and only aggregate data analysis will be done so that individuals are not identifiable by indirect means

How will my data be kept confidential?

- This study is designed to be anonymous, this means that except for the researcher, no one else, can link the data you provide to you, or identify you as a participant.
- Data files on work computers will be password protected
- Please note that regulatory agencies, and the Institutional Review Board may review the research records
- A copy of your signed consent form will be maintained by the principal investigator for at least 3 years after the project is complete before it is destroyed. The consent forms will be stored in a secure location that only members of the research team will have access to and will not be linked to any data obtained during the project.
- The final research project findings will be made available to you through the dean's office

What are my rights as a research participant?

- Your participation is voluntary. Your decision to participate will have no impact on your current or future relations with the University
- You may skip or refuse to answer any question for any reason
- You may choose not to participate.
- If you choose not to participate there is no penalty. You are free to withdraw from this research study at any time, for any reason. If you choose to withdraw from the research there will be no penalty to you.
- **Who may I contact with questions?**
- Call the principal investigator on +27606433760 *or email to* *thembimtombeni@gmail.com*
- You may also contact the two supervisors listed above.
- If you have any questions or concerns about your rights as a research subject, you may contact The UCT Faculty of Health Sciences Human Research Ethics

Committee on +27 21 4047682 or by fax on +27214066411 or email nosi.tsama@uct.ac.za (Ref 320/16)

jrec@medsch.uz.ac.zw (ref 295/2016)

- Please keep a copy of this consent form for your records.

Participant's Statement

I understand the above description of this research and the risks and benefits associated with my participation as a research subject. I agree to take part in the research and do so voluntarily.

_____ _____

Participant's signature Date

_____

Printed name

Researcher's Statement

The participant named above had sufficient time to consider the information, had an opportunity to ask questions, and voluntarily agreed to be in this study.

_____ _____

Researcher's signature Date

_____

Printed name

Appendix F1

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee
Room E52-24 Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 404 7682 Facsimile [0211 406 6411
Email: nosi.tsama@uct.ac.za
Website: www.health.uct.ac.za/fhs/researchlhumanethics/forms

11 August 2016

HREC REF: 320/2016

Dr H Geduld
Emergency Medicine
J46, Old Main Building

Dear Dr Geduld

PROJECT TITLE: IDENTIFYING PROCEDURAL CORE COMPETENCIES FOR UNDERGRADUATE
EMERGENCY MEDICINE EDUCATION AT THE UNIVERSITY OF ZIMBABWE
COLLEGE OF HEALTH SCIENCES (UZCHS) (Masters candidate-Dr S Mtombeni)

Thank you for your response letter to the Faculty of Health Sciences Human Research Ethics Committee dated 15 July 2016.

It is a pleasure to inform you that the HREC has formally approved the above-mentioned study.

Approval is granted for one year until the 30th August 2017.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website:
www.health.uct.ac.za/fhs/research/humanethics/forms)

Please note that for all studies approved by the HREC, the principal investigator must obtain appropriate institutional approval before the research may occur.

We acknowledge that the student Dr S Mtombeni will be involved in this study.
Please quote the HREC REF in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Yours sincerely 

PROFESSOR M L CKMA

CHAIRPERSO	. FHS HUMAN RESEARCH ETHICS COMMITTEE

Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938

- HREC 320/2016

This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Convention on Harmonisation Good Clinical Practice (ICH GCP), South African Good Clinical Practice Guidelines (DOH 2006), based on the Association of the British Pharmaceutical Industry Guidelines (ABPI),and Declaration of Helsinki (2013) guidelines.
The Human Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 31

Appendix F2

Joint Research Ethics Committee For The University of Zimbabwe, College of Health Sciences and Parirenyatwa Group of Hospitals

Parirenvatwa JREC NO. 4, COUege
Of ealthSciences Building Health Sciences
Group of Hospitalswepr,one: +263 a 708140/ 791631 Ext. 2241/2242

University of Zimbabwe

Email•Orec.omce@gman.com/jrec@medsch.uz.ac.zw.w•bsne:www.jree.uz.ac.z
w

APPROVAL LETTER

Date: 1 9th October 2016 .JREC Ref: 295/16

Names of Researcher: Dr Sithembile Mtombeni
Address: c/o Mrs Kaseke, University of Zimbabwe - Department of Rehabilitation

RE: IDENTIFYING PROCEDURAL CORE COMPETENCES FOR UNDERGRADUATE EMERGENCY MEDICINE AT UZCHS.

