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

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Abbreviations

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

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. 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 emergencies⁴. 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 health⁶.

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 interventions⁵. 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. In Zimbabwe, a significant proportion of maternal mortality was traced to inability to identify and manage or refer serious complications by emergency providers. Worldwide, poor procedure performance, especially during emergency care delivery, is a major source of stakeholder complaints and malpractice claims.

**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.’

A regional survey in 2014 by the African Federation of Emergency Medicine (AFEM), established that a major barrier to successful integration of acute care into health systems is ‘lack of consensus on essential components’. 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.

**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. 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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{19}

The findings consistently confirmed curriculum gaps, significantly highlighted in the practical skills domain. Further afield, in Malaysia and Africa, the pattern persisted.\textsuperscript{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.\textsuperscript{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. 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.

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. 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.

**Which undergraduate EM competencies are critical?**

Society expects every physician to be able to respond to medical emergencies regardless of their chosen specialisation. 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. 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. 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.

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. 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. A recent Germany exploratory study concurred with the American findings, 64% of the surveyed junior medical doctors felt inadequately prepared for practical skills. 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. 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\textsuperscript{29}.

In Zimbabwe, a survey conducted by Munongo et al in 2013 confirmed a similar scenario\textsuperscript{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\textsuperscript{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\textsuperscript{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\textsuperscript{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’\textsuperscript{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\textsuperscript{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\textsuperscript{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\textsuperscript{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.
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

<table>
<thead>
<tr>
<th>Gender</th>
<th>male</th>
<th>female</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years of experience</th>
<th>&lt; 5 years</th>
<th>5 - 10</th>
<th>&gt;10</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>6</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specialty / Department</th>
<th>surgery</th>
<th>Medicine</th>
<th>Paeds</th>
<th>Ob/ Gyn</th>
<th>dentistry</th>
<th>Psych</th>
<th>Anaest</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Hazards control/ safety</th>
<th>Emergency pharmacology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use of personal protective equipment (aprons, gowns, goggles, face masks, gloves, boots)</td>
<td>26. Insulin dosage calculation and infusion set up</td>
</tr>
<tr>
<td>2. Correct handwashing and scrubbing</td>
<td>28. Administer glucose infusion as per calculated requirements</td>
</tr>
<tr>
<td>3. Safe handling and disposal of biological waste</td>
<td>29. Administer correct doses of IV anticonvulsant medications</td>
</tr>
<tr>
<td>4. Safe handling and disposal of sharps</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient assessment</th>
<th>Resuscitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Apply monitors and interpret readings (BP, Sats, ECG)</td>
<td>29. Basic life support: conduct of CPR</td>
</tr>
<tr>
<td>8. Giving a concise informative patient handover/ referral</td>
<td>31. Basic paediatric resuscitation using protocols</td>
</tr>
<tr>
<td></td>
<td>32. Break bad news to patient/family</td>
</tr>
<tr>
<td></td>
<td>33. Peripheral venous cannulation</td>
</tr>
<tr>
<td></td>
<td>34. Correct injection techniques (subcutaneous, intravenous, intramuscular)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Airway management</th>
<th>Venous access and specimen sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Relieve an obstructed airway</td>
<td>35. Venepuncture and correct specimen handling for lab assays</td>
</tr>
<tr>
<td>10. Demonstrate correct suctioning of airway</td>
<td>36. Peripheral arterial blood sampling</td>
</tr>
<tr>
<td>11. Bag mask ventilation</td>
<td>37. Perform lumbar puncture with precautions</td>
</tr>
<tr>
<td>12. Correct insertion of airway adjuncts (OPA, NPA)</td>
<td>38. Nasogastric tube insertion and stomach contents aspiration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breathing/ Respiratory Therapy</th>
<th>Trauma and Wound Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Oxygen administration with various devices</td>
<td>39. Wound irrigation/ wash out to reduce contamination</td>
</tr>
<tr>
<td>14. Nebulised medication administration</td>
<td>40. Local anaesthetic infiltration of traumatic laceration</td>
</tr>
<tr>
<td>15. Demonstrate correct use of peak flow meter</td>
<td>41. Aseptic wound closure with sutures/alternatives</td>
</tr>
<tr>
<td>16. Demonstrate correct use of metered dose inhaler/spacer</td>
<td>42. Assess a burn patient and initiate fluid resuscitation</td>
</tr>
<tr>
<td>17. Emergency decompression of pneumothorax</td>
<td>43. Abscess incision and drainage</td>
</tr>
<tr>
<td>18. Intercostal tube insertion and removal</td>
<td>44. Animal and human bite wound management</td>
</tr>
</tbody>
</table>

| Circulatory Emergencies | |
|-------------------------||
| 19. External haemorrhage control using direct pressure | |
| 20. Assessment and initial fluid resuscitation of a shocked patient | |
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. Perform 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

**Urology, obstetrics/gynaecology emergencies**
56. Urethral catheterisation
57. Speculum examination
58. Emergency vaginal delivery
59. Foetal assessment/monitoring
60. Neonatal resuscitation: basic

**Round 2 and 3**
66. Perform endotracheal intubation and confirmation of tube placement (RSI)
67. Set up and initiate non-invasive ventilation e.g. CPAP
68. Perform vagal manoeuvres for supraventricular Tachycardia (with precautions)
69. Perform safe synchronised cardioversion
70. Conduct brain stem testing

