

**Division of Emergency Medicine  
Research Committee**

**2018 Research Report**



A joint committee of the University of Cape Town,  
Stellenbosch University and the Western Cape Government



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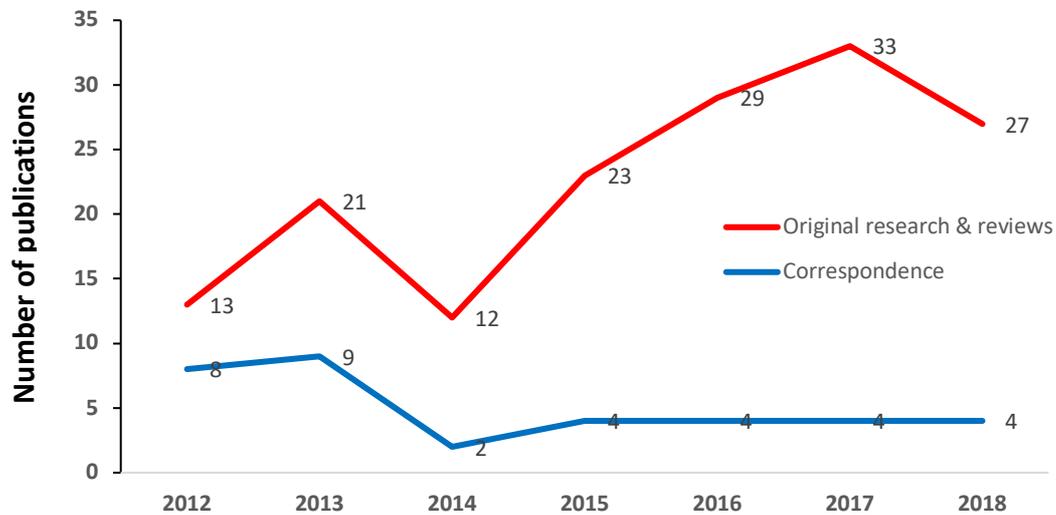
## 1 Summary of EMDRC Research Activities

In 2018 the Emergency Medicine Divisional Research Committee (EMDRC) received 77 submissions with 32 research proposals approved for further submission to the relevant research ethics committees (Table 1). The following members of the EMDRC are acknowledged for their consistent contribution to reviewing submissions in 2018: Ms Rachel Allgaier, Dr Julian Fleming, Dr Heike Geduld, Dr Clint Hendrikse, Dr Peter Hodgkinson, Dr Willem Jooste, Dr Waseela Khan, Dr Heinrich Lamprecht, Dr Sue le Roux, Mr Michael McCaul, Dr Colleen Saunders, Dr Wayne Smith, Dr Willem Stassen and Prof Lee Wallis.

**Table 1: EMDRC Review activities 2013-2018**

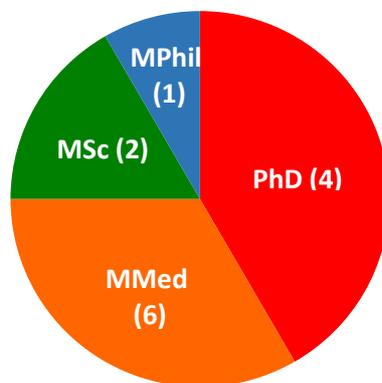
	<b>Ave</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
All submissions	<b>72</b>	45	53	115	63	78	<b>77</b>
<i>Summaries</i>	<b>32</b>	6	19	57	32	37	<b>40</b>
<i>Proposals</i>	<b>40</b>	39	34	58	31	41	<b>37</b>
Reviews performed	<b>144</b>	90	106	230	126	156	<b>154</b>
Submissions approved	<b>52</b>	31	32	84	47	57	<b>59</b>
Proposals approved	<b>28</b>	26	18	37	21	31	<b>32</b>
Revisions advised	<b>19</b>	14	20	29	16	16	<b>17</b>
Rejected	<b>1</b>	0	1	2	0	1	<b>1</b>

Together with their students, EMCT staff authored or co-authored 31 research publications including four letters to the editor and 27 original research and review articles (Figure 1).



**Figure 1: EMDRC Publication outputs 2012-2018**

A total of 13 students successfully completed their dissertations in 2018, either in full (PhD, MSc) or partial fulfilment (MMed, MPhil) of their degree requirements (Figure 2).



**Figure 2: Breakdown of student dissertations completed in 2018**

*Full-text copies of all research outputs are available on request from Dr Colleen Saunders, Division of Emergency Medicine, University of Cape Town.*

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## 2 Opinion pieces and Brief Communications

### 2.1 Lack of Acute Care Resources to Diagnose and Treat Acute Coronary Syndrome in Lower-Income Settings

*JG. Beukes, C. Hendrikse, SR. Bruijns. Glob Heart 2018; 13(1):35-6.e4.*

This letter to the editor described a small study which aimed to indirectly describe and compare the availability of resources to manage ACS in low- and middle-income countries with resources in high-income countries by means of a survey distributed to delegates at the International Conference on Emergency Medicine 2016, Cape Town. Although the study sample was small, it provides a bleak perspective of the resources available in low- and middle-income countries to allow for appropriate management of ACS as per the American Heart Association's guidelines as a gold standard.

### 2.2 The case for a regional approach to publication impact

*S. Bruijns, C. Lamanna. ecancermedalscience 2018; 12: ed78.*

This editorial makes the case for the creation of a regional impact metric to better serve clinicians, researchers, and libraries in understanding which journals are relevant to their context and practice. The authors argue that using the world as the denominator lacks granularity and may be deleterious in regions where the gap in infrastructure, resources or human capital is too large as they impact the way in which the local scientific community can interact with the local disease burden, which in many cases differs regionally.

### 2.3 Hospital proximity does not guarantee access to emergency care

*H. Geduld, EJ. Calvello Hynnes, LA. Wallis, T. Reynolds. Lancet Global Health 2018. 6(6): e731.*

This letter to the editor is in response to a publication by Ouma and colleagues (March 2018), which highlights the importance of access to emergency care. The authors conclude that 71% of the population in sub-Saharan Africa lives within 2 hours of hospital access and makes the assumption that hospital proximity equals access to emergency services. Geduld et al argue that most patients with an emergent condition who can access a hospital are likely to be met with limited, ineffective or non-existent emergency care. Most hospitals in sub-Saharan Africa are without well organised emergency care provision and actual access to emergency care is much lower than the authors' estimates.

### 2.4 Measuring regional impact: The case for bigger data

*C. Lamanna, S. Bruijns. Learned Publishing 2018; 31(4), 413-416*

This opinion piece describes a method of evaluating the impact of research within a specific region. It is currently not possible to measure the impact of research within a specific region. There are both practical and philosophical reasons why online views may be preferable to citations for measuring the regional impact of clinical research. With only a few changes to existing data collection strategies, a new regional impact metric could be created. A reliable regional impact metric would allow local clinicians to discover practical context-appropriate research. By collecting regional view data, journals may be incentivised to increase their view

footprint beyond the West; this would disproportionately benefit the developing world. By focusing on views as well as citations, authors would be encouraged to increase the clarity, readability, and engagingness of their work. Reaping these rewards would not require a data revolution: the data are there, they are just not being collected. It appears then, despite all the hype surrounding big data, that in the field of scholarly communication, data are not yet big enough.