Thank you for your application for ethical review of the above mentioned research to the Joint Research Ethics Committee. Please be advised that the Joint Research Ethics Committee has reviewed and approved your application to conduct the above named study. You are still required to obtain MRCZ approval and if required by the nature of your study, RCZ approval as well, before you commence the study.

- APPROVAL NUMBER: JREC/295
- APPROVAL DATE: 19th October 2016
- EXPIRY DATE: 18th October 2017

This approval is based on review and approval of the following documents that the were submitted to the Joint Ethics Committee:

a) Completed application form
b) Full Study Protocol
c) Informed Consent in English and/or appropriate local language
d) Data collection tool version

After this date the study may only continue upon renewal. For purposes of renewal please submit a completed renewal form (obtainable from the JREC office) and the following documents before the expiry date:

a. A Progress report
b. A Summary of adverse events.
c. A DSMB report

OHRP IRB Number: .ORG 00008914
PARIRENYATWA GROUP OF HOSPITALS FWA: 00019350

- MODIFICATIONS:

  Prior approval is required before implementing any changes in the protocol including changes in the informed consent.

- TERMINATION OF STUDY:

  On termination of the study you are required to submit a completed request for termination form and a summary of the research findings/ results.

Yours sincerely,

Professor MM Chidzo ga
JREC Chairman

Appendix F3

Telephone: 791792/791193
Telefax: (263) -4 - 790715
E-mail: mrcz@mrcz.org.zw
Website: http://www.mrcz.org.zw
Medical Research Council of Zimbabwe
Josiah Tongogara / Mazoe Street
P. O. Box CY 573 Causeway

Harare

APPROVAL

Ref: MRCZ/B/1157 17 November, 2016

Sithembile Mtombeni
Faculty of Health Sciences

University of Cape Town

South Africa

RE: - Identifying Procedural Core Competencies for Undergraduate Emergency Medicine (EM) Education at the University of Zimbabwe College of Health Sciences (UZCHS)

Thank you for the above titled proposal that you submitted to the Medical Research Council of Zimbabwe (MRCZ) for review. Please be advised that the Medical Research Council of Zimbabwe has reviewed and approved your application to conduct the above titled study. This is based on the following documents

(among others) that were submitted to the MRCZ for review:

a) Research Protocol
b) Consent forms
c) Study Tools

- APPROVAL NUMBER : MRCZ/B/1157

This number should be used on all correspondence, consent forms and documents as appropriate.

- TYPE OF REVIEW : EXPEDITED
- EFFECTIVE APPROVAL DATE : 17 November, 2016 • EXPIRATION DATE : 16 November, 2017
- After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ Website should be submitted three months before the expiration date for continuing review.
- SERIOUS ADVERSE EVENT REPORTING: All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 3 working days using standard forms obtainable from the MRCZ Website.
- MODIFICATIONS: Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Website is required before implementing any changes in the Protocol (including changes in the consent documents).
- TERMINATION OF STUDY: On termination Of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Website.
- QUESTIONS: Please contact the MRCZ on Telephone No. (04) 791792, 791193 or by e-mail on mrcz@nrcz.org.zw

- Other
- Please be reminded to send in copies of your research results for our records as well as for Health Research Database.

Yours Faithfully

- You're also encouraged to submit electronic copies of your publications in peer-reviewed joumals that may emanate from this study.