71. Certify and notify death
72. Safe use of tourniquets to control exsanguinating haemorrhage
73. Control of gastrointestinal massive haemorrhage with endocavitatory pressure
74. Perform basic point of care emergency ultrasound
75. Perform equipment check and basic trouble shooting in the Emergency Department
76. Administration of emergency/resuscitation drugs

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

**Patient transport**
61. Safe transfer of patient from stretcher to bed
62. Safe patient packaging for aeromedical transfer
63. Cervical spine immobilisation in trauma
64. Securing iv lines, tubing, catheters for transfer
65. Mobile monitoring equipment set up

81. Basic Ultrasound in Trauma
82. Perform basic regional nerve blocks e.g. ring block
83. Knee joint aspiration technique
84. Abdominal paracentesis for ascites
85. Control of GIT bleeding with medications
86. Reduction of joint dislocations
87. Manual reduction of displaced limb fractures
88. External auditory meatus foreign body removal
89. Nasal passage foreign body removal
90. Reduction of para phimosis
91. Suprapubic catheterisation
92. Manual removal of placenta/retained products of conception
93. Examination of sexual assault victims
94. Safe use of blood product substitutes in shock resuscitation
<table>
<thead>
<tr>
<th>78. Calculate and administer correct doses of intravenous anticonvulsants</th>
<th>96. Full spinal immobilisation techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>79. Administer procedural sedation, with precautions</td>
<td>97. Safe procedural sedation outside the ED</td>
</tr>
<tr>
<td>80. Perform peripheral vein dilatation</td>
<td>98. Initiation of warming and cooling to control extremes of temperature</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>Subdomain/ System</th>
<th>No. of Items on list</th>
<th>No. reaching consensus</th>
<th>% Acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazards Control and Safety</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Patient Assessment</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Airway Management</td>
<td>8</td>
<td>7</td>
<td>87</td>
</tr>
<tr>
<td>Breathing/ Ventilation Support</td>
<td>8</td>
<td>7</td>
<td>87</td>
</tr>
<tr>
<td>Circulation Emergencies</td>
<td>9</td>
<td>7</td>
<td>78</td>
</tr>
<tr>
<td>Resuscitation</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Point of Care Testing</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Emergency Pharmacology</td>
<td>9</td>
<td>7</td>
<td>78</td>
</tr>
<tr>
<td>Vascular access, Specimen sampling and Injection therapy</td>
<td>11</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td>Trauma care and Injury management</td>
<td>12</td>
<td>11</td>
<td>92</td>
</tr>
<tr>
<td>Ear, Nose, Throat and Eye Emergencies</td>
<td>7</td>
<td>4</td>
<td>57</td>
</tr>
<tr>
<td>Dental Emergencies</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Urology Emergencies</td>
<td>4</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>Gynaecology/ Obstetrics emergencies</td>
<td>6</td>
<td>5</td>
<td>83</td>
</tr>
<tr>
<td>Psychiatry Emergencies</td>
<td>3</td>
<td>2</td>
<td>67</td>
</tr>
<tr>
<td>Transporting the critically ill/ injured</td>
<td>8</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>Items suggested by participants</td>
<td>8</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total items reaching consensus</strong></td>
<td><strong>113</strong></td>
<td><strong>98</strong></td>
<td><strong>87</strong></td>
</tr>
</tbody>
</table>

**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 qualifications19. 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 countries20. 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.

Acknowledgement

We want to thank the senior lecturers at the UZCHS who participated in this Delphi study, for their time and honest input.

We appreciate the following emergency physicians for validating the research survey questionnaire: Dr Willem Jooste (UCT), Dr Dineo Moiloa (MD Inc), Dr Alex Midgely (UCT), Dr Kaveto Sikuvi (UCT), Dr Diulu Kabongo (SU), Dr Annet Ngabirano (SU) and Dr Elaine Erasmus (SU).

Finally, we sincerely acknowledge the statistical guidance received from Mr. William Msembali (Clinical Research Center, UCT) and the project coordination by Mrs Farayi Kaseke of UZCHS

Supplementary data

Data associated with this article can be forwarded per request.
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- Size the illustrations close to the desired dimensions of the published version. 
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- Supply files that are too low in resolution; 
- Submit graphics that are disproportionately large for the content. 

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**Table 1** Title of table

Align heading left Align heading middle Align heading middle Align heading middle

| Align content left | Align content middle | Align content middle | Align content lefta | Align content middleb | Align content middle | a | Footnote 1, b | Footnote 2 |

**References**

**Citation in text**

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substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

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Reference to a book:


Reference to a chapter in an edited book:


Reference to a website:


Reference to a dataset:

Note shortened form for last page number. e.g., 51–9, and that for more than 6 authors the first 6 should be listed followed by 'et al.' For further details you are referred to 'Uniform Requirements for Manuscripts submitted to Biomedical Journals' (J Am Med Assoc 1997;277:927–34) (see also Samples of Formatted References).