### 3 Original Research and Reviews

#### 3.1 A comparison between differently skilled prehospital emergency care providers in major-incident triage in South Africa

*AN. Alenyo, WP. Smith, M. McCaul, DJ. van Hoving. Prehosp Disaster Med. 2018; 33(6):575-80.*

The aim of this cross-sectional study was to determine the difference in major-incident triage performance between prehospital emergency care providers with different training levels in South Africa utilizing the Triage Sieve algorithm. Participants wrote a validated 20-question pre-test before completing major-incident training. Two post-tests were also completed: a 20-question written test and a three-question face-to-face evaluation. A total of 129 prehospital providers participated. Most (n=87; 67.4%) were BLS providers. The overall correct triage score pre-training was 53.9% (95% CI, 51.98 to 55.83), over-triage 31.4% (95% CI, 29.66 to 33.2), and under-triage 13.8% (95% CI, 12.55 to 12.22). Post-training, the overall correct triage score increased to 63.6% (95% CI, 61.72 to 65.44), over-triage decreased to 17.9% (95% CI, 16.47 to 19.43), and under-triage increased to 17.8% (95% CI, 16.40 to 19.36). The ALS providers had both the highest likelihood of a correct triage score post-training (odds ratio 1.21; 95% CI, 0.96-1.53) and the shortest duration of triage (median three seconds, interquartile range two to seven seconds; P=0.034). Participants with prior major-incident training performed better (P=0.001). Accuracy of major-incident triage across all levels of prehospital providers in South Africa is less than optimal with non-significant differences post-major-incident training. Prior major-incident training played a significant role in triage accuracy indicating that training should be an ongoing process. Although ALS providers were the quickest to complete triage, this difference was not clinically significant. The BLS and ILS providers with major-incident training can thus be utilized for primary major-incident triage allowing ALS providers to focus on more clinical roles.

#### 3.2 Does Point-of-Care Ultrasonography Improve Clinical Outcomes in Emergency Department Patients With Undifferentiated Hypotension? An International Randomized Controlled Trial From the SHoC-ED Investigators

*PR. Atkinson, J. Milne, H. Lamprecht, M. Stander, D. Lussier, C. Pham, R. Henneberry, JM. Fraser, MK. Howlett, M. Mekwan, B. Ramrattan, J. Middleton, DJ. van Hoving, M. Peach, L. Taylor, T. Dahn, S. Hurley, K. MacSween, LR. Richardson, G. Stoica, S. Hunter, PA. Olszynski, DA. Lewis. Ann Emerg Med. 2018; 72(4):478-89.*

This international, multicenter, randomized controlled trial recruited from six centers in North America and South Africa. The effect of a point-of-care ultrasonography protocol versus standard care without point-of-care ultrasonography for survival and clinical outcomes was compared. Selected hypotensive patients (systolic blood pressure <100 mm Hg or shock index >1) were randomized to early point-of-care ultrasonography plus standard care versus standard care without point-of-care ultrasonography. Diagnoses were recorded at 0 and 60 minutes. The primary outcome measure was survival to 30 days or hospital discharge. Secondary outcome measures included initial treatment and investigations, admissions, and length of stay. Follow-up was completed for 270 of 273 patients. The most common diagnosis in more than half the patients was occult sepsis. We did not find any benefits for survival, length of stay, rates of CT scanning, inotrope use, or fluid administration. The

addition of a point-of-care ultrasonography protocol to standard care may not translate into a survival benefit in this group.

### **3.3 Evaluating emergency care capacity in Africa: an iterative, multicountry refinement of the Emergency Care Assessment Tool**

*C. Bae, JL. Pigoga, M. Cox, B. Hollong, J. Kalanzi, G. Abbas, LA. Wallis, EJ Calvello Hynes. BMJ Glob Health. 2018; 15;3(5):e001138.*

This study aimed to describe the piloting and refinement of the African Federation for Emergency Medicine's Emergency Care Assessment Tool (ECAT). ECAT represents an objective measurement tool to assess emergency care capacity in healthcare facilities in low- and middle-income countries. We undertook iterative, multisite refinement of the ECAT to improve usability and context-appropriateness. After pilot testing at a South African referral hospital, subsequent studies occurred at district, regional and central facilities across four countries representing the major regions of Africa: Cameroon, Uganda, Egypt and Botswana. At each site, the tool was administered to three participants: one senior physician, one senior nurse and one other clinical provider. Feedback informed refinements of the ECAT, and an updated tool was used in the next-studied country. Iteratively implementing refined versions of the tool in various contexts across Africa resulted in a final ECAT that uses signal functions, categorised by sentinel conditions and evaluated against discrete barriers to emergency care service delivery, to assess Emergency Units. It also allowed for refinement of administration and data analysis processes. The ECAT has a total of 71 items. Advanced facilities are expected to perform all 71 signal functions, while intermediate facilities should be able to perform 53. The ECAT is the first tool to provide a standardised method for assessing facility-based emergency care in the African context. It identifies where in the maturation process a hospital or system is and what gaps exist in delivery of care, so that a comprehensive roadmap for development can be established. Although validity and feasibility testing have now occurred, reliability studies must be conducted prior to amplification across the region.

### **3.4 Defining quality indicators for emergency care delivery: findings of an expert consensus process by emergency care practitioners in Africa**

*MC. Broccoli, R. Moresky, J. Dixon, I. Muya, C. Taubman, LA. Wallis, EJ. Calvello Hynes. BMJ Glob Health. 2018; 15;3(1):e000479.*

The aim of this study was to determine context-appropriate facility-based emergency care quality indicators that will allow uniform and objective data collection to enhance emergency care delivery throughout Africa. Along with a comprehensive literature review, a multiphase expert consensus process was undertaken to identify, rank and refine quality indicators. The consensus working group selected seven conditions addressing nearly 75% of mortality in the African region to prioritise during indicator development, and the final product at the end of the multiphase study was a list of 76 indicators for emergency care that are appropriate for use in the African setting. The adaptation of a standardised set of indicators will enhance the quality of care provided and allow for comparison of system strengthening efforts and resource distribution.

### **3.5 Essential medicines for emergency care in Africa**

*MC. Broccoli, JL. Pigoga, M. Nyirenda, LA. Wallis, EJ. Calvello Hynes. Emerg Med J. 2018; 35:412-9.*

This study aimed to establish an essential medicine list (EML) for emergency care in Africa by means of literature review and multiple iterations of expert consensus. The final emergency care EML included 213 medicines, 25 of which are not in the 2017 WHO EML, but were deemed essential for clinical practice by regional emergency providers. The final EML has associated recommendations of desirable or essential and is subdivided by facility level. Thirty-nine medicines were recommended for basic facilities, an additional 96 for intermediate facilities (eg, district hospitals) and an additional 78 for advanced facilities (eg, tertiary centres).

### **3.6 Describing key performance indicators for waiting times in emergency centres in the Western Cape Province, South Africa, between 2013 and 2014**

*K. Cohen, S. Bruijns. S Afr Med J. 2018; 108(7):579-84.*

This retrospective, descriptive study describes the 6-monthly Western Cape emergency centre waiting time audits between 2013 and 2014. There was no significant difference in triage acuity proportions between hospital and community health centre emergency centres. Waiting times were longer than recommended for the South African Triage Scale, but higher-acuity patients were seen faster than lower-acuity patients. Waiting times were significantly longer at hospitals than at community health centres. A red priority patient presenting to a community health centre would take 6.1 times longer to reach definitive care than if the patient had presented to a hospital emergency centre.

