Emergency Medicine Division

Research Committee

2017 Research Report

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

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Contents

1 Summary of EMDRC Research Activities

In 2017 the Emergency Medicine Divisional Research Committee (EMDRC) received 78 submissions with 31 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 2017: Ms Rachel Allgaier, A/Prof Stevan Bruijns, Dr Julian Fleming, Dr Heike Geduld, Dr Clint Hendrikse, Dr Peter Hodkinson, Dr Sue le Roux, Mr Michael McCaul, Dr Colleen Saunders, Dr Wayne Smith, and Prof Lee Wallis.

Table 1: EMDRC Review activities 2012-2017

	Ave	2012	2013	2014	2015	2016	2017
All submissions	**68**	56	45	53	115	63	**78**
Summaries	***31***	34	6	19	57	32	**37**
Proposals	***38***	22	39	34	58	31	**41**
Reviews performed	**137**	112	90	106	230	126	**156**
Submissions approved	**49**	41	31	32	84	47	**57**
Proposals approved	***25***	18	26	18	37	21	**31**
All revision	**18**	15	14	20	29	16	**16**
All rejected	**1**	0	0	1	2	0	**1**

Together with their students, EMCT staff authored or co-authored 37 research publications including four letters to the editor and 33 original research and review articles (Figure 1).

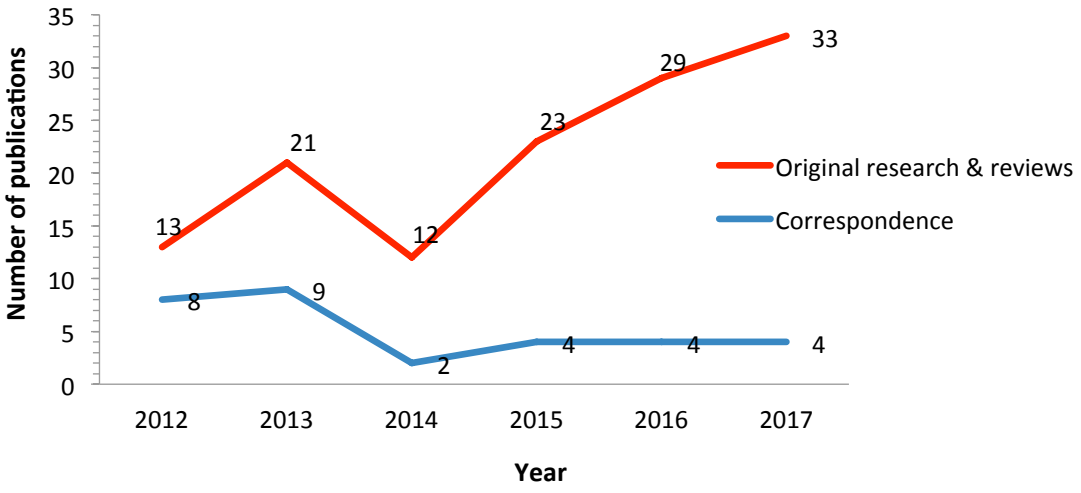

Figure 1: EMDRC Publication outputs 2012-2017

A total of 20 students successfully completed their dissertations through the Division of Emergency Medicine in 2017, either in full (PhD, MSc) or partial fulfilment (MMed, MPhil) of their degree requirements (Figure 2). Four of these were awarded with distinction.

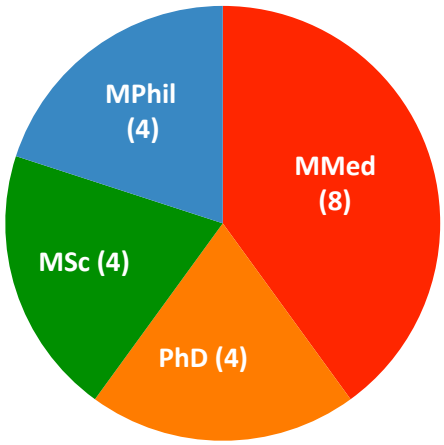

Figure 2: Breakdown of student dissertations completed in 2017

Full-text copies of all research outputs are available on request from Dr Colleen Saunders, Research Manager, Division of Emergency Medicine, University of Cape Town (T: +27 21 650 4842; E: c.saunders@uct.ac.za).

2 Opinion pieces and Brief Communications

2.1 Gender-specific differences and burn outcome.

L. Blom, L. Laflamme, L.A. Wallis, M. Hasselberg. Burns. 2017. 43:886-894.

Pauzenberger et al. disagreed with the findings of the authors' previously published study. This reply letter to the editor addressed the comments by stating that the underlying reasons could only be speculated upon and that more research is needed to make any clear conclusions about possible gender differences. The authors point out that a study from another part of South Africa showed similar gender differences in the referral pattern but the mechanisms behind the numbers were not investigated.