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Appendix B: AFEM Curriculum

The African Federation for Emergency Medicine

Keystone Curriculum

**General Principles of 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

<table>
<thead>
<tr>
<th>BLOCK</th>
<th>DIDACTIC CORE</th>
<th>CORE INTERACTIVE MODULE</th>
<th>EXPANDED INTERACTIVE MODULE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I</strong></td>
<td>Functional anatomy of the cardiac system, including conduction system</td>
<td>Bradycardia and tachycardia cases</td>
<td>Bradycardia and tachycardia cases</td>
</tr>
<tr>
<td></td>
<td>Diagnosis of circulatory failure: Physical exam, labs, ultrasound</td>
<td>Hypertension cases and acute management</td>
<td>Hypertension cases and acute management</td>
</tr>
<tr>
<td></td>
<td>Circulatory resuscitation: Fluids, pressors, and inotropes</td>
<td>Ischaemic limb cases</td>
<td>Ischaemic limb cases</td>
</tr>
<tr>
<td></td>
<td>Introduction to bradyarrhythmias and tachyarrhythmias</td>
<td>Advanced mitral valve disease</td>
<td>Advanced mitral valve disease</td>
</tr>
<tr>
<td><strong>II</strong></td>
<td>Congestive cardiac failure: Acute exacerbation</td>
<td>Etiologies of cardiomyopathies</td>
<td>Aetiologies of cardiomyopathies</td>
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<td></td>
<td>Congenital heart disease</td>
<td>Cardiac tamponade</td>
<td>Cardiac tamponade</td>
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<td></td>
<td>Valvular heart disease</td>
<td>Essential cardiac pharmacology</td>
<td>Essential cardiac pharmacology</td>
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<td></td>
<td>Peri-myocarditis and endocarditis</td>
<td>Self-study ECG cases</td>
<td>Self-study ECG cases</td>
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<tr>
<td><strong>III</strong></td>
<td>Hypertension</td>
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<tr>
<td></td>
<td>Ischaemic heart disease: Angina and myocardial infarction</td>
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<tr>
<td></td>
<td>Aortic aneurysm and dissection</td>
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<tr>
<td></td>
<td>Deep venous thrombosis/Pulmonary embolus</td>
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</tr>
</tbody>
</table>

*Skills presentations are identified by BLUE text*
### 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

<table>
<thead>
<tr>
<th>Didactic Core</th>
<th>Core Interactive Module</th>
<th>Expanded Interactive Module</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dermatology (I)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How to describe a skin lesion</td>
<td>Skin lesions in adults</td>
<td>Skin lesions in adults</td>
</tr>
<tr>
<td>Differential for types of lesions: Ulcerative, plaque, papular, vesicular, exfoliative (excluding purpura)</td>
<td>Skin lesions in children</td>
<td>Skin lesions in children</td>
</tr>
<tr>
<td>Treatments for dermatologic conditions: Anti-bacterials, antifungals, immune modifiers, mechanical therapies</td>
<td>Approach to breast lesions</td>
<td>Approach to breast lesions</td>
</tr>
<tr>
<td>Dermatologic manifestations of systemic disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Haematology (II)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life-threatening rashes</td>
<td>Disseminated intravascular coagulation</td>
<td>Disseminated intravascular coagulation</td>
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<tr>
<td>Purpura</td>
<td>Anti-platelet and anti-coagulation agents</td>
<td>Anti-platelet and anti-coagulation agents</td>
</tr>
<tr>
<td>Anaemia</td>
<td>Emergency complications of malignancies and chemotherapy</td>
<td>Emergency complications of malignancies and chemotherapy</td>
</tr>
<tr>
<td>Sickle cell disease</td>
<td>Controversies in the treatment of sickle cell disease</td>
<td>Controversies in the treatment of sickle cell disease</td>
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<tr>
<td><strong>Rheumatology (III)</strong></td>
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<tr>
<td>Bleeding disorders</td>
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<tr>
<td>Blood products in the ED and transfusion reactions</td>
<td></td>
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<tr>
<td>Approach to the inflamed or painful joint</td>
<td></td>
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</tr>
<tr>
<td>Lupus and vasculitides</td>
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</tr>
<tr>
<td><strong>Skills Block:</strong></td>
<td>Physical examination: Shoulder</td>
<td>Physical examination: Shoulder</td>
</tr>
</tbody>
</table>
### 3: TRAUMA (6 weeks)