### **3.7 Inter-rater and intra-rater reliability of the South African Triage Scale in low-resource settings of Haiti and Afghanistan**

*M. Dalwai, K. Tayler-Smith, M. Twomey, M. Nasim, AQ. Popal, WH. Haqdot, O. Gayraud, S. Cherestal, LA. Wallis, P. Valles. Emerg Med J. 2018; 35(6):379-83.*

This study aimed to assess the inter-rater and intrarater reliability of the South African Triage Scale in four Médecins Sans Frontières (MSF) supported emergency departments (EDs) in Afghanistan and Haiti (two trauma-only EDs and two mixed EDs). Participants from each site assigned triage ratings to a set of context-specific vignettes. Inter-rater reliability was assessed by comparing triage ratings among nurses; intrarater reliability was assessed by asking the nurses to retriage 10 random vignettes from the original set and comparing these duplicate ratings. A total of 67 nurses agreed to participate in the study. Inter-rater agreement was moderate across all sites (ICC range: 0.50–0.60; QWK range: 0.50–0.59) apart from the trauma ED in Haiti where it was moderate to substantial (ICC: 0.58; QWK: 0.61). Intrarater agreement was similar across the four sites (68%–74% exact agreement); when allowing for a one-level discrepancy in triage ratings, intrarater reliability was near perfect across all sites (96%–99%). No significant correlation was found between years of nursing experience and reliability. The SATS has moderate reliability in different EDs in Afghanistan and Haiti. These findings, together with concurrent findings showing that the SATS has good validity in the same settings, provide evidence to suggest that SATS is suitable in trauma-only and mixed EDs in low-resource settings.

### **3.8 A comparison of work stressors in higher and lower resourced emergency medicine health settings**

*S. de Haan, H. Lamprecht, MK. Howlett, J. Fraser, D. Sohi, A. Adishes, PR. Atkinson. Can J Emerg Med. 2018; 20(5):713-20.*

This study aimed to compare reported stressors for emergency physicians and trainees in high- and low-resource settings, namely Canada and South Africa. The investigators conducted an online cross-sectional survey of 504 emergency medicine trainees and physicians in both countries for six domains (demands, role, support, change, control, and relationships) using the validated Management Standards Indicator Tool. Trainees in low-resource settings reported higher stressors. And trainees reported higher levels of stressors than specialists, regardless of the resource setting.

### **3.9 The epidemiology of operations performed by the National Sea Rescue Institute of South Africa over a 5-year period**

*E. Erasmus, C. Robertson, DJ. van Hoving. Int Marit Health. 2018; 69(1):1-7.*

This study aimed to describe the epidemiology of 3281 operations performed by the National Sea Rescue Institute (NSRI) of South Africa over a 5 year period. There was marked seasonal variation with peak periods in the South African summer holiday season. Water-based operations (67.6%) were the most frequent operations performed. The NSRI assisted 3399 individuals of which 77% were male. The mean age of rescued persons was 42 years. Eight hundred and thirty-six (25%) individuals had non-fatal injuries or illnesses requiring medical assistance. Medical emergencies (35%), traumatic injuries (32.8%), and non-fatal drownings (23%) were the most common types of injury and illness. The majority of the 184 (18%) deaths recorded were due to drowning (75%). The results suggest further preventative measures and public health strategies be implemented to minimise traumatic and medical incident severity and subsequent casualties at sea.

### **3.10 Attitudes of prehospital providers on transport decision-making in the management of patients with a suicide attempt refusing care: A survey based on the Mental Health Care Act of 2002**

*K. Evans, H. Geduld, W. Stassen. S Afr J Psych. 2018; 24(6):a1156.*

This cross-sectional study aimed to describe the attitudes of prehospital providers and describe transport decision-making around the management of patients with a suicide attempt. A vignette-based survey was utilised to collect data related to training and knowledge of the *Mental Health Care Act*, prehospital transport decision-making and patient management. Patients with less dramatic suicidal history were more likely to be discharged on scene. Few respondents reported the use of formal suicide evaluation tools to aid their decision. Respondents displayed negative attitudes towards suicidal patients. Some respondents reported returning to find a suicidal patient dead, while others reported patient attempts at suicide when in their care. Eighty percent of respondents had no training in the management of suicidal patients, while only 7.0% had specific training in the *Mental Health Care Act*. It is essential to urgently develop training programmes to ensure that prehospital providers are better equipped to deal with suicidal patients.

### **3.11 Describing suspected non ST-elevation acute coronary syndrome using troponin at a regional, public South African emergency centre with the Roche cardiac reader**

*D. Kabongo, M. Kalla, R. Allgaier, SR. Bruijns. SA Heart. 2018; 15(2), 102-107.*

This retrospective, cross sectional study aimed to describe the acute coronary syndrome diagnosis and its outcome in an undifferentiated chest pain population when using a troponin assay that predates current reference standards at a public, Cape Town emergency centre. The study included 969 patients, of which 4% were excluded due to poor clinical record keeping. Acute coronary syndrome was diagnosed in 28%, from which 21% were troponin positive which differed to troponin negative acute coronary syndrome ( $p < 0.001$ ). Unstable angina was diagnosed in 77% of acute coronary syndrome patients. The results displayed that a high proportion of chest pain patients did not have acute coronary syndrome and unstable angina numbers were much higher than described elsewhere. The study suggests that further research is required to explore safe, local diagnostic strategies that can strike a balance between patient safety and cost effectiveness.

### **3.12 Identifying barriers for out of hospital emergency care in low and low-middle income countries: a systematic review**

*AG. Kironji, P. Hodkinson, SS. de Ramirez, T. Anest, L. Wallis, J. Razzak, A. Jenson, B. Hansoti. BMC Health Serv Res. 2018; 18(1), 291.*

This systematic review aimed to summarize literature for low and low-middle income countries to identify barriers and key interventions for out-of-hospital emergency care (OHEC) delivery. Of the 1927 titles identified, 31 met the inclusion criteria and were included in the study. Barriers to OHEC were divided into six categories that included: culture/community, infrastructure, communication/coordination, transport, equipment and personnel. Lack of transportation was a common problem, with 55% of articles reporting this as a hindrance to OHEC. Ambulances were the most commonly mentioned (71%) mode of transporting patients. Sixty-one percent of articles identified a lack of skilled personnel as a key barrier, with 32% of OHEC being delivered by laypersons without formal training. Forty percent of the systems identified in the review described a uniform access phone number for emergency medical service activation. Policy makers and researchers seeking to improve OHEC in low and low-middle income countries should focus on increasing the availability of transport and trained providers while improving patient access to the OHEC system.

### **3.13 Teleconsultation Using Mobile Phones for Diagnosis and Acute Care of Burn Injuries Among Emergency Physicians: Mixed-Methods Study**

*A. Klingberg, LA. Wallis, M. Hasselberg, P. Yen, SC. Fritzell. JMIR mHealth and uHealth. 2018; 6(10).*

This study aimed to assess the usability of a mobile phone app for remote consultations and referrals of burn injuries in 24 emergency doctors and 4 burns consultants. This study followed a mixed-methods approach which included a usability questionnaire and a think-aloud interview. Analysis of the interview was undertaken with predefined codes relating to the following 3 themes: ease of use, usefulness of content, and technology-induced errors.