2.2 The Kampala Trauma Score has poor diagnostic accuracy for most emergency presentations.

S.R. Bruijns, L.A. Wallis. Int J Care Injured. 2017. 48:2365-2374.

This letter to the editor was in response to Gardner et al.'s recommendation to use the Kampala Trauma Score as a "practical and valid triage tool to predict patient prognosis, emergency department outcomes and inform referral decision making." They argue that the Kampala Trauma Score has not been validated or shown to be beneficial in low-resource setting when used in parallel with another triage tool. The South African Triage Scale on the other hand has validity across a spectrum of emergency presentations, including trauma. They conclude that the Kampala Trauma Score appears to have similar accuracy to the South African Triage Score where trauma is concerned, but has no value for the non-trauma patients that more commonly present; it is therefore not recommended for triage use.

2.3 Standardised training is the key to accuracy in triage.

S.R. Bruijns, P. Louw, A. Kuiler, E. Esterhuyse, Y.N. Magerman. S Afr Med J. 2017. 107(7):546.

This letter to the editor discusses the need for training in the use of triage tools such as the South African Triage Scale. The authors call for continuous training and assessment, along with practice and audit. An open-access SATS provider curriculum is available from the provincial website: http://www.emct.info/triage.html.

2.4 Consequences of EMS delays.

P.W. Hodkinson, S. de Vries, L.A. Wallis. S Afr J Surg. 2017. 55(1): 48.

This letter to the editor disputes the claim of serious consequences of emergency medical service delays on outcome from penetrating abdominal injury by Chowdhury et al. The authors felt Chowdhury et al.'s paper was a misrepresentation of the facts around the role and depth of issues around the transfer of trauma patients, and relating response time to mortality rates. The use of response times as an indicator for EMS performance is a misguided indicator for EMS effectiveness, among other problematic concepts highlighted in this letter.

3 Original Research and Reviews

3.1 Describing the categories of people that contribute to an emergency centre crowd at Khayelitsha Hospital, Western Cape, South Africa

E. Ahiable, S. Lahri, S. Bruijns. Afr J Emerg Med. 2017; 7(2).

This prospective, cross-sectional study aimed to count and categorise the people (e.g. staff, patients, visitors) in a busy emergency centre at three selected times every day for four weeks. A total of 16,353 people were counted during the study period. On average, 39% of the group were staff, 32% were patients and 29% were visitors. Of the staff, 586 (3.6%) were EC doctors, 733 (4.4%) were non-EC doctors, 1488 (9%) were EC nurses, and 445 (3%) were non-EC nurses. Staff levels fluctuated predictably, reducing at night and over weekends, while patient levels remained constant. Non-EC doctors more than doubled during the day on week shifts, in significantly more numbers than EC doctors, suggesting that many of the patients in the EC were likely to be admissions boarding in the EC. Visitor numbers were substantial during visiting hours and further aggravated crowding. Resource-light studies involving flow are important to explore crowding in low- and middle- income settings.

3.2 Operational demands on pre-hospital emergency care for burn injuries in a middle-income setting: a study in the Western Cape, South Africa

R. Allgaier, L. Laflamme, LA. Wallis. Int J Emerg Med. 2017; 10(2).

This retrospective, cross-sectional study of administrative and patient records aimed to describe the burn cases from a viewpoint of operational factors important to pre-hospital emergency medical services (EMS). EMS treated 1198 patients with confirmed burns, or 0.6% of the total EMS caseload, over the 12-month study period. Of the confirmed cases, 625 (52.2%) were located outside the City of Cape Town and 1058 (88.3%) were transported to a medical facility. Patients from urban areas had longer mission times. Children accounted for 37.5% (n = 449) of all burns. The majority of transported patients that were triaged were yellow (n = 238, 41.6% rural and n = 182, 37.4% urban). Burns make up a small portion of the EMS caseload. More burns occurred in areas far from urban hospitals and burn centres. The majority of burn cases met the burn centre referral criteria.

3.3 Accuracy of acute burns diagnosis made using smartphones and tablets: a questionnaire-based study among medical experts

L. Blom, C. Boissin, N. Allorto, L.A. Wallis, M. Hasselberg, L. Laflamme. BMC Emergency Medicine 2017; 17:39

This study aimed to determine the accuracy of image-based remote diagnosis burns commonly presenting to emergency centres in the Western Cape. A review of eight emergency centres in the Western Cape identified 10 commonly seen burn injuries in adults and children. A web-based questionnaire was administered to South African and Swedish burns specialists, and South African emergency medicine specialists, in order to assess total body surface area (TBSA) depth for 51 images of burns. The assessment of TBSA was highly accurate, however burn depth assessments

were of low accuracy. Burns images viewed on handheld devices may therefore be suitable for seeking expert advice on burn size but not burn depth.