<table>
<thead>
<tr>
<th>Didactic Core</th>
<th>Core Interactive Module</th>
<th>Expanded Interactive Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Approach to the trauma patient: Priorities in poly-trauma</td>
<td>Crush syndrome and rhabdomyolysis</td>
<td>Crush syndrome and rhabdomyolysis</td>
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<tr>
<td>Special considerations in the paediatric and geriatric trauma patient</td>
<td>Abdominal injury cases</td>
<td>Abdominal injury cases</td>
</tr>
<tr>
<td>Approach to the patient with head trauma</td>
<td>Thoracic injury cases</td>
<td>Thoracic injury cases</td>
</tr>
<tr>
<td>Facial trauma</td>
<td>Hand injury and infection cases</td>
<td>Hand injury and infection cases</td>
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<tr>
<td>II Eye trauma</td>
<td>Lightning and electrical injuries</td>
<td>Lightning and electrical injuries</td>
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<tr>
<td>Neck trauma</td>
<td>Aortic injuries</td>
<td>Aortic injuries</td>
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<tr>
<td>Spinal injuries</td>
<td>Blast injuries</td>
<td>Blast injuries</td>
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<tr>
<td>Peripheral vascular injuries</td>
<td>Mammalian bites</td>
<td>Mammalian bites</td>
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<tr>
<td>III Thoracic trauma</td>
<td>Diagnosis and management of strains and sprains</td>
<td>Diagnosis and management of strains and sprains</td>
</tr>
<tr>
<td>Abdominal trauma</td>
<td>How to describe a fracture</td>
<td>How to describe a fracture</td>
</tr>
<tr>
<td>Pelvic trauma</td>
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<td>Radiation injuries</td>
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<tr>
<td>Genitourinary trauma</td>
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<td>Wrist fracture</td>
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<td>IV Burns and smoke inhalation</td>
<td></td>
<td>Advanced lower limb fracture</td>
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<tr>
<td>Drowning</td>
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<td>Strangulation injuries</td>
</tr>
<tr>
<td>Approach to paediatric fractures Non-accidental injury patterns</td>
<td>Evidence based volume resuscitation in trauma</td>
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<td>Upper limb fractures</td>
<td>Upper limb fractures</td>
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<tr>
<td>Lower limb fractures</td>
<td>Lower extremity dislocations</td>
<td></td>
</tr>
<tr>
<td>Upper extremity dislocations</td>
<td>Lower extremity dislocations</td>
<td></td>
</tr>
</tbody>
</table>

**Skills Block:**

- Examination of the injured knee
- Examination of the injured hand
- Dislocation reduction techniques: Shoulder and elbow
- Dislocation reduction techniques: Hip and knee
- Dislocation reduction techniques: Ankle, phalanges, other
- Wound management & suturing
- Stabilization of pelvic fracture
- Splinting
- Escharotomy
- Advanced wound repair
- Burr holes
- XR interpretation: Upper extremity
- XR interpretation: Lower extremity
- XR interpretation: Spine
**4: INFECTIOUS DISEASE**

<table>
<thead>
<tr>
<th>Didactic Core</th>
<th>Core Interactive Module</th>
<th>Expanded Interactive Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Approach to the patient with sepsis</td>
<td>Adult with fever cases</td>
<td>Adult with fever cases</td>
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<td>Malaria</td>
<td>Child with fever cases</td>
<td>Child with fever cases</td>
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<tr>
<td>Fever in the immunocompromised patient</td>
<td>Malaria diagnostics and treatment guidelines</td>
<td>Malaria diagnostics and treatment guidelines</td>
</tr>
<tr>
<td>HIV/AIDS emergencies</td>
<td>Other childhood viral infections: Varicella, mumps, mononucleosis</td>
<td>Other childhood viral infections: Varicella, mumps, mononucleosis</td>
</tr>
<tr>
<td>II Age-based evaluation and empiric treatment of the child with fever</td>
<td>Septic joint</td>
<td>Septic joint</td>
</tr>
<tr>
<td>Approach to the child with skin lesion or rash</td>
<td>Strep throat</td>
<td>Strep throat</td>
</tr>
<tr>
<td>Meningitis</td>
<td>National burden of disease</td>
<td>National burden of disease</td>
</tr>
<tr>
<td>Extra-pulmonary TB</td>
<td>Current national vaccination schedule</td>
<td>Current national vaccination schedule</td>
</tr>
<tr>
<td>III Infectious diarrhoea and complications</td>
<td>Controversies in the management of sepsis: volume, steroids, EGDT</td>
<td>Controversies in the management of sepsis: volume, steroids, EGDT</td>
</tr>
<tr>
<td>Parasitic infection of gastrointestinal tract</td>
<td>Kawasaki’s disease</td>
<td></td>
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<tr>
<td>Typhoid and cholera</td>
<td>Controversies in the treatment of meningitis</td>
<td></td>
</tr>
<tr>
<td>Hepatitis</td>
<td>Post-exposure prophylaxis in the health care worker</td>
<td></td>
</tr>
<tr>
<td>IV Spinal infections</td>
<td>Polio and botulism</td>
<td></td>
</tr>
<tr>
<td>Urinary tract infections, including renal and schistosomiasis</td>
<td>Tick-borne illness</td>
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</tr>
<tr>
<td>Soft tissue infection: Cellulitis and abscess</td>
<td>Toxic shock syndrome</td>
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<td>---------------------------------------------</td>
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<tr>
<td>Dermatoparasites</td>
<td>Haemorrhagic fevers</td>
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<tr>
<td>Rabies and tetanus</td>
<td>Outbreak control</td>
<td></td>
</tr>
<tr>
<td>Post-infectious inflammatory conditions</td>
<td>Nosocomial infections: Pneumonia, CSF, joints, skin, blood</td>
<td></td>
</tr>
<tr>
<td>Rheumatic fever</td>
<td>Local anti-microbial resistance patterns and rational antibiotic use</td>
<td></td>
</tr>
<tr>
<td>Influenza, SARS and global epidemics</td>
<td>National and WHO treatment guidelines</td>
<td></td>
</tr>
</tbody>
</table>

**Emergency facility response to highly communicable pathogens Skills Block:**

- Incision and drainage
- Recognition of cutaneous infections
- Ultrasound of skin and soft tissue infections