MEDICAL RESEARCH COUNCIL OF ZIMBABWE

2016 -11- 17

APPROVED

MRCZ SECRETARIAT
FOR CHAIRPERSON
MEDICAL RESEARCH COUNCIL OF ZIMBABVVE

Chapter 3

Research Proposal

Topic: Identifying Procedural Core Competencies for Undergraduate Emergency Medicine (EM) Education at the University of Zimbabwe College of Health Sciences (UZCHS)

Student: Sithembile Mtombeni

Affiliation: University of Cape Town (UCT)

Student number: CHNSIT001

Supervisors

1. Dr Heike Geduld

   Degrees: MBChB, MMed, FCEM
   Division of Emergency Medicine, UCT
2. Prof Midion Chidzonga

   Degrees: BDS, FFDRCSI, MMed, MPhil
   University of Zimbabwe, College of Health Sciences (UZCHS)

This study is in partial fulfillment of the MMed (Emergency Medicine) degree

Declaration

I Sithembile Mtombeni hereby declare that the work on which this proposal is based is my original work (except where acknowledgement indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

I empower the university to reproduce either the whole or any portion of the contents in any manner whatsoever.

Signature__ *smtombeni* _____

Date__27/02/2018_____

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Methods

Resource considerations

Ethics

Dissemination of findings

Study limitations

References

Appendix

1. Research Proposal Summary

Topic: Identifying Procedural Core Competencies for Undergraduate Emergency Medicine (EM) Education at the University of Zimbabwe College of Health Sciences (UZCHS)

Research aim: To use the Delphi technique to gain expert consensus on a list of procedural competencies for undergraduate Emergency medical education at UZCHS.

Research Objective:

- To delineate a list of locally appropriate undergraduate EM procedural core competencies for UZCHS through a consensus building process

Methods: A three stage modified online Delphi technique will be used to collect data from expert medical trainers at UZCHS

Expected outcomes: expert consensus on a list of procedural EM core competencies for potential inclusion into the undergraduate EM curriculum

Ethical considerations: adherence to ethical guidelines of the UCT, UZCHS and Medical Research Council of Zimbabwe Health Research Ethics committees

Resource considerations: R2000 will be spent on ethical clearance and manuscript preparation as well as dissemination of findings.

2. Background and Motivation

Introduction

Each year more than 100 million people sustain injuries, while five million people die of violence and injury related causes worldwide. Low and middle income countries (LMICs) account for about 90% of this morbidity and mortality.[1] This high morbidity and mortality in LMICs is compounded by an overwhelming burden of acute medical and surgical conditions; including infectious diseases such as malaria, respiratory infections and HIV complications.[2] There is unmet need for emergency care especially in sub-Saharan Africa. Despite the obvious need, emergency care services are not well developed in Africa.

Emergency Medical services in Africa

While some countries like South Africa, Tanzania, Kenya and Ethiopia have established specialised emergency medical services, other Sub-Saharan African countries are still at planning stages. At its 60th World Health Assembly, having considered the report on emergency care systems, the WHO urged member states to 'ensure that appropriate core competencies are part of relevant health curricular and to promote continuing education to providers of trauma and emergency care.'[2] Medical education and training are considered major determinants of successful emergency medical care service delivery.

Emergency medical services in Zimbabwe

Emergency medicine is not a recognised specialty in Zimbabwe. Despite the specialty's non-existence, EM care exists and is currently provided in a less structured manner. The University of Zimbabwe College of Health Sciences (UZCHS) is considering the re-organisation of EM education by introducing Emergency Medicine (EM) as a specialty. Training opportunities in undergraduate EM are currently spread across various surgical and medical departments. Streamlined emergency medicine training is among innovative programs that are envisaged to add value to medical education at the University of Zimbabwe, College of Health Sciences (UZCHS).