3.4 Adherence to referral criteria at admission and patient management at a specialized burns centre: the case of the Red Cross War Memorial Children's Hospital in Cape Town, South Africa

C. Boissin, M. Hasselberg, E. Kronblad, S-M. Kim, L.A. Wallis, H. Rode, L. Laflamme. Int J Environ Res Public Health. 2017; 14:732.

This retrospective records-based study aimed to determine the Red Cross War Memorial Children's Hospital's level of adherence to the provincial burn centre referral criteria. The secondary aim was to assess which referral criteria were associated with care received at the burns centre. The overall adherence was 93.4% (100% among children under 2 years of age and 86% among the others) and it did not vary remarkably over time. The two criteria of "injury sustained at a specific anatomical site" (85.2%) and "young age" (51.9%) were those most often identified. Children aged 2 years or older were more likely to undergo surgery or to stay longer than those of young age (although a referral criterion) and so were those with higher injury severity (a referral criterion). In this specialized paediatric burns centre, children are admitted mainly according to the guidelines. However, given the high prevalence of paediatric burns in the region and the limited resources at the burns centre, adherence to the guidelines need to be further studied at all healthcare levels in the province.

3.5 Poor access for African researchers to African emergency care publications: a cross-sectional study

S.R. Bruijns, M. Maesela, S. Sinha; M. Banner. West J Emerg Med. 2017; 18(6):1018-24.

This retrospective, cross-sectional study aimed to describe access to African emergency care publications in terms of publisher-based access (open access or subscription) and alternate access (self-archived or author provided), as well as the cost of access. All emergency medicine publications in Scopus between 2011 and 2015 were included in the study. Of the 666 publications from 49 journals, 59.3% were open access. For subscription-based articles, 39.1% were self-archived, 22.1% were author-provided, and 38.8% were inaccessible. Mean article access cost was $36.44, and mean processing charge was $2,319.34. Using the purchasing power parity index it was calculated that equivalent out-of-pocket expenditure for South African, Ghanaian and Tanzanian authors would respectively be $15.77, $10.44 and $13.04 for access, and $1,004.02, $664.36 and $830.27 for processing. Based on this, the corrected cost of a single-unit article access or process charge for South African, Ghanaian and Tanzanian authors, respectively, was 2.3, 3.5 and 2.8 times higher than the standard rate. One in six African emergency care publications are inaccessible outside institutional library subscriptions; additionally, the cost of access to publications in low- and middle-income countries appears prohibitive. Publishers should strongly consider revising pricing for more equitable access for researchers from low- and middle-income countries.

3.6 Improving publication quality and quantity for acute care authors from low- and middle-income settings

S.R. Bruijns, M. Banner, G.A. Jacquet. Ann Emerg Med. 2017; 69(4).

This study aimed to describe the *African Journal of Emergency Medicine*'s (*AfJEM*'s) journal-initiated platform to improve publication quantity and quality in Sub-Saharan Africa emergency care research via a programme called "Author Assist". After either pre- or post-peer review rejection, authors are matched to an experienced volunteer assistant to revise and resubmit their article in a process that blinds handling editors and reviewers, but not the editor in chief, to participation. Of the 47 articles referred for Author Assist during the study period of five years, 12 (26%) were originally rejected in the pre-peer review stage and 35 (74%) after peer review. Twenty-eight (60%) authors offered Author Assist enrolled. Of the 14 resubmissions during the study period, 12 (86%) were accepted for publication. For comparison, 37 of 40 regular revisions (93%) (without assistance) were accepted for publication during the same period. Author Assist reversed one in four rejection decisions through a process that unavoidably but minimally biases peer review. Of the few free publication-improvement services targeting researchers in low- and middle-income countries, AfJEM's Author Assist is the only journal-led initiative, and the only one specific to emergency medicine.

3.7 Analysis of risk factors, presentation and in hospital events of very young patients presenting with STEMI

E.L. Callachan, A.A. Alsheikh-Ali, L.A. Wallis. J Saudi Heart Assoc. 2017; 29(4)

This study aimed to describe the clinical profile and treatment of STEMI patients aged <40 years treated at hospital in Abu Dhabi, United Arab Emirates. Of the of 77 STEMI patients in the study, smoking was prevalent (61.0%). Beta-blockers were frequently prescribed (90.7%) while aspirin was infrequently prescribed (12%). Of patients without history of each condition, 36.7% were diagnosed in-hospital with hypertension, 28.6% with elevated low-density lipoprotein, and 18.8% with lowered high-density lipoprotein. Among young adults who use tobacco, there is a need for improved screening for risk factors. Earlier detection and treatment of dyslipidemia and hypertension could prevent acute cardiac events among individuals aged <40 years with multiple risk factors.