The users perceived the app to be easy to use and useful, however some challenges were identified. Issues relating to usability were associated with navigation and users also had problems in understanding some icons and terminologies. When a new system is competing with other technologies, usefulness and ease of use become highly important. Some users felt limited by predefined options, and they wanted to be able to freely express their clinical findings. This study therefore echoes previous findings that when using standardized templates, the systems should also allow the user to express their clinical findings in their own words.

### **3.14 Disaster preparedness and response capacity of regional hospitals in Tanzania: a descriptive cross-sectional study**

*PM. Koka, HR. Sawe, KR. Mbaya, SS. Kilindimo, JA. Mfinanga, VG. Mwafongo, LA. Wallis, TA. Reynolds. BMC Health Serv Res. 2018; 18(1), 835.*

This descriptive cross-sectional survey was conducted in all Tanzanian regional hospitals. Data were prospectively collected using a structured questionnaire based on the WHO National Health Sector Emergency Preparedness and Response Tool. The study surveyed 25 regional hospitals in mainland Tanzania, in which interviews were conducted with 13-hospital doctors in charge, 9 matrons and 4 heads of casualty. All the hospitals were found to have inadequate numbers of all cadres of health care providers to support effective disaster response. 92% of hospitals reported experiencing a disaster in the past 5 years; with the top three being large motor vehicle accidents 87%, floods 26% and infectious disease outbreaks 22%. Fifteen hospitals (60%) had a disaster committee, but only five (20%) had a disaster plan. This nationwide survey found that hospital disaster preparedness is at an early stage of development in Tanzania, and important opportunities exist to better prepare regional hospitals to respond to disasters. The findings and discussion of this study will support coordinated planning at the regional and national level in Tanzania.

### **3.15 Developing a South African Helicopter Emergency Medical Service Activation Screen (SAHAS): A Delphi study**

*D. Laatz, T. Welzel, W. Stassen. Afr J Emerg Med. 2018; doi: <https://doi.org/10.1016/j.afjem.2018.09.001>*

Helicopter Emergency Medical Services (HEMS) are an expensive resource that should be utilised efficiently to optimise the cost-benefit ratio. This study aimed to systematically utilise expert opinions to reach consensus on HEMS call-out criteria that are contextual to the South African setting. A modified Delphi technique was used to develop call-out criteria, using current literature as the basis of the study. Purposive, snowball sampling was employed to identify a sample of 118 participants locally and internationally, of which 42 participated for all three rounds. After two rounds, consensus was obtained for 63% of criteria, while 64% of generated statements received consensus in the third round. Results emphasised the opinion that HEMS dispatch criteria relating to patient condition and incident locations were preferential to a comprehensive list. The combination of existing literature and participant opinions, established that call-out criteria are most efficient when based on clinical parameters and geographic considerations, as opposed to a specified list of criteria.

### **3.16 Poor return on investment: investigating the barriers that cause low credentialing yields in a resource-limited clinical ultrasound training programme**

*H. Lamprecht, G. Lemke, D. van Hoving, T. Kruger, L. Wallis. Int J Emerg Med. 2018; 11(1), 11.*

The purpose of the study was to establish and analyse the barriers that specifically lead to poor credentialing success within a resource-limited clinical ultrasound training programme. A cross-sectional survey was conducted on trainees who attended the introductory clinical ultrasound courses held in Cape Town since its inception. Only one fifth of trainees (19.7%), who entered the Cape Town training programme, credentialed successfully. Time constraints were the highest ranked barrier amongst all trainees. Access barriers (to trainers and ultrasound machines) were the second highest ranked amongst the non-credentialed group. A combination between access and logistical barriers (e.g. difficulty in finding patients with pathology to scan) were the second highest ranked in the credentialed group. Access barriers conspire to burden the Cape Town clinical ultrasound training programme. The study suggests that novel solutions are necessary to overcome these access barriers to improve future credentialing success.

### **3.17 Global emergency care clinical practice guidelines: A landscape analysis**

*M. McCaul, M. Clarke, SR. Bruijns, PW. Hodkinson, B. de Waal, J. Pigoga, LA. Wallis, T. Young. Afr J Emerg Med. 2018; 8(4), 158-163*

This study described the characteristics and quality of clinical practice guidelines (CPGs) relevant to prehospital care worldwide, in order to strengthen guideline development in low-resource settings for emergency care. A descriptive study of a database of international CPGs relevant to emergency care produced by the African Federation for Emergency Medicine (AFEM) CPG project in 2016. Guideline quality was assessed with the AGREE II tool, independently and in duplicate. In total, 276 guidelines were included. Less than 2% of CPGs originated from low- and middle-income countries (LMICs); only 15% of guidelines were prehospital specific, and there were no CPGs directly applicable to prehospital care in LMICs. Most guidelines used *de novo* methods (58%) and were produced by professional societies or associations (63%), with the minority developed by international bodies (3%). Guideline quality varied across topics, subpopulations and producers. Although some high-quality CPGs exist relevant to emergency care, none directly address the needs of prehospital care in LMICs, especially in Africa. Strengthening guideline development capacity, including adaptive guideline development methods that use existing high-quality CPGs, is a priority.

### **3.18 Developing prehospital clinical practice guidelines for resource limited settings: why re-invent the wheel?**

*M. McCaul, B. de Waal, P. Hodkinson, JL. Pigoga, T. Young, LA. Wallis. BMC Res notes. 2018; 11(1), 97*

This study reports on the development of a context specific prehospital clinical practice guidelines (CPG) using an alternative guideline development method. This project produced the first emergency care CPG for prehospital providers in Africa. It included > 270 CPGs and produced over 1000 recommendations for prehospital emergency care. The study

encountered various difficulties, including (1) applicability issues: few pre-hospital CPGs applicable to Africa, (2) evidence synthesis: heterogeneous levels of evidence classifications and (3) guideline quality. Learning points included (1) focusing on key CPGs and evidence mapping, (2) searching other resources for CPGs, (3) broad representation on CPG advisory boards and (4) transparency and knowledge translation. Re-inventing the wheel to produce CPGs is not always feasible. The study encourages further projects to use existing CPGs in developing guidance to improve patient care in resource-limited settings.

### **3.19 The association between hospital arrival time, transport method, prehospital time intervals, and in-hospital mortality in trauma patients presenting to Khayelitsha Hospital, Cape Town**

*A. Möller, L. Hunter, L. Kurland, S. Lahri, DJ. van Hoving. Afr J Emerg Med. 2018; 8, 89-94.*

This study retrospectively analysed the database at the Khayelitsha Hospital Emergency Centre for trauma related patients presenting to the resuscitation area. Eligible patients' folders were scrutinised for hospital arrival time, transport time intervals, transport method and in-hospital mortality. Most patients were 19–44-year-old males (80.3%) and penetrating trauma the most frequent mechanism of injury (64.5%). In total, 48.5% patients arrived with their own transport, 47.7% by ambulance and 3.8% by the police service. The arrival of trauma patients peaked during the weekend, and was especially noticeable between midnight and 6 a.m. In-hospital mortality (3.4%) was not significantly affected by transport method ( $p=0.26$ ), hospital arrival time ( $p=0.22$ ) or prehospital transport time intervals (all  $p$ -values  $>0.09$ ). Therefore, the method of transport, hospital arrival time and prehospital transport time intervals did not have a substantially measurable effect on in-hospital mortality. Additional studies with larger samples are suggested due to the small event rate.