Competency based training as a suitable approach in contrast to current practice

Substantial work has been done on establishing EM core competencies in developed countries in the past forty years. At both undergraduate and postgraduate levels, competencies were founded on consensus building among experts. This is true for the USA (ACGME), Canada (Can Meds), Australia and others. In 2009 the International Federation for Emergency Medicine (IFEM) published a model worldwide curriculum for Emergency medicine at undergraduate level with a comprehensive list of 18 outcome or competency areas.[3] They however caution users to adapt this generic curriculum to local contexts. The African Federation on Emergency Medicine (AFEM) provides guidance on Emergency Care education in LMICs. Most emergency medicine curriculum work was done in South Africa, Botswana, Ethiopia, Ghana, Sudan and Tanzania where Emergency Medicine is now established as a medical specialty. In all these countries Emergency education curriculum was developed for postgraduate levels, with no formalized curriculum or competencies for undergraduates. The AFEM curriculum, although listing some procedural competencies applicable to undergraduate level, was designed for postgraduate intermediate and specialist levels.

The starting point for most of the established African programs has been postgraduate (residency) training which then paves way for undergraduate EM development. For example, Osei-Ampofo, Oduro, Onteng and others describe the founding of the specialist EM program in Ghana, with a brief mention of the introduction of undergraduate EM medical education through a one-week rotation. [4] In Botswana Cox and Chandra describe experiences of problem based learning as applied to Emergency undergraduate medical education, without details of curriculum competencies or pre-determined outcomes.[5] There is no standardized undergraduate emergency medicine curriculum or competence lists for African settings. The UZCHS is looking to create a locally appropriate and contextually relevant undergraduate EM curriculum. Consensus building on procedural EM competences is a starting point for a streamlined comprehensive curriculum that is envisaged to meet the identified need for effective emergency care in Zimbabwe. This process is envisioned to contribute to a systematic approach to undergraduate EM education

The current time-based block system for undergraduate clinical training in Zimbabwe dictates a set time of rotation in each clinical specialty. The UZCHS is currently introducing competency based curricula in line with the Medical and Dental Council requirements.[6] Introduction of a dedicated EM block, based on set competencies will align well with current educational initiatives.

Creative ways are required to introduce an additional block into the already overwhelmed curriculum. MacFarlane and Green-Thompson report on the integration of emergency medicine into an existing clinical teaching block combining forensic medicine, emergency medicine, trauma and anaesthetics in a South African University.[7] Thus innovative ways can be used to introduce undergraduate EM within existing clerkships/rotations.

In order to provide formative and summative assessment in any educational program, competencies have to be set. AFEM provides postgraduate benchmarks for EM training in LMICs while IFEM is a worldwide benchmark for undergraduate EM education. The UZCHS needs to adjust the AFEM postgraduate curriculum and adapt the IFEM undergraduate curriculum to suit the undergraduate level within the Zimbabwean/ African context[8].This progression will be achieved through a consensus building process.

Which undergraduate EM competencies are critical?

Emergency Medicine (EM) competencies can be taught across four main domains: knowledge, communication, attitudes/ professionalism and procedural skills. The acquisition of knowledge, attitudes and communication skills is emphasised across all existing specialties where students rotate through. Procedural skills required for effective emergency care are currently fragmented across different clerkship blocks in the departments of Internal Medicine, Surgery, Obstetrics and Gynaecology, Anaesthesia, Paediatrics, Psychiatry and Community Medicine. Each department currently teaches procedures relevant to that specialty despite the obvious overlaps that may lead to inefficiencies through repetition and omissions. The teaching of emergency procedures in a streamlined approach will provide speedy improvement in EM care, as critically ill or injured patients frequently require these procedures in combination, for timely diagnosis and treatment.

Motivation/ Rationale

Core undergraduate EM competencies have not been established in Africa and at UZCHS. There is need therefore, for consensus building to enable identification of undergraduate EM core competencies. This will pave way for formalisation of EM training in Zimbabwe.

The Delphi technique is a recognized consensus building process and therefore suitable for this project.[9] Alternative methods like consensus conferences and nominal group techniques are logistically restrictive and limited in scope.

3. Research Question

Which Undergraduate EM Procedural competencies (practical skills required for effective EM care) are considered essential, through consensus, by expert medical trainers at UZCHS?

Aim and Objectives

Study Aim

The aim of this study is to establish a locally appropriate list of undergraduate EM core competencies that will serve as a foundation and guidance for teaching EM practical procedures at UZCHS.