3.8 Outcomes by mode of transport of ST elevation MI patients in the United Arab Emirates

E.L. Callachan, A.A. Alsheikh-Ali, S. Chandrasekhar Nair, S.R. Bruijns, L.A. Wallis. West J Emerg Med. 2017; 18(3):349-55.

This multicentre, retrospective and prospective study aimed to assess differences in demographics, medical history, treatment times, and follow-up status among patients with STEMI who were transported by various means to four hospitals in Abu Dhabi, United Arab Emirates. Results indicated significant differences ($p<0.001$) in modes of transportation when considering symptom-onset-to-balloon time, door-to-balloon time, and health status at six-month and one-year follow-up. Median times (interquartile range) for patients transported by EMS, private vehicle, or transferred from an outside facility were as follows:

symptom-onset-to-balloon time in hours, 3.1 (1.8-4.3), 3.2 (2.1–5.3), and 4.5 (3.0–7.5), respectively; door-to-balloon time in minutes, 70 (48–78), 81 (64–105), and 62 (46–77), respectively. In all cases, EMS transportation was associated with a shorter time to treatment than other modes of transportation. However, the EMS group experienced greater rates of in-hospital events, including cardiac arrest and mortality, than the private transport group. The results support EMS transportation for patients with acute coronary syndrome as it speeds up time to treatment, including time to balloon inflation, potentially reducing readmission and adverse events.

3.9 Acute Pain Guidelines

S. Chetty, E. Frohlich, P. Penfold, E. Hodgson, M. Raff, H. Kluyts, A. Travers, C-A. Lee, L.A. Wallis, C. Lundgren, A. Milner. Prof Nurs Today. 2017; 21(2):29-46.

This is a summary of the *South African Acute Pain Guidelines* which is an official publication of The South African Society of Anaesthesiologists. The authors form the consensus group. The guidelines summarise the physiology of acute pain, measurement and assessment of acute pain, and enteral and parenteral drug lists.

3.10 Is the South African Triage Scale valid for use in Afghanistan, Haiti and Sierra Leone?

M. Dalwai, P. Valles, M. Twomey, Y. Nzomukunda, P. Jonjo, M. Sasikumar, M. Nasim, A. Razaaq, O. Gayraud, P.R. Jecrois, L.A. Wallis, K. Tayler-Smith. BMJ Glob Health. 2017; 2(2).

This retrospective cohort study aimed to assess the validity of the South African Triage Scale (SATS) in four Médicins Sans Frontières (MSF)-supported emergency centres in Afghanistan, Haiti and Sierra Leone. Validity was assess by comparing patients' SATS ratings with their final EC outcome (i.e. hospital admission, death or discharge). In the two trauma-only settings, the SATS demonstrated good validity: it accurately predicted an increase in the likelihood of mortality and hospitalisation across incremental acuity levels ($p<0.001$) and EC outcomes for 'green' and 'red' patients matched the predicted EC outcomes in 84%-99% of cases. In the mixed EC (both medical and trauma cases), the SATS was able to predict an incremental increase in hospitalisation ($p<0.001$) across both trauma and non-trauma cases. In the paediatric-only setting, SATS was able to predict an incremental increase in hospitalisation in the non-trauma cases only ($p<0.001$). However, 87% (non-trauma) and 94% (trauma) of 'red' patients in the mixed-medical setting were over triaged and 76% (non-trauma) and 100% (trauma) of 'green' patients in the paediatric settings were under triaged. The SATS is a valid tool for trauma-only settings in low-resource countries. Its use in mixed settings seems justified, but context-specific assessments would seem prudent. Finally, in paediatric settings with endemic malaria, adding haemoglobin level to the SATS discriminator list may help to improve the under-triage of patients with malaria.

3.11 Reliability and validity of pediatric triage tools evaluated in low resource settings: a systematic review

B. Hansoti, A. Jenson, D. Keefe, S. Steward De Ramirez, T. Anest, M. Twomey, K. Lobner, G. Kelen, L.A. Wallis. BMC Pediatrics. 2017; 17:37.