### **3.20 Global resuscitation alliance Utstein recommendations for developing emergency care systems to improve cardiac arrest survival**

*GD. Nadarajan, L. Tiah, AFW. Ho, A. Azazh, MK. Castren, SL. Chong, MJ. el Sayed, T. Hara, BS. Leong, FK. Lippert, MHM. Ma, YY. Ng, HM. Ohn, J. Overton, PP. Pek, S. Perret, LA Wallis, KD. Wong, MEH. Ong. Resuscitation 2018; 132, 85-89*

The Global Resuscitation Alliance (GRA) was established to improve survival for Out-of-Hospital Cardiac Arrest (OHCA). However, these 10 programs were recommended in the context of developed Emergency Care Systems (ECS). This study aimed to explore barriers faced by developing ECS and to establish the pre-requisites needed. It also developed a framework which developing ECS may use to build their emergency response capability. At a consensus meeting the 74 participants were key stakeholders from 26 countries. Five discussion groups examined the chain of survival and were voted upon to reach a consensus. The answers and discussion points from each group was used to construct the modified survival framework with the chain of survival as the backbone. Eleven key statements were then derived to describe the pre-requisites for achieving the GRA 10 programs. The participants voted on the importance and feasibility of these statements as well as the GRA 10 programs using a matrix that is used by organisations to prioritise their action steps. The study concludes that the barriers for developing ECS systems to improve OHCA survival rates may be overcome by systematic prioritisation and cost-effective innovative solutions.

### **3.21 Demographics and predictors of mortality in children undergoing resuscitation at Khayelitsha Hospital, Western Cape, South Africa**

*D. Richards, L. Hunter, K. Forey, C. Myers, E. Christensen, S. Cain, M. Givens, E. Wylie, HJ. Lategan, DJ. van Hoving. Afr J Child Health. 2018; 12(3), 127-131.*

This study aimed to describe characteristics of children under the age of 12 who required resuscitation upon presentation to Khayelitsha Hospital (KH), determine predictors of mortality, and compare paediatric volume to specialist physician presence in the unit. A six-month retrospective chart review was performed on patients < 12 years who were treated in the resuscitation area. A total 317 patients were enrolled with a median age of 14 months. The top 5 diagnoses were: pneumonia; neonatal sepsis; seizures; polytrauma and acute gastroenteritis complicated by septic shock. Overall mortality was 7% and mortality in children less than 1 month of age was 12%. Premature birth was associated with a mortality odds ratio of 8.44 ( $p=0.002$ ). More than two-thirds (73%) of paediatric resuscitations occurred when specialist physicians were not physically present in the unit. The study findings indicate that children under one month of age with a history of prematurity are at high risk and may benefit most from paediatric-specific expertise and rapid transfer to a higher level of care.

### **3.22 Keeping our heads above water: A systematic review of fatal drowning in South Africa**

*CJ Saunders, D. Sewduth, N. Naidoo. S Afr Med J 2018; 108(1): 61-68*

Drowning is an under-recognised public health burden and the strategic implementation of intervention programmes driven by evidence-based decisions is of importance in resource-limited settings such as South Africa. The authors performed a systematic review of published literature and technical reports to identify the epidemiological data describing fatal drowning in South Africa. A total of 40 articles and reports covering data collection periods between 1995 and 2016 met the inclusion criteria. These were largely focused on urban settings. The fatal drowning burden in SA was found to be stable at approximately 3.0 per 100 000 population. Drowning mortality rates were reported to be high in children aged >15 years, particularly in those aged >5. The authors concluded that there is a need for detailed drowning surveillance to monitor national trends and identify risk factors in all SA communities.

### **3.23 The clinical presentation, utilization, and outcome of individuals with sickle cell anaemia presenting to urban emergency department of a tertiary hospital in Tanzania**

*HR. Sawe, TA. Reynolds, JA. Mfinanga, MS. Runyon, BL. Murray, LA. Wallis, J. Makani. BMC hematology. 2018; 18(1), 25*

This is a prospective cohort study of patients with sickle cell anaemia (SCA) presenting to the emergency department (ED) at Muhimbili National Hospital (MNH). The study enrolled 752 (2.7%) people with SCA from 28,322 patients who presented to the MNH-ED. Pain (81.6%) and fever (38.4%) were the most frequent presenting complaint. Patients with fever, hypoxia, altered mental status and bradycardia had statistically significant relative risk of mortality of 10.4, 153, 50 and 12.1 ( $p < 0.0001$ ) respectively, compared to patients with normal vitals.

Overall, 87.2% patients received Complete Blood Cell counts test, of these 52.1% had severe anaemia, and a 30.3 (p = 0.02) relative risk of mortality compared to patients with higher haemoglobin. Patients who had malaria, elevated renal function test and hypoglycemia, had relative risk of mortality of 22.9, 10.4 and 45.2 (p < 0.0001) respectively, compared to patient with normal values. Most (71.0%) patients were hospitalized for in patients care, and the overall mortality rate was 2.1%. The findings of this study can inform development of treatment guidelines, clinical staff education, and clinical research aimed at optimizing care for SCA patients.

### **3.24 The proportion of South Africans living within 60 and 120 minutes of a percutaneous coronary intervention facility**

*W Stassen, LA Wallis, C Vincent-Lambert, M Castren, L Kurland. Cardiovasc J Afr 2018. 29(1): 6-11.*

Timely reperfusion following myocardial infarction improves mortality rates, and emergency medical services play a pivotal role in transporting patients with ST-elevation myocardial infarction directly to a percutaneous coronary intervention (PCI) facility. Access to PCI is, in part, dependant on the geographic distribution of patients around PCI facilities. In this study, the authors aimed to determine the proportion of South Africans living within 60 and 120 minutes' drive time of a PCI facility. Approximately 54% and 72% of the South African population live within 60 and 120 minutes of a PCI facility respectively. The median drive time and distance to a PCI facility was 100 minutes across 123.6 km. However, receiving PCI within 120 minutes of first medical contact may be unlikely for some due to a lack of medical insurance, under-developed referral networks or other system delays. Coronary care networks should therefore be developed based on the proximity of communities to 12-lead ECG and reperfusion therapies (such as PCI facilities).

### **3.25 The burden of intentional self-poisoning on a district-level public Hospital in Cape Town, South Africa**

*D. van Hoving, LD. Hunter, RJ. Gerber, HJ. Lategan, CJ Marks. AfJEM 2018. 8(3):79-83*

The aim of this retrospective study was to describe all adults presenting with intentional self-poisoning over a six-month period to the resuscitation unit of Khayelitsha Hospital, Cape Town. A total of 192 patients were included in the analysis. The mean age was 27.3 years with the majority being female (n = 132, 68.8%). HIV-infection was a comorbidity in 39 (20.3%) patients, while 13 (6.8%) previously attempted suicide. Presentations per day of the week were almost equally distributed while most patients presented after conventional office hours (n = 152, 79.2%), were transported from home (n = 124, 64.6%) and arrived by ambulance (n = 126, 65.6%). Patients spend a median time of 3h37m in the resuscitation unit (interquartile range 1 h 45 m–7 h 00 m; maximum 65 h 49 m). Patient acuity on admission was mostly low according to both the Triage Early Warning Score (non-urgent n = 100, 52.1%) and the Poison Severity Score (minor severity n = 107, 55.7%). Pharmaceuticals were the most common type of toxin ingested (261/343, 76.1%), with paracetamol the most frequently ingested toxin (n = 48, 25.0%). Eleven patients (5.7%) were intubated, 27 (14.1%) received N-acetylcysteine, and 18 (9.4%) received benzodiazepines. Fourteen (7.3%) patients were

transferred to a higher level of care and four deaths (2%) were reported. Intentional self-poisoning patients place a significant burden on emergency centres. The high percentage of low-grade acuity patients managed in a high-acuity area is of concern and should be investigated further.