Research objective:

To delineate a list of locally appropriate undergraduate EM procedural core competencies for UZCHS through a consensus building process

4. Methodology

4.1 Study design

An online expert survey will be used to generate consensus on EM procedural core competencies for undergraduate education. The Delphi technique is a special form of expert survey that is amenable to online communication, and aids in streamlining of priorities, without necessarily assembling the experts physically.[9]

This Delphi consensus technique will be conducted using online Survey Monkey tool (www.surveymonkey.com)

A potential list of EM procedural competencies will be compiled from IFEM and AFEM curricula guidelines (attached as Appendix 1 and II). All items on these two reference documents that specify practical emergency procedures relevant to undergraduate level will be included on the initial survey questionnaire. IFEM undergraduate curriculum is a generic worldwide guiding document that need adaptation. AFEM postgraduate EM curriculum provides general guiding objectives suitable for African settings[10].

Combining recommendations in these two reference/ guiding documents will provide a suitable starting point, to generate a potential list for consensus building for UZCHS. An 'Other' category will be added at the end of each section in the first Delphi stage to allow participants to list additional items deemed essential and locally relevant to the competencies list.

The additional items will then be incorporated into the second Delphi iteration. Participants will be provided with space for comments under each section to capture qualitative input for process enrichment. Subsequent Delphi iterations will include summarized and ranked data from preceding stages, with measures of dispersion and central tendency for items that fail to reach a 75% consensus on a four-point Likert scale[9]. Data analysis and summarisation will be done by the researchers after each iteration using Microsoft Excell spreadsheets according to predetermined end points. Presenting data summaries with means and standard deviations to participants together with items not reaching consensus is meant to influence opinion formation by participants. The items are standardized procedures or skills which are well understood by participants and therefore do not need wording reconfiguration in subsequent Delphi stages. The questionnaire items not reaching consensus opinion will therefore be recirculated unaltered. After the third stage the final list of procedural competencies will be determined.

4.2 Study setting, population and recruitment/ enrolment

The study will be conducted online with participants invited by email to participate. The study population consists of 31 experts across four academic hospitals in seven departments at the UZCHS

A list of potential participants with e-mail contacts will be obtained from the UZCHS Human Resources office.

Based on previous similar surveys, a response rate of at least 50% is expected, yielding a final minimum sample of 15 expects.

Inclusion criteria

The questionnaire will be administered to expert medical trainers. Expert medical trainers are medical specialists appointed in at least a senior lecturer position with a professional mandate to plan, oversee, teach, supervise and evaluate medical students in their practice of clinical emergency procedures across seven academic departments, at the four academic hospitals in Harare, Zimbabwe. These departments are Anaesthesiology, Internal Medicine, Surgery, Paediatrics, Primary Care/ Community Medicine, Psychiatry and Obstetrics/ Gynaecology.

In the absence of Emergency medical specialists, this sample of participants is considered appropriate due to both content and context expertise. They have provided training and evaluation in emergency clinical procedures for many years amid contextual emergency care challenges in Zimbabwe, although split across separate specialty undergraduate teaching blocks.

This research project does not suggest that emergency undergraduate education does not exist at the UZCHS, but endeavors to establish consensus on a list of procedural core competencies that will be embedded in the future comprehensive EM curriculum. Despite the seeming heterogeneity of the study sample, participants are all highly experienced/ competent and knowledgeable specialists in their respective departments teaching and evaluating medical students on emergency procedures routinely.

The definition of ‘experts’ for Delphi studies remains contentious; while some researchers prefer expertise by academic qualification, others argue that ‘expertise’ should encompass

much deeper and broader criteria that include attitude, skills, experience, recognition in the local context in addition to knowledge or academic qualifications[11,12.] The level of 'expertise' that produces valid Delphi processes has not been established and heterogeneous samples have been shown to produce comparable outcomes to homogeneous ones.