**5: PAEDS/PSYCH/HEENT**

<table>
<thead>
<tr>
<th>Didactic Core</th>
<th>Core Interactive Module</th>
<th>Expanded Interactive Module</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paediatrics (I)</strong></td>
<td></td>
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</tr>
<tr>
<td>Foreign bodies in children: Ears, nose, aspiration, and ingestion</td>
<td>Special considerations in the paediatric physical examination</td>
<td>Special considerations in the paediatric physical examination</td>
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<tr>
<td>Approach to the child with abnormal gait or limp</td>
<td>Paediatric medical resuscitation</td>
<td>Paediatric medical resuscitation</td>
</tr>
<tr>
<td>Approach to the malnourished child</td>
<td>Paediatric trauma resuscitation</td>
<td>Paediatric trauma resuscitation</td>
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<tr>
<td>Positive pressure ventilation in the child</td>
<td>Neonatal resuscitation</td>
<td>Neonatal resuscitation</td>
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<tr>
<td>Common problems in neonates</td>
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<td>SIDS</td>
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<tr>
<td>Skills Block: Paediatric vascular access, including umbilical lines</td>
<td>Psychiatric Emergencies(II)</td>
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</tr>
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</tr>
<tr>
<td>Approach to the agitated patient: Acute psychosis and mania</td>
<td>The psychiatric H&amp;P</td>
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</tr>
<tr>
<td>Evaluation of the suicidal or homicidal patient</td>
<td>Physical and pharmacologic restraint cases</td>
<td></td>
</tr>
<tr>
<td>Medical clearance of the psychiatric patient</td>
<td>Management of acute anxiety</td>
<td></td>
</tr>
<tr>
<td>Diagnosis and treatment of depression</td>
<td>Anti-depressant medications</td>
<td></td>
</tr>
<tr>
<td>Management of acute anxiety</td>
<td>Toxicologic syndromes associated with psychiatric medications</td>
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</tr>
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<td></td>
<td>Somatisation and relationship to depression</td>
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</tr>
<tr>
<td></td>
<td>Medico-legal aspects of psychiatric care</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assessing competence</td>
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<table>
<thead>
<tr>
<th>HEENT(III)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life-threatening ENT and oral infections</td>
</tr>
<tr>
<td>Epistaxis</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Approach to the patient with stridor (adults and children)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Differential diagnosis of head and neck mass (adults and children)</td>
</tr>
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<tr>
<td>Evaluation of the red eye</td>
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### Skills Block:

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical examination of the HEENT system, including fundoscopy</td>
<td>Physical examination of the HEENT system, including fundoscopy</td>
</tr>
<tr>
<td>Dental procedures</td>
<td>Dental procedures</td>
</tr>
<tr>
<td>Nasal packing</td>
<td>Nasal packing</td>
</tr>
<tr>
<td>Incision and drainage of peri-tonsilar abscess</td>
<td>Incision and drainage of peri-tonsilar abscess</td>
</tr>
<tr>
<td>Foreign body removal: pharynx, ear, nose, eye</td>
<td>Foreign body removal: pharynx, ear, nose, eye</td>
</tr>
<tr>
<td>Repair of ear and nose wounds, including septal haematoma</td>
<td>Repair of ear and nose wounds, including septal haematoma</td>
</tr>
<tr>
<td>Dislocation reduction techniques: TMJ</td>
<td>Dislocation reduction techniques: TMJ</td>
</tr>
<tr>
<td>Ocular US</td>
<td>Ocular US</td>
</tr>
<tr>
<td>Slit lamp examination</td>
<td>Advanced airway management</td>
</tr>
<tr>
<td>Lateral canthotomy</td>
<td>Lateral canthotomy</td>
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</tbody>
</table>

### 6: RESPIRATORY

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

### Neulisation and assessment of peak flow

#### Thoracentesis

---

## III: GENITOURINARY and METABOLIC

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

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

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

**OB/GYN (I)**
- Trauma in pregnancy
- Pregnancy-related vaginal bleeding (excluding ectopic)
- Diagnosis and treatment of ectopic pregnancy
- Eclampsia and hypertensive disorders of pregnancy

**OB/GYN (II)**
- Infections in pregnancy
- STD in women, including PID and other complications

**OB/GYN (II)**
- Management of UTI in pregnancy
- Hypertensive disorders of pregnancy
<table>
<thead>
<tr>
<th>Evaluation of sexual assault victims</th>
<th>Comparison of surgical and medical interventions for ectopic pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foetal monitoring in pregnancy</td>
<td>Classification of vulval and labial lesions</td>
</tr>
<tr>
<td>Special considerations in the exam of sexual assault victims</td>
<td>Assessment of foetal viability</td>
</tr>
<tr>
<td>Drugs to avoid in pregnancy</td>
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</table>

**Skills Block:**

<table>
<thead>
<tr>
<th>Physical examination of the pregnant patient</th>
<th>Physical examination of the pregnant patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bimanual and speculum exam</td>
<td>Bimanual and speculum exam</td>
</tr>
<tr>
<td>Emergency delivery: Normal</td>
<td>Emergency delivery: Normal</td>
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<td>Emergency delivery: Abnormal</td>
<td>Emergency delivery: Abnormal</td>
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<tr>
<td>Ultrasound in first and second-trimester pregnancy</td>
<td>Ultrasound in first and second-trimester pregnancy</td>
</tr>
<tr>
<td>Ultrasound in third-trimester pregnancy</td>
<td>Ultrasound in third-trimester pregnancy</td>
</tr>
<tr>
<td>Adnexal mass: Ultrasound</td>
<td>Adnexal mass: Ultrasound</td>
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<tr>
<td>Caesarean section</td>
<td>Caesarean section</td>
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</table>