This systematic review aimed to analyse the reliability and validity of prioritisation tools for critically ill children in low-resource settings. Of the 4717 studies searched, seven studies evaluating triage tools and ten studies evaluating integrated management of childhood illnesses were included. There were wide varieties in method for assessing reliability and validity, with different settings, outcome metrics and statistical methods. Studies evaluating triage tools for paediatric patients in low and middle income countries are scarce. The methodology utilised in conducting these studies varied greatly and did not allow for the comparison of tools across study sites.

3.12 Prioritizing the care of critically ill children in South Africa. How does SCREEN perform against other triage tools?

B. Hansoti, P. Hodkinson, LA. Wallis. Pediatr Emer Care. 2017;

This study measured the sensitivity and specificity of SCREEN (Sick Children Require Emergency Evaluation Now) compared to four other previously validated triage tools. SCREEN, a subjective tool that aims to identify critically ill children, showed high sensitivity (100%-98.7%; $p < 0.001$) and specificity (64.4%-50.7%; $p < 0.001$) when compared with the other validated triage tools. The SCREEN tool may offer a simple and effective method to identify critically ill children in low-resource environments. It is also scalable and inexpensive.

3.13 SCREEN: A simple layperson administered screening algorithm in low resource international setting significantly reduces waiting time for critically ill children in primary healthcare clinics

B. Hansoti, A. Jenson, A.G. Kironji, J. Katz, S. Levin, R. Rothman, G.D. Kelen, L.A. Wallis. PLoS One. 2017; 12(8)

This prospective, observational implementation-effectiveness hybrid study sought to determine: (1) the impact of SCREEN implementation on waiting times as a primary outcome measure, and (2) the effectiveness of the SCREEN tool in accurately identifying critically ill children. The proportion of critically ill children who saw a professional nurse within ten minutes increased tenfold from 6.4% to 64% with the median time to seeing a professional nurse reduced from 110.3 minutes to 4.9 minutes ($p<0.001$). Overall layperson screening compared to Integrated Management of Childhood Illnesses designation by a nurse had a sensitivity of 94.2% and a specificity of 88.1%, despite large variance in adherence to the SCREEN algorithm across clinics.

3.14 A smartphone-based consultation system for acute burns - methodological challenges related to follow-up of the system

M. Hasselberg, L.A. Wallis, P. Blessing, L. Laflamme. Global Health Action. 2017; 10:sup3.

This study describes a smartphone-based consultation system for acute burns that is in various stages of implementation in the Western Cape, South Africa. It also describes the assessments in relation to its implementation with a special focus on methodological challenges.

3.15 Case mix of patients managed in the resuscitation area of a district-level public hospital in Cape Town

L.D. Hunter, S. Lahri, D.J. van Hoving. Afr J Emerg Med. 2017; 7:19-23.

This prospective observational study was conducted at a district level hospital in the Western Cape. The objective was to describe the case mix of adult patients managed in the resuscitation unit. Data were collected by clinicians via a smartphone application on their own devices. A total of 2324 patient admissions were analysed. The mean age was 36.9 years with a male predominance (58.8%). Most patients were triaged into high-acuity categories (70.0%). HIV infection was the most common comorbidity (22.8%). Acute medical (50.8%) and trauma-related patients (39.9%) dominated the cohort. The median length of stay was 195 minutes and 502 (21.6%) patients were transferred to higher levels of care. There were 74 (3.2%) deaths.

3.16 Reliability and validity of emergency department triage tools in low- and middle-income countries: a systematic review

A. Jenson, B. Hansoti, R. Rothman, S.S. de Ramirez, K. Lobner, L.A. Wallis. Eur J Emerg Med. 2017.

This systematic review sought to quantify and evaluate studies evaluating triage tools in low- and middle-income countries. Literature between 2000 and 2015 were reviewed for the overall quality of evidence using the GRADE criteria. Eighteen studies were included in the review, evaluating six triage tools. Three of the 18 studies were in low-income countries and none were in rural hospitals. Two of the six tools had evaluations of reliability. Each tool positively predicted clinical outcomes, although the variety in resource environments limited ability to compare the predictive nature of any one tool. The South African Triage Scale had the highest quality of evidence. In comparison with high-income countries, the review showed fewer studies evaluating reliability and presented a higher number of studies with small sample sizes that decreased the overall quality of evidence.

3.17 Assessing guidelines for burn referrals in a resource-constrained setting: Demographic and clinical factors associated with inner-facility transfer

A. Klingberg, LA. Wallis, H. Rode, T. Stenberg, L. Laflamme, M. Hasselberg. Burns. 2017.

This cross-sectional case review of patients presenting with a burn at the trauma unit of Red Cross War Memorial Children's Hospital in Cape Town, South Africa. The aim was to assess

demographic and clinical factors associated with inter-facility referrals for patients with burns in a resource constrained setting. Six hundred and eleven children were referred to the burns or intensive care unit and 253 children were treated and discharged from the trauma unit. Of those admitted as inpatients, 94% fulfilled at least one criteria for referral and 80% of those treated and discharged fulfilled the criteria for referral.