Exclusion criteria

Medical trainers who solely teach basic sciences at UZCHS or other non-clinical disciplines like Pathology will be excluded. Eligible experts who do not respond to two reminders per stage or decline to participate will also be excluded. Participants declining to participate in subsequent stages will be asked to provide reasons for dropping out in order to compare responders and non-responders.

4.3 Data collection and data management

4.3.1 Data collection and analysis

A questionnaire will be sent through an electronic survey tool (www.surveymonkey.com) to listed experts to rate competencies using a five-point Likert scale. The details are shown on the research instrument in appendix III. The four-point Likert scale has been designed to avoid neutrality and encourage commitment. Arbitrary progressive agreement scores of one to four (1 to 5) are assigned to the Likert scale. Participants will also be asked to suggest competencies for inclusion in the first round. The second stage will consist of listed competencies that fail to reach consensus set limits of 75% at the end of the first stage, and new suggestions. The last and third Delphi stage will determine the final list of agreed core competencies to be submitted to UZCHS curriculum committee for consideration.

4.3.2 Statistical analysis

Statistical analysis will occur concurrently with data collection using electronic spreadsheets (Microsoft Excel, Microsoft Corporation, Redmond, WA). The principal investigator will be responsible for statistical analysis.

Aggregate Likert scale consensus ratings will be calculated as percentages for the group for each listed competency, using spread sheets to generate total scores and percentages.

For each stage an item that generates an aggregate agreement score of at least 75% of participants (scoring 4 or 5 on the Likert scale) qualifies for the final consensus list. Items scoring a group aggregate score of less than 75% are carried over to the next reiteration together with summarised and ranked scores with associated medians and standard deviations so that participants make an informed decision before final opinion formation, until they get a consensus reject or accept aggregate opinion in the final Delphi round.[12]

4.3.3 Data management and safety

Data files will be kept on password protected office computers and electronic files containing data will also be accessed by password authentication. Only anonymous collated data will be reported and shared with all participants.

5. Projected Timeline

The proposed study period is February 2016 to December 2016 as shown in the chart below.

Activity	Feb 16	Mar 16	Apr 16	May 16	Jun 16	Jul 16	Aug 16	Sep 16	Oct 16	Nov 16	Dec 16
Research Proposal,											
Ethics											
Data Collection											
Data analysis											
Project write up											

Publication & Diss.											

Estimated Time line

6. Expected Study outcomes

At the end of the consensus building process, a locally appropriate list of undergraduate procedural EM core competencies will be established as foundational to curriculum guidance for formal EM education at UZCHS. The process followed will also form part of a roadmap towards establishing the remaining undergraduate EM core competencies in the domains of knowledge, communication and professionalism.

7. Resource Considerations and Budget

Projected cost is R2000 as detailed in the budget estimate below. This online survey requires the lead researcher to send out email invitations and receive/ analyse responses using spreadsheets. The cost involved is for ethical clearance and publication. This will be funded by student's academic sponsor as per prior agreement.

8. Budget

Activity/ Item	Unit cost	Quantity	Estimated cost (R)
Ethical Clearance- copies, application fee(Medical Research Council of Zimbabwe (MRCZ)	300	1	300
Data analysis (statistician	Student waiver		0
Project manuscript printing and binding	200	3	600
publication of findings	450	1	450

Contingency at 10%			135
Total			R2,185

9. ETHICAL CONSIDERATIONS

Ethical clearance has been granted by the Health Research Ethics Committee (HREC) University of Cape Town and is now being sought from UZCHS/Parirenyatwa Group of Teaching Hospitals Joint Research Ethics Committees. Informed consent will be sought from participants and confidentiality built into the survey process. A copy of the informed consent form is attached in Appendix IV. Participation is voluntary and withdrawal from the study at any point is allowed. There is no financial cost or gain to individual participants.

The external body involved is the UZCHS. The UZCHS health research ethics committee has been notified of the impending application and have provided formal application forms and guidance.