**Tox (III)**

<table>
<thead>
<tr>
<th>Approach to the patient with suspected toxicologic syndrome</th>
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</thead>
<tbody>
<tr>
<td>Cholinergic and anticholinergic poisoning</td>
<td>Acetaminophen and salicylate overdose</td>
</tr>
<tr>
<td>Acetaminophen and salicylate overdose</td>
<td>Acetaminophen and salicylate overdose</td>
</tr>
<tr>
<td>Sympathomimetics and opioids</td>
<td>Alcohol intoxication and withdrawal</td>
</tr>
<tr>
<td>Alcohol intoxication and withdrawal</td>
<td>Alcohol intoxication and withdrawal</td>
</tr>
<tr>
<td>Corrosive and caustic agents</td>
<td>Sedative hypnotics: Barbiturates and benzodiazepines</td>
</tr>
<tr>
<td>Sedative hypnotics: Barbiturates and benzodiazepines</td>
<td>Sedative hypnotics: Barbiturates and benzodiazepines</td>
</tr>
<tr>
<td>GHB (gamma-hydroxybutyrate)</td>
<td>GHB (gamma-hydroxybutyrate)</td>
</tr>
<tr>
<td>Toxic bites and stings</td>
<td>Antidotes: Sodium bicarbonate</td>
</tr>
<tr>
<td>Antidotes: Sodium bicarbonate</td>
<td>Antidotes: Sodium bicarbonate</td>
</tr>
<tr>
<td>Other antidotes: Naloxone, Flumazenil, chelating agents, Digibind</td>
<td>Other antidotes: Naloxone, Flumazenil, chelating agents, Digibind</td>
</tr>
<tr>
<td>Beta-blockers, calcium channel blockers, digoxin Beta-blocking agents, calcium channel blockers, digoxin</td>
<td>Beta-blockers, calcium channel blockers, digoxin Beta-blocking agents, calcium channel blockers, digoxin</td>
</tr>
<tr>
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</tr>
<tr>
<td>Carbon monoxide Toxic bites and sting cases Organic alcohols Iron and lead poisoning Toxic plants and mushrooms Local rodenticides INH toxicity Quinine toxicity Methaemoglobinemia Seafood toxins Theophylline and other xanthenes</td>
<td>Carbon monoxide Toxic bites and sting cases Organic alcohols Iron and lead poisoning Toxic plants and mushrooms Local rodenticides INH toxicity Quinine toxicity Methaemoglobinemia Seafood toxins Theophylline and other xanthenes</td>
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</tbody>
</table>

9: NEUROLOGIC

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

**Skills Block:** The neurologic exam The neurologic exam
<table>
<thead>
<tr>
<th>Didactic Core</th>
<th>Core Interactive Module</th>
<th>Expanded Interactive Module</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I</strong> Approach to the abdominal pain</td>
<td>Mesenteric ischaemia</td>
<td>Mesenteric ischaemia</td>
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<tr>
<td>Age-based approach to the child with abdominal pain</td>
<td>Gallbladder disease</td>
<td>Gallbladder disease</td>
</tr>
<tr>
<td>Approach to the patient with abdominal mass</td>
<td>Chronic liver disease, cirrhosis and portal hypertension</td>
<td>Chronic liver disease, cirrhosis and portal hypertension</td>
</tr>
<tr>
<td>Gastrointestinal bleeding</td>
<td>GI bleeding in adults</td>
<td>GI bleeding in adults</td>
</tr>
<tr>
<td><strong>II</strong> Approach to vomiting with and without diarrhoea in adults</td>
<td>GI bleeding in children</td>
<td>GI bleeding in children</td>
</tr>
<tr>
<td>Approach to vomiting with and without diarrhoea in children</td>
<td>Oesophageal emergencies</td>
<td>Oesophageal emergencies</td>
</tr>
<tr>
<td>Bowel obstruction in adults and children</td>
<td>Anal and rectal disorders</td>
<td>Anal and rectal disorders</td>
</tr>
<tr>
<td>Hernia diagnosis and treatment</td>
<td>Diverticular disease</td>
<td></td>
</tr>
<tr>
<td><strong>III</strong> Pancreatitis</td>
<td></td>
<td>Acute liver failure and hepatitis</td>
</tr>
<tr>
<td>Acute jaundice</td>
<td></td>
<td>Inflammatory bowel disease</td>
</tr>
</tbody>
</table>
## 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
- Gastric tube placement: NGT, OGT, and GT replacement
- Paracentesis
- XR interpretation: Abdomen
- CT interpretation: Abdomen
- Understanding hepatitis diagnostics
- Peritoneal fluid analysis
- Ultrasound for biliary disease
- Advanced ultrasound: Abdominal
- Appendectomy