3.18 Pioneering small-group learning in Tanzanian emergency medicine: Investigating acceptability for physician learners

A.G. Lim, H. Geduld, K. Checkett, H.R. Sawe, T.A. Reynolds. African Journal of Health Professions Education 2017. 9(1).

There is little evidence describing whether small-group learning (SGL) modalities are perceived to be effective in African EM training programmes. This study aimed to investigate the acceptability of SGL for physicians' training by exploring the perceived effectiveness of SGL compared with traditional didactic lectures among 38 emergency department physician learners in Dar es Salaam, Tanzania. Perceptions of SGL were identified from qualitative responses to a written questionnaire, and regression analyses were used to determine strength of association between quantitative outcomes. SGL scored more favourably with regard to improving clinical practice, enjoyment of learning, and building peer-to-peer relations. Lectures scored more favourably at improving medical knowledge.

3.19 A description of pharmacological analgesia administration by public sector advanced life support paramedics in the City of Cape Town

R. Matthews, M. McCaul, W. Smith. AfJEM 2017. 7(1).

This study aimed to describe pre-hospital pain management practices by Emergency Medical Services in the Western Cape. A retrospective survey of patient care records describing analgesic drug administration by advanced life support paramedics was undertaken. A total of 530 patient care records were included. Morphine was administered in 70% of cases, nitrates in 37%, and ketamine in 1.7% of cases. A total of 5 mg or less of morphine was administered in 75% of cases, with the median dose being 4 mg (IQR 3–6). Single doses were administered in 72.2% of morphine administrations, 56% of ketamine administrations and 82% of nitrate administrations. Advanced Life Support providers in the Western Cape do not appear to conform to best practice and use low doses of morphine.

3.20 The State of Emergency Medical Services (EMS) Systems in Africa

NK. Mould-Millman, J. Dixon, N. Sefa, A. Yancey, B.G. Hollong, M. Hagahmed, A.A. Ginde, L.A. Wallis. Prehosp Dis Med 2017. 32(3)

A detailed EMS system questionnaire ascertaining EMS systems' jurisdiction, operations, finance, clinical care, resources, and regulatory environment was administered to experts between 2013 and 2014. Emergency Medical Services systems were found to exist in one-third of African countries. Injury and obstetric complaints were the leading African

prehospital conditions. Only a minority (<9.0%) of Africans have coverage by an EMS system and most systems were predominantly basic life support, government operated, and fee-for-service.

3.21 Assessment of hospital-based adult triage at emergency receiving areas in hospitals in Northern Uganda

K. Opiro, L.A. Wallis, M. Ogwang. African Health Sciences 2017. 17(2).

The aim of this study was to determine the presence of hospital triage systems, the cadre of staff undertaking triage and barriers to development/improvement of formal triage systems in the Acholi region of northern Uganda. Only one of the 6 hospitals surveyed had a formal hospital-based adult triage protocol in place. Only 2 hospitals had an allocated emergency department. Lack of training, variation of triage protocols from hospital to another, shortage of staff on duty, absence of national guidelines on triage and poor administrative support were the major barriers to the development of formal triage in all these hospitals.

3.22 Trauma burden in Tanzania: a one-day survey of all district and regional public hospitals.

H. Sawe, J. Mfinanga, K.R. Mbaya, P.M. Koka, S.S. Kilindimo, M.S. Runyon, V.G. Mwafongo, L.A. Wallis, T.A. Reynolds. BMC Emergency Medicine 2017, 17:30.

The aim of this study was to describe the injury epidemiology across Tanzania. A purpose-designed data collection sheet was used to gather the demographic and clinical information of all patients presenting during the day-site visit to each hospital. Of the 5227 patients seen in the 24-h period, 9.7% presented with trauma-related complaints. Road traffic accident was the most common mechanism of injury, accounting for 44.7% of complaints. Open wounds and bone fractures were the two most frequent diagnoses, with a combined 300 (59%) cases. Trauma constitutes a substantial burden among patients seeking care in acute intake areas of hospitals across Tanzania.

3.23 Percutaneous coronary intervention still not accessible for many South Africans.

W. Stassen, L.A. Wallis, C. Lambert, M. Caastren, L. Kurland. AfJEM 2017; 7(3).

This study aimed to determine the coverage of percutaneous coronary intervention-facilities in South Africa and relate this to access based on population and socio-economic status. A disparity was found to exist between the number of private and state-owned PCI-facilities when compared to the poverty and insurance status of individuals. For many South Africans, access to primary PCI is therefore impossible given their socio-economic status or geographical location.