10. Dissemination of Research Findings

The study findings will be shared with the UZCHS. A hard copy will be submitted for the UZCHS's library reference collection. At least one article will be published in a peer reviewed journal**.**

11. Study Limitations

This study is time constrained and it is not possible to engage all stakeholders in the consensus process. It is assumed that a response rate of at least 50% will be achieved, if this fails the findings may not represent a valid consensus process. The study is limited to consensus on procedural skills only with the hope that progress will be made to eventually include all EM domains.

12. **References**

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http://www.afem.info/resources/afem-curriculum/?id=73%27A

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Nurse Researcher 2006, 14, 1 pp. 59-69

12. Powell C (2002). The Delphi technique: myths and realities.

Journal of Advanced Nursing 41(4) pp. 376-382
Blackwell Publishing Ltd

13. Appendix

I. IFEM curriculum document

http://www.ifem.cc/

II. AFEM curriculum guidance document

http://www.afem.info/resources/afem-curriculum/?id=73%27A

III Research survey Instrument

IV Informed Consent to Research Participation

V Ethical clearance HREC UCT

UNIVERSITY OF CAPE TOWN

FACULTY OF HEALTH SCIENCES

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Dissertation Title:	Identifying Procedural Core Competencies for Undergraduate Emergency		
	Medicine Education at the University of Zimbabwe College of Health Sciences		

Supervisor	Dr Heike Geduld	**Word count**	6824	**No. of pages**	139

1. IMPORTANT NOTES:

1.1 Candidates for graduation in June and December may expect to receive notification of the outcome of the examination of the dissertation not later than 1st week in June and last week in November, respectively, provided the dissertation was submitted by the due date. Where a dissertation has been submitted well in advance of the due date, earlier notification will be given, if possible. However, the University does not undertake to reach a decision by any specific date.

1.2 Candidates who are required to revise and re-submit for re-examination are required to register during the revision phase. Fees will be calculated according to the date of the notification of the "revise and re-submit" result and the date of re-submission. [Faculty will advise Fees by sending copy of R&R result to Fees.]

1.3 Candidates are asked to note that the University will not permit degree/diploma qualifiers to graduate if they have any outstanding fees, fines, interest or dues**. The final date for payment of outstanding amounts is 30 April in the** case **of qualifiers for June graduation and 31 October in the case of qualifiers for December graduation.**

1.4 Please note that should your examination process run into the following year, you will have to re-register in order to be considered for graduation.

2 DECLARATIONS:

2.1 I am presenting this dissertation in FULL/PARTIAL fulfilment of the requirements for my degree.

2.2 I know the meaning of plagiarism and declare that all of the work in the dissertation, save for that which is properly acknowledged, is my own.

2.3 I hereby grant the University of Cape Town free licence to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever of the above dissertation.

Signature	*smtombeni*	***Date:***	27/02/2018

3 FUNDING AND FEES:

Candidates submitting have a choice in regard to fees and funding options:

3.1 To claim a fee rebate* and discontinue funding through the PGFO, if applicable (the student remains registered until graduation or the start of the next academic year (see University Rule G5.2). *(Only applicable in second or subsequent year in which the dissertation is being completed - Fee Rule 8)

3.2 To remain registered and engaged in the department while **writing up a paper for publication**, with full student rights and full access to facilities, full liability for fees for the year and continued eligibility for funding already awarded for that academic year. Access will extend only until such time as you graduate. Should you need access beyond this, you will need to arrange for 3rd party access within your department.

Please indicate your preference

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I wish to continue fee liability, funding eligibility (if applicable) and access to all facilities	

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a) the implications of the fee rebate on their access to facilities and eligibility for funding, and

b) that if they were to stay on in the department and receive payment through the payroll, such payment is taxable.

Signature	*smtombeni*	***Date:***	27/02/2018

FOR COMPLETION BY FACULTY OFFICE

I acknowledge receipt of the uploaded copy (on PeopleSoft) of the Master's dissertation of the above candidate submitted for examination:

Signature	*smtombeni*	***Date:***	27 /2 /2018
Abstract submitted	Yes		No

cc **Fees**

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Student number: CHNSIT001

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smtombeni

Date:
27/02/2018

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