### **3.26 Clinical Interventions Account for Scene Time in a Helicopter Emergency Medical Service in South Africa**

*G. van Niekerk, T. Welzel, W. Stassen. Air Med J 2018. 37(6):357-361*

Helicopter emergency medical services (HEMS) have been associated with a prolonged scene time, compromising the time benefit in an urban setting. This retrospective chart review aimed to establish whether HEMS scene time was associated with the number of clinical interventions performed and improved patient stability by extracting the number of clinical interventions and patient stability using the Mainz Emergency Evaluation Score (MEES), and correlating this with scene time. Five hundred fourteen clinical interventions were performed on 204 patients. A median of 2 clinical interventions per patient was performed on scene. Performing 1 additional clinical intervention was associated with an approximate 4-minute increase in on-scene time. Some improvement in patient stability was shown by a mean change in the MEES of 0.65 after on-scene intervention, but this did not reach MEES clinical cut-off measures. The number of clinical interventions performed by helicopter crews can account for scene time in a South African HEMS. The clinical interventions performed by helicopter crews tend to have a positive effect on patient stability.

### **3.27 Estimated injury-associated blood loss versus availability of emergency blood products at a district-level public hospital in Cape Town, South Africa**

*H. Weeber, LD. Hunter, DJ. Van Hoving, HJ. Lategan, SR. Bruijns. AfJEM 2018. 8(2):69-74.*

International guidance suggests that injury-associated haemorrhagic shock should be resuscitated using blood products. However, low- and middle-income countries have poor access to blood products. This retrospective, cross-sectional study aimed to estimate the amount of blood loss from serious injury in relation to available emergency blood products at a secondary-level, public Cape Town hospital. Injuries were coded using the Abbreviated Injury Scale, which was then used to estimate blood loss for each patient using an algorithm from the Trauma Audit Research Network. Descriptive statistics were used to describe blood volume lost and blood units required to replace losses greater than 15% circulating blood volume. Four units of emergency blood are stored in a dedicated blood fridge in the emergency centre. Platelets and fresh plasma are not available. A total of 389 injury events were enrolled of which 93 were excluded due to absent clinic data. The mean age was 29 ( $\pm 10$ ) years. We estimated a median of one unit of blood requirement per week or weekend, up to a maximum of eight or six units, respectively. Most patients ( $n = 275$ , 94%) did not have sufficient injury to warrant transfusion. Overall, one person would require a transfusion for every 15 persons with a moderate to serious injury. The volume of available emergency blood therefore appears inadequate for injury care, and doesn't consider the need for other causes of acute haemorrhage. Furthermore, lack of other blood components (i.e. plasma and platelets) presents a challenge in this low-resourced setting.

## 4 Doctor of Philosophy (PhD) in Emergency Medicine

### 4.1 Reliability and validity of the South African Triage Scale in low-resource settings

*M. Dalwai. UCT 2018. Supervisors: L. Wallis, M. Twomey, K. Tayler-Smith*

In 2004, the Cape Triage Group developed the South African Triage Scale (SATS) that uses a physiologically based scoring system together with a list of discriminators - designed to triage patients into one of four priority groups for medical attention. The SATS has been implemented and assessed extensively in South Africa, but its performance across a spectrum of different low-resource settings, particularly non-sub-Saharan African and trauma-only settings, has not been adequately assessed. In 2011, Médecins Sans Frontières (MSF) began introducing the SATS in various projects where it was providing emergency medical care. This retrospective cohort study sought to assess the reliability and validity of the SATS in different low-resource settings. The SATS was evaluated in Northern Pakistan by describing the steps of implementation and how accurate nurses were in using the triage scale. After one month of implementation, 370 triage forms from a one-week period were evaluated. The SATS was found to be easily implemented and accurately completed. The inter- and intra-rater reliability and accuracy of nurse triage ratings when using the SATS was then assessed by asking 15 EC nurses to assign triage ratings to a set of 42 reference vignettes under classroom conditions. Study 3 aimed to improve the ability to measure reliability and validity in paediatric settings by developing a set of paediatric paper-based vignettes using the Delphi methodology. In a two-round consensus building process, a panel of EC experts were asked to independently triage 50 clinical vignettes using one of four acuity levels. Vignettes that reached a minimum of 80% group consensus for acuity ratings were included in the final set of reference vignettes. Study 4 aimed to assess the reliability of the SATS across MSF-supported hospitals using paper-based vignettes in Afghanistan, Haiti and Sierra Leone. Applying the same methodology as in Northern Pakistan, we assessed reliability under classroom conditions. Lastly, study 5 aimed to assess the validity of the SATS across MSF-supported hospitals by comparing patients' SATS ratings with their final EC outcomes across four sites in Afghanistan, Haiti and Sierra Leone. The SATS has reasonable reliability with good validity across different ECs in various lower-source settings. The SATS is a valid triage tool for prioritisation of patients with trauma in low-resource settings. Its use in mixed EC settings seems justified, but in paediatric settings context-specific adjustments and assessments of its performance would be prudent.

### 4.2 A critical realist study into the emergence and absence of academic success among Bachelor of Emergency Medical Care students

*S. Sobuwa. UCT 2018. Supervisors: S. Bruijns, B. Lord*

This critical realist thesis explores academic success in the four-year Bachelor of Emergency Medical Care degree in South Africa. The Bachelor of Emergency Medical Care degree is a relatively new degree that is offered at four universities in South Africa. In view of the existing shortage of paramedics both in South Africa and on the African continent, an understanding of the factors that play a role in academic success may lead to an increase in the number of emergency care providers. The study utilised a sequential, explanatory, mixed methods research design. The quantitative phase consisted of an online survey that was disseminated

to Bachelor of Emergency Medical Care students in South Africa with the aim of gaining an insight into their socio-cultural history. During the qualitative phase focus groups were held with students while semi-structured interviews were conducted with lecturing staff members, to explore the causal powers and generative mechanisms that give rise to or enable the emergence or absence of academic success among Bachelor of Emergency Medical Care students. A total of 176 participants from an available sample of 408 students responded to the survey. Not repeating a year was significantly associated with two important variables, namely, the possession of a pre-existing emergency care qualification and not being a white student. The results revealed that the following interactive generative mechanisms played a role in the lack of academic success, namely, biological, socioeconomic, socio-cultural, normative, psychosocial and psychological factors while the following interactive generative mechanisms facilitated the emergence of academic success – psychological, psycho-social, normative and socioeconomic factors.