3.24 African emergency care providers' attitudes and practices towards research

D.J. van Hoving, P. Brysiewicz. AfJEM 2017; 7(1).

This study aimed to assess the perceptions and practices towards research among current emergency care providers in Africa by surveying all individual members of the African Federation of Emergency Medicine. One hundred and sixty-eight responses were analysed (invited n = 540, responded n = 188, 34.8%, excluded n = 20). Lack of research funding (64.3%), lack of research training (51.2%), and lack of allocated research time (45.2%) were found to be the main barriers to research involvement. A total of 79.8% felt that emergency care workers need to be shown how to use research to improve clinical practice, and most agreed that insufficient emergency care research is being conducted in Africa.

3.25 Abdominal ultrasound for diagnosing abdominal tuberculosis or disseminated tuberculosis with abdominal involvement in HIV-positive adults

D.J. van Hoving, G. Meintjies, Y. Takwoingi, R. Griesel, G. Maartens, E. A. Ochodo. Cochrane Database of Systematic Reviews 2017.

This article describes a protocol for a Cochrane Review to determine the diagnostic accuracy of abdominal ultrasound as a standalone test for detecting abdominal TB or disseminated TB with abdominal involvement in HIV-positive adults.

3.26 Major incident triage: Derivation and comparative analysis of the Modified Physiological Triage Tool (MPTT)

J. Vassallo, J. Beavis, J.E. Smith, L.A. Wallis. Injury 2017; 48(5).

This retrospective review of the UK Joint Theatre Trauma Registry was performed for all adult patients presenting to a deployed Military Treatment Facility between 2006 and 2013. Using hospital physiological data, binary logistic regression models were used to derive optimum physiological ranges to predict the need for life-saving intervention and develop the Modified Physiological Triage Tool (MPTT). The MPTT (sensitivity 69.9%, 95% CI 0.677-0.720, specificity 65.3%, 95% CI 0.632-0.675) performance characteristics were found to exceed existing major incident triage systems, whilst maintaining an appropriate rate of over-triage and minimising under-triage.

3.27 The civilian validation of the Modified Physiological Triage Tool (MPTT): an evidence-based approach to primary major incident triage

J. Vassallo, J.E. Smith, O. Bouamra, F. Lecky, L.A. Wallis. EMJ 2017; 34(12).

This study aimed to validate the MPTT in a civilian environment using a retrospective review of the Trauma Audit and Research Network (TARN) database for all adult patients between 2006 and 2014. During the study period, 218 985 adult patients were included in the TARN database. The MPTT (sensitivity 57.6%, specificity 71.5%) outperformed all existing triage methods with a 44.7% absolute reduction in under triage compared with existing UK civilian methods.

3.28 The prospective validation of the Modified Physiological Triage Tool (MPTT): an evidence-based approach to major incident triage

J. Vassallo, S. Horne, J.E. Smith, L.A. Wallis. JRAMC 2017; 163(6).

In this study, physiological data and interventions were prospectively collected for consecutive adult patients with trauma presenting to the emergency department at Camp Bastion, Afghanistan. Patients were triaged using existing triage tools and the MPTT. The MPTT outperformed all existing triage tools at predicting the need for life-saving intervention, with a 19.6% absolute reduction in under triage compared with the existing Military Sieve while maintaining acceptable levels of over triage.

3.29 Major incident triage and the implementation of a new triage tool, the MPTT-24

J. Vassallo, J.E. Smith, L.A. Wallis. JRAMC 2017; doi:10.1136/jramc-2017-000819.

In order to improve the applicability of the MPTT, the upper respiratory rate (RR) threshold was increased to 24 breaths per minute (bpm) to produce the MPTT-24. The aim of this study was to conduct a feasibility analysis of the proposed MPTT-24, comparing its performance with the existing UK Military Sieve. Both the MPTT and MPTT-24 outperformed existing UK methods of triage with an increase in sensitivity of between 25.5% and 29.5%, however the MPTT-24 was found to allow for a more rapid triage assessment.

3.30 Cardiopulmonary resuscitation by Emergency Medical Services in South Africa: Barriers to achieving high quality performance.

JP. Veronese, LA. Wallis, R. Allgaier, R. Botha. AfJEM 2017; 8(1):6-11.