## 11: OUT-OF-HOSPITAL and DISASTER MEDICINE

<table>
<thead>
<tr>
<th>Didactic Core</th>
<th>Core Interactive Module</th>
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</thead>
<tbody>
<tr>
<td>General principles of pre-hospital care</td>
<td>Pre-hospital disaster response</td>
<td>Basic emergency first responder kit</td>
</tr>
<tr>
<td>General principles of disaster medicine</td>
<td>Hospital-based disaster response</td>
<td>Aero-medical services</td>
</tr>
<tr>
<td>Transfer medicine (including interfacility communication)</td>
<td>Mechanical and structural collapse</td>
<td>Ethics in disaster response</td>
</tr>
<tr>
<td>Mass gatherings</td>
<td>Complex humanitarian emergencies</td>
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<tr>
<td></td>
<td>Chemical and biological incidents</td>
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<tr>
<td></td>
<td>Recovering from a disaster</td>
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</tr>
</tbody>
</table>
Appendix B: IFEM Curriculum

International Federation for Emergency Medicine

INTERNATIONAL FEDERATION FOR EMERGENCY MEDICINE
MODEL CURRICULUM FOR EMERGENCY MEDICINE

Cherri Hobgood, MD,1 Venkataraman Anantharaman, MD,2 Glen Bandiera, MD,3 Peter Cameron, MD,4 Pinchas Halperin, MD,5 Nicholas Jouriles, MD,6 Darren Kilroy, MD,7 Terrence Mulligan, MD,8 Andrew Singer, MD,9 for the International Federation for Emergency Medicine

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2Glen Bandiera, University of Toronto, Toronto, ON, Canada

3Peter Cameron, MD

4Pinchas Halperin, Tel Aviv Medical Center, Tel Aviv, Israel

5Nicholas Jouriles, Akron General Medical Center, Akron, Ohio, USA

6Darren Kilroy, College of Emergency Medicine, London, United Kingdom

7Terrence Mulligan, Erasmus University School of Medicine, Rotterdam, The Netherlands
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RUNNING HEAD: IFEM Model Curriculum

KEY WORDS: curriculum, international emergency medicine, medical education,
WORD COUNT: 2372
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 time-sensitive 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
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 aneurysm

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
   35.3: 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.

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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 junior 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

<table>
<thead>
<tr>
<th>Emergency Procedure</th>
<th>Not Sure</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HAZARDS CONTROL/ SAFETY</strong></td>
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<tr>
<td>Use of personal protective equipment (aprons, gowns, goggles, face masks, gloves, boots)</td>
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<tr>
<td>Correct handwashing and scrubbing</td>
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<tr>
<td>Safe handling and disposal of biological waste</td>
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<tr>
<td>Safe handling and disposal of sharps</td>
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<tr>
<td>Other: Specify</td>
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<tr>
<td><strong>EMERGENCY MEDICINE PRACTICE</strong></td>
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<tr>
<td>Rapid focussed assessment of the critically ill/injured patient</td>
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<td>Giving a concise informative patient handover/referral</td>
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<td>Focussed Emergency department case presentation</td>
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<td>Analgesia and procedural sedation administration</td>
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<tr>
<td>Emergency/ Resuscitation drugs administration:</td>
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<tr>
<td>1. Adenosine</td>
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<td>2. Adrenaline</td>
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<td>3. Amiodarone</td>
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<td>4. Calcium chloride/ Carbonate</td>
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<td>5. Potassium Sulphate</td>
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<td>6. Magnesium Sulphate</td>
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<td>7. Antivenom</td>
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<td>8.</td>
<td>Fibrinolytics eg streptokinase, rTPA</td>
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<td>9.</td>
<td>Insulin infusion</td>
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<td>10.</td>
<td>Glucose infusion (neonate, child, adult)</td>
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</table>