### **4.3 Coronary care networks in the resource-limited setting: systems of care in South Africa**

*W. Stassen. SU and Karolinska Institutet 2018. Supervisors: L. Kurland, L. Wallis, C. Lambert, M. Castren.*

ST-elevation myocardial infarction (STEMI) occurs commonly in South Africa and at much younger ages than observed elsewhere in the world. Emergent treatment in the form of coronary reperfusion is required to reduce morbidity and mortality following STEMI. Well organised networks of care (coronary care networks, CCNs) that seamlessly integrate prehospital care, in-hospital assessment and percutaneous coronary intervention are recommended to reduce mortality for these patients. This project aimed to examine the current state of Coronary Care Networks in South Africa and to provide recommendations for future development of such networks. Study I was a cross-sectional descriptive study that aimed to determine the current PCI-capable facilities in South Africa and sought correlations between the resources, population, poverty and insurance status. Study II utilised proximity analysis to determine the average drive times of South African municipal wards to the closest PCI-capable facility for each South African province and determined the proportion of South Africans living within one and two hours respectively, from such a facility. Study III used network optimisation modelling to propose an optimised reperfusion strategy for patients with STEMI, based on proximity, using the North West province as a case study. Finally, Study IV employed qualitative methodology to determine the barriers and facilitators to developing CCNs in South Africa by performing interviews with individuals working with the South African contexts of coronary care. South Africa has 62 PCI-capable facilities, with most PCI-facilities (n=48; 77%) owned by the private healthcare sector. A disparity exists between the number of private and state-owned PCI-facilities when compared to the poverty ( $r=0.01$ ;  $p=0.17$ ) and insurance status of individuals ( $r=-0.4$ ;  $p=0.27$ ) (Study I). This means that reperfusion by PCI is likely inaccessible to many despite approximately, 53.8% and 71.53% of the South African population living within 60 and 120 minutes of a PCI facility (Study II). An efficient and swift model that provides a recommendation for the best reperfusion strategy even in the instance of a large amount of ward data with these additional constraints is presented. This model can be run in realtime and can guide reperfusion decisions at the bedside or form the basis of regional reperfusion guidelines, and CCN development priorities (Study III). When considering

the local CCN, we found an under-resourced CCN that is not prioritised by policymakers and displays considerable variation in performance based on time of day and geographic locale. Specific barriers to the development of CCNs in South Africa included poor recognition and diagnosis of STEMI, inappropriate transport and treatment decisions, and delays. Facilitators to the development of CCNs were regionalised STEMI treatment guidelines, further research and prehospital thrombolysis programmes (Study IV). In conclusion, South Africa has a shortage of PCI facilities. Many patients may not be able to access care due to socio-economic status. When considering proximity alone, most South Africans are able to access PCI within guideline timeframes. Current CCNs in South Africa are under-resourced, over-burdened and not prioritised. Future efforts should aim at improving STEMI recognition and diagnosis to decrease delays to reperfusion.

#### **4.4 Major incident triage: development and validation of a modified primary triage tool**

*J. Vassallo. UCT 2018. Supervisors: L. Wallis, JE. Smith*

Existing methods of primary major incident triage demonstrate poor performance at identifying the Priority One patient in need of a life-saving intervention. The aim of this thesis was to derive an improved triage tool. The first part of the thesis defined what constitutes a life-saving intervention then, using a retrospective military cohort, the optimum physiological thresholds for identifying the need for life-saving intervention were determined; the combination of which was used to define the Modified Physiological Triage Tool (MPTT). The MPTT was validated using a large civilian trauma database and a prospective military cohort. Subsequently, to describe the safety profile of the MPTT, an analysis of the implications of under-triage was undertaken. Finally, pragmatic changes were made to the MPTT (MPTT-24) - in order to provide a more useable method of primary triage. A total of 32 interventions were considered life-saving, and the optimum physiological thresholds to identify these were a GCS <14, 12 < RR <22 and a HR < 100. Within both the military and civilian populations, the MPTT outperformed all existing methods of triage with the greatest sensitivity and lowest rates of under-triage, but at the expense of over-triage. Applying pragmatic changes, the MPTT-24 had comparable performance to the MPTT and continued to outperform existing methods. The priority of primary major incident triage is to identify patients in need of life-saving intervention and to minimise under-triage. Fulfilling these priorities, the MPTT-24 outperforms existing methods of triage and its use is recommended as an alternative to existing methods of primary major incident triage. The MPTT-24 also offers a theoretical reduction in time required to triage and uses a simplified conscious level assessment, thus allowing it to be used by less experienced providers.

## 5 Master of Science (MSc) in Emergency Medicine

### 5.1 Development and usability testing of a data visualisation platform for an African trauma data registry

*B. Griffith. UCT 2018. Supervisors: L. Wallis, T. Reynolds*

Trauma is a significant contribution to the global burden of mortality and disease, especially in sub-Saharan Africa. The methods for tracking, recording, and analysing the incidence and causes of trauma are underdeveloped. To address this, The African Federation for Emergency Medicine (AFEM) developed a trauma form and Trauma Data Registry to collect trauma data in multiple sites in sub-Saharan Africa. This study aimed to create, and assess the usability and functionality of, a trauma data visualisation platform for use in conjunction with the Trauma Data Registry. The usability assessment of the AFEM Trauma Data Visualisation Platform aimed to determine the specific website features and analytical needs of African trauma research facilities by surveying individuals from healthcare facilities that are currently using the AFEM Trauma Form. A total of 45 healthcare practitioners from eight countries participated in the background survey, and 34 HCPs participated in the usability study. The mean scores for the usability questionnaire portion were high. Major positive themes of the participant comments included easy to use and time saving, while major negative themes included feasibility concerns, and comments about specific variables to add were common. Overall satisfaction with the Trauma Data Platform was high, and the user comments and suggestions will be incorporated into future versions of the platform. This research highlights the importance of considering the feasibility of health technology in its introduction.

### 5.2 Estimated trauma-associated blood loss versus availability of emergency blood products at a district-level public hospital in Cape Town

*H. Weeber. UCT 2018. Supervisors: S. Bruijns, DJ van Hoving*

International guidance suggests that injury-associated haemorrhagic shock should be resuscitated using blood products. However, in low- and middle-income countries there is poor access to blood products. This study aimed to estimate the amount of blood loss from serious injury in relation to available emergency blood products at a secondary-level public Cape Town hospital. This cross-sectional study included all injured patients cared for in the resuscitation area of Khayelitsha Hospital's emergency centre over a fourteen-week period. The Abbreviated Injury Scale was used to estimate blood loss for each patient using an algorithm from the Trauma Audit Research Network. A total of 389 injury events were enrolled. We estimated a median of 1 unit of blood requirement per week or weekend, up to a maximum of 8 units or 6 units respectively. Most patients (94%) did not have sufficient injury to warrant transfusion. The volume of available emergency blood appears inadequate for injury care, and doesn't consider the need for other causes of acute haemorrhage. Furthermore, lack of other blood components (plasma and platelets) presents a challenge in this low-resourced setting.

## 6 Master of Medicine (MMed) dissertations

### 6.1 A comparison between differently skilled pre-hospital emergency care providers in major incident triage in South Africa

*A. Alenyo Ngabirano. SU 2018. Supervisors: DJ. van Hoving, W. Smith*

Major incident triage ensures effective emergency care and utilization of resources. Prehospital emergency care providers are often the first medical professionals to arrive at any major incident and should be competent in primary triage. However, various factors including level of training influence their triage performance. This study aimed to determine the difference in major incident triage performance between different training levels of prehospital emergency care providers, pre- and post-training, in South Africa utilizing the Triage Sieve algorithm. A total of 129 prehospital providers participated. The mean age was 33.4 years and 65 (50.39%) were male. Most (n=87, 67.44%) were BLS providers. The overall correct triage score pre-training was 53.91% (95% CI 51.98 to 55.83), over triage 31.43% (29.66 to 33.2) and under triage 13.84 % (12.55 to 12.22). Post-training, the overall correct triage score increased to 63.60% (61.72 to 65.44), over triage decreased to 17.91% (16.47 to 19.43) and under triage increased to 17.83% (16.40 to 19.36). ALS providers had both the highest likelihood of a correct triage score post-training (odds ratio 1.21 (95%CI 0.96-1.53)) and the shortest duration of triage (median 3 sec, interquartile range 2 to 7sec) (p=0.034). Participants with prior major incident training performed better (p=0.001). Prior major incident training played a significant role in triage accuracy indicating that training should be an ongoing process. Although ALS-providers were the quickest to complete triage, this difference was not clinically significant. BLS and ILS providers with major incident training can be thus be utilized for primary major incident triage allowing ALS providers to focus on more clinical roles.

### 6.2 Poor access to acute care resources to treat major trauma in low- and middle-income settings: A self-reported survey of acute care providers

*A. Alibhai. UCT 2018. Supervisors: S. Bruijns, C. Hendrikse*

Injury and violence are neglected global health concerns, despite being largely preventable. This small study uses evidence-based guidance (2016 National Institute of Clinical Excellence guidelines) to indirectly describe and compare the self-reported perception of availability of resources for manage major trauma in high-income, and low- and middle-income countries, of delegates attending the 2016 International Conference on Emergency Medicine held in South Africa. The survey instrument captured responses from 392 participants working in both pre- and in-hospital settings and responses were grouped according to income group (either high-income, or low- and middle-income) based on the World Bank definition for income group. A Fisher's Exact test was conducted to compare responses between different income groups. A total of 206 (53%) respondents were from high-income countries and 186 (47%) were from low- to middle-income countries. Respondents described significantly less access to resources and services for low- and middle-income countries to adequately care for major trauma patients both pre- and in-hospital when compared to high-income countries.

Shortages ranged from consumables to analgesia, imaging to specialist services, and pre-hospital to in-hospital care.

### **6.3 The epidemiology of operations performed by the National Sea Rescue Institute of South Africa**

*E. Erasmus. SU 2018. Supervisors: DJ. van Hoving,*

Injuries remain a major contributor of morbidity and mortality worldwide. Non-fatal drowning in Africa remains unquantified but it is estimated to be ten times higher than the fatal drowning rate. Timely search and rescue, initial resuscitation and rapid transportation to definitive care play a crucial role in preventing injury-related morbidity and mortality. The National Sea Rescue Institute (NSRI) of South Africa is a non-profit organization responsible for ~97% of maritime search and rescue operations in South Africa (including inland navigable waters). This study aimed to describe the epidemiology of operations performed by the NSRI of South Africa over a 5-year period. The NSRI launched 3281 operations over the study period. Marked seasonal variation were noticeable with peak periods in December and January, corresponding to the South African summer holiday season. Water-based operations (67.6%) were the most frequent operation performed. The NSRI assisted 3399 individuals of which 77% were male. The mean age of rescued persons was 42 years. Eight hundred and thirty-six individuals (25%) had non-fatal injuries or illnesses requiring medical assistance. Medical emergencies (35%), traumatic injuries (32.8%), and non-fatal drownings (23%) were the most common types of injury and illness. The majority of the 184 (18%) deaths recorded were due to drowning (75%). Injury and illness, specifically drowning utilize a large proportion of search and rescue services. The results may further preventative measures and public health strategies to minimize traumatic and medical incident severity and subsequent casualties at sea.

### **6.4 Adverse event registry analysis of an EMS system in a low resource setting: a descriptive study**

*S. Geraty. UCT 2018. Supervisors: S. Bruijns, H. Lamprecht*

Identifying medical error is important for mitigating future risk and improving patient safety. This study describes the Western Cape Emergency Medical Services Adverse Event Registry over a six-year period between 1 January 2010 to 31 December 2015. All cases classified as an adverse event or near miss were extracted for in depth review. Altogether 106 adverse events and 47 near misses were reported over the six-year period. Of these, 65 (42%) cases were adult medical patients, 31 (20%) adult trauma patients, 15 (10%) obstetric patients and 42 (27%) paediatric patients. The caseload was observed to increase over the six-year period, whilst system medical errors decreased and individual medical errors increased over the same period. In this low resource emergency medical service system, individual medical errors increased and system medical errors decreased as more recommendations derived from adverse events caused by the system errors were implemented. This created a greater need for individual and group training of EMS clinical providers.

## **6.5 The Perceptions of Emergency Medicine Physicians and Trainees Regarding Family Presence During Adult Patient Resuscitation in South African Public-Sector Emergency Centres**

*N. McAlpine. UCT 2018. Supervisors: H. Geduld, J. Rajbaran*

The benefits of family presence during adult resuscitation (FPDR) are well documented in the literature but not always practised. The purpose of this study was to evaluate the perceptions of Emergency Medicine physicians and specialist trainees regarding FPDR in South African public sector Emergency Centres. This descriptive study used an electronic survey distributed via email to 157 Emergency Medicine physicians and specialist trainees in South Africa. Most South African Emergency Medicine physicians and trainees did not feel that FPDR interrupted patient care; did not feel it hindered the teams' productivity; and did not believe it increases complaints about the quality of patient care. Despite this, practice of FPDR was found to be uncommon and knowledge regarding FPDR guidelines was poor. The views of South African Emergency Medicine physicians and specialist trainees regarding FPDR are in keeping with other pro-FPDR countries. However, these views do not seem to translate into practice.

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

*S. Mtombeni. UCT 2018. Supervisors: H. Geduld, M. Chidzonga*

Major curricula gaps have been identified as underlying suboptimal clinical skills in addressing the high burden of injury morbidity and mortality in low- and middle-income countries. 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. A three-stage modified online Delphi survey was used to gain consensus among expert medical trainers at UZCHS, between July and August 2017. A total of 19 expert medical teachers, representing seven clinical departments responded to the survey, with 15 completing all rounds, of which 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 locally appropriate undergraduate procedural core competencies was generated by three Delphi rounds. This process can serve as guidance for curriculum projects in Zimbabwe and similar settings.

## 7 Masters of Philosophy (MPhil) dissertations

### 7.1 Developing call out criteria for South African helicopter services: A Delphi study

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Helicopter Emergency Medical Services (HEMS) are an expensive resource that should be utilised efficiently to optimise the cost-benefit ratio. This may be achieved by implementing call-out criteria that are most appropriate to the healthcare system in which HEMS operate. By identifying patients that are most likely to benefit from HEMS, their utilisation can be enhanced and adjusted to ensure optimal patient outcome. The aim of this study was to utilise expert opinion to reach consensus on HEMS call-out criteria that are contextual to the South African setting. A modified Delphi technique was used to develop call-out criteria, using current literature as the basis of the study. Purposive, snowball sampling was employed to identify a sample of 118 participants locally and internationally, of which 42 participated for all three rounds. After two rounds, consensus was obtained for 63% (36/57) of criteria, while 64% of generated statements received consensus in the third round. HEMS dispatch criteria relating to patient condition and incident locations were found to be preferential to a comprehensive list. The combination of existing literature and participant opinions, established that callout criteria are most efficient when based on clinical parameters and geographic considerations, as opposed to a specified list of criteria.