**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 Tachycardia
- Basic defib/monitor functional status check
- Preform safe defibrillation and Electrical cardioversion
- Transcutaneous pacing technique
- Pharmacological cardioversion-antiarrhythmics 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
<table>
<thead>
<tr>
<th>Procedure</th>
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</thead>
<tbody>
<tr>
<td>Blood glucose measurement</td>
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<tr>
<td>Pulse oximetry</td>
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<td>Urine pregnancy testing</td>
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<td>Urine dipstick and interpretation</td>
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<tr>
<td>Blood gas interpretation</td>
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<tr>
<td>Point of care/ limited ultrasound</td>
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<td>Other: Specify</td>
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<tr>
<td>INTRAVENOUS ACCESS AND Injection Therapy</td>
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<tr>
<td>Peripheral venous cannulation</td>
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<tr>
<td>Central venous catheterisation</td>
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<tr>
<td>Administer IV fluids and medication infusions</td>
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<td>Administer blood products safely</td>
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<tr>
<td>Intraosseous needle insertion</td>
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<td>Subcutaneous injection</td>
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<td>Intramuscular injection</td>
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<tr>
<td>Regional blocks eg ring block, penile block</td>
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<tr>
<td>Other: Specify</td>
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<tr>
<td>SAMPLING EMERGENCY SPECIMENS</td>
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<tr>
<td>Venepuncture</td>
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<tr>
<td>Arterial blood sampling</td>
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<tr>
<td>Blood culture and pus swab sampling</td>
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<tr>
<td>Lumbar puncture</td>
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<tr>
<td>Joint injection/ aspiration</td>
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<tr>
<td>Needle thoracocentesis</td>
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<tr>
<td>Abdominal paracentesis</td>
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<td>Other: Specify</td>
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</tbody>
</table>
**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
<p>| <strong>Nasal passage foreign body removal</strong> |  |  |  |
| <strong>EYE Injury assessment</strong> |  |  |  |
| <strong>Eye irrigation</strong> |  |  |  |
| <strong>Fluorescein staining of cornea</strong> |  |  |  |
| <strong>Eye padding</strong> |  |  |  |
| <strong>Eye Foreign body removal</strong> |  |  |  |
| <strong>Other: Specify</strong> |  |  |  |
| <strong>OBSTETRICS/ GYNAECOLOGY EMERGENCIES</strong> |  |  |  |
| <strong>Speculum examination</strong> |  |  |  |
| <strong>Manual removal of retained products of conception</strong> |  |  |  |
| <strong>Emergency vaginal delivery</strong> |  |  |  |
| <strong>Emergency breech vaginal delivery</strong> |  |  |  |
| <strong>Emergency management of shoulder dystocia</strong> |  |  |  |
| <strong>Foetal assessment/ monitoring</strong> |  |  |  |
| <strong>Neonatal resuscitation: Basic</strong> |  |  |  |
| <strong>Other: Specify</strong> |  |  |  |
| <strong>EMERGENCY PSYCHIATRY</strong> |  |  |  |
| <strong>Verbal restraint (talking/ calming down aggressive patient</strong> |  |  |  |
| <strong>Safe Physical restraint technique</strong> |  |  |  |
| <strong>Pharmacological restraint</strong> |  |  |  |
| <strong>Protocol based suicidal risk assessment</strong> |  |  |  |
| <strong>TRANSPORT OF THE CRITICALLY ILL / INJURED PATIENT</strong> |  |  |  |
| <strong>Safe transfer of patient from stretcher to bed</strong> |  |  |  |
| <strong>Cervical spine immobilisation in Trauma</strong> |  |  |  |</p>
<table>
<thead>
<tr>
<th>Full spinal immobilisation technique</th>
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<tbody>
<tr>
<td>Securing IV lines, tubing, catheters for transfer</td>
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<tr>
<td>Basic monitoring equipment set up/troubleshoot</td>
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<tr>
<td>Safe procedural sedation</td>
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<tr>
<td>Warming and cooling techniques and equipment usage</td>
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<tr>
<td>Other: Specify</td>
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</tbody>
</table>

**OTHER CATEGORY**

Specify/ suggest procedures

---

**Demographics**

<table>
<thead>
<tr>
<th>What is your gender</th>
<th>female</th>
<th>male</th>
<th>Prefer not to say</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your involvement in teaching/ evaluating/ assessing emergency procedures?</td>
<td>Curriculum design/ approval</td>
<td>Teach students</td>
<td>Evaluate/ grade students</td>
</tr>
<tr>
<td>(Please select all items that apply to you)</td>
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</tr>
<tr>
<td>For how long have you been performing the above role(s)</td>
<td>Less than 5 years</td>
<td>5-10 years</td>
<td>More than ten years</td>
</tr>
<tr>
<td>Please state the primary clinical department in which you work/ teach; For example</td>
<td>Anaesthetics</td>
<td>Gynaecology/ Obstetrics</td>
<td>surgery</td>
</tr>
</tbody>
</table>
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

[Email](Thembimtombeni@gmail.com)
+27606433760

**Supervisors**

1. **Dr Heike Geduld**
   - **Email Address:** Heike.Geduld@uct.ac.za
   - **Contact Number:** +27 84 7571565

2. **Prof Midion Chidzonga**
   - **Email Address:** mtnchidzonga@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
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
CHAIRPERSON FHS HUMAN RESEARCH ETHICS COMMITTEE

Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB000001938

• 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

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

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

APPROVAL LETTER

Date: 19th 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 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
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,

[Signature]

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
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.

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

Yours Faithfully

MRCZ SECRETARIAT
FOR CHAIRPERSON
MEDICAL RESEARCH COUNCIL OF ZIMBABWEE
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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Research proposal summary
Background and motivation
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. 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. 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. 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. 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. 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. 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. 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.
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 settings10.

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 scale9. 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\textsuperscript{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.

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<thead>
<tr>
<th>Activity</th>
<th>Feb 16</th>
<th>Mar 16</th>
<th>Apr 16</th>
<th>May 16</th>
<th>Jun 16</th>
<th>Jul 16</th>
<th>Aug 16</th>
<th>Sep 16</th>
<th>Oct 16</th>
<th>Nov 16</th>
<th>Dec 16</th>
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</table>
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

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

   Sixtieth World Health Assembly, Agenda Item 12.14
   WHA 60.22, 23 May 2007
   Accessed online, www.sciencedirect.com on 05/03/2015
6. Medical and Dental Council of Zimbabwe: education and training
   www.mdpcz.co.zw/education. Accessed 21/09/15
   Accessed online apps.who.int/gb/ebwha/pdf_files/wha60
   Accessed online on www.sciencedirect.com

   Medical Teacher, Vol 27 (7) pp. 639-643


   Accessed online on 15/12/2015
   http://www.afem.info/resources/afem-curriculum/?id=73%27A


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


   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
Title: Dr
Student No: CHNSIT001
Name, Surname: Sithembile Mtombeni
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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

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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.
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