The aim of this study was to determine the quality of CPR provision by EMS staff in a simulated setting. A descriptive study was conducted to determine the competency of intermediate-qualified EMS personnel in administering CPR. Theoretical knowledge was determined using a multiple-choice questionnaire, and psychomotor skills were video-recorded and then assessed by independent reviewers. This study observed that overall CPR knowledge and skill performance was below standard. Only 25% of the items tested showed that participants applied their relevant knowledge to the equivalent skill and this suggests that theoretical knowledge has a small but notable role to play on some components of skill performance.

3.31 Integrating mHealth at point of care in low-and middle-income settings: the system perspective.

LA. Wallis, P. Blessing, M. Dalwai, S.D. Shin. Glob Health Action 2017; 10(sup3):1327686.

Many aspects of mHealth have great promise within resource-poor settings. However, there are a number of considerations for the integration of mHealth into existing health systems. This paper discusses these considerations from regulatory, technological and user perspectives. The need for an

appropriate legislative and regulatory framework is discussed, as well as other confidentiality issues. Issues such as usability of the application, signal loss, data volume utilization, need to enter passwords, and the availability of automated or in-app context-relevant clinical advice are also discussed. From a user perspective, there are three groups to consider: experts, front-line clinicians, and patients. For clinicians, ease of integration into daily work flow is critical, as are familiarity and acceptability of other technology in the workplace. Front-line staff tend to work in areas with more challenges around cell phone signal coverage and data availability than 'back-end' experts.

3.32 A roadmap for the implementation of mHealth innovations for image-based diagnostic support in clinical and public-health settings: a focus on front line health workers.

LA. Wallis, M. Hasselberg, C. Barman, I. Bogoch, S. Broomhead, G. Dumont, J. Groenewald, J. Lundin, J. Norell Bergendahl, P. Nyasulu, M. Olofsson, L. Weinehall, L. Laflamme. Glob Health Action 2017; 10(sup3):1340254.

Diagnostic support for clinicians through application of mHealth technologies has shown a slow uptake despite promising opportunities. This paper discusses the consensus recommendations for the development of a roadmap to implement image-based support for clinicians, specifically focusing on how to overcome potential barriers affecting front-line users, the health-care organization and the technical system. Image-based diagnostic systems will pave the way to making health care more accessible and more equitable. However, the successful implementation of those solutions will require a seamless introduction into routines, adequate technical support and significant added value.

3.33 Poor adherence to tranexamic acid guidelines for adult, injured patients presenting to a district, public South African hospital.

J.C.G. Wiese, D.J. van Hoving, L. Hunter, S. Lahri, S.R. Bruijns. AfJEM 2017; 7(2):63-67.

The 2013 Western Cape Emergency Medicine Guidelines adopted the use of Tranexamic acid (TXA) in severe injury. This study aimed to describe compliance with these guidelines. A retrospective study of TXA use in 301 adult injury patients presenting to Khayelitsha Hospital was performed. Overall compliance was 58%. For those without an indication, overall compliance was 96% (172 of 180). Of the 115 patients who had an indication, only eight (18%) received the first dose of TXA and none received a follow-up infusion. Compliance with the protocol was significantly better if an indication for TXA did not exist, compared to when one did ($p < 0.001$). This study concluded that TXA was not used in accordance with local guidelines. Reasons for this are multifactorial and likely include stock levels, lack of administration equipment, time to reach definitive care, poor documentation and hesitancy to use.

4 Doctor of Philosophy (PhD) in Emergency Medicine

4.1 Mode of transport to hospital among patients with ST Elevation Acute Myocardial Infarction (STEMI) in the Emirate of Abu Dhabi: Correlates, physician and patient attitudes, and associated clinical outcomes.

E. Callachan. UCT 2017. Supervisors: L.A. Wallis, A. Alsheik-Ali

Prehospital care provided by emergency medical services (EMS) can significantly improve outcomes in acute coronary syndromes, including ST-elevation myocardial infarction (STEMI. This quantitative, observational study, sought to (1) assess physicians' perceptions of, and recommendations for, utilization and improvement of EMS, (2) assess patients' awareness of EMS, mode of transport use in decision to seek care and reasons for their decision, and (3) establish if mode of transport used has implications for clinical outcomes. Physician participants (n = 106) were most supportive of prehospital 12-lead ECG for STEMI, but indicated low satisfaction with existing EMS services in Abu Dhabi. Over half of STEMI patient participants (n=587) did not know the phone number to contact EMS, and only 14.7% used EMS in their decision to seek care. EMS-transported patients were more likely to receive timely treatment and had a lower incidence of mortality compared to privately-transported patients. These findings suggest a need to raise public awareness of EMS and its importance for coronary symptoms in Abu Dhabi.

4.2 An investigation into recruitment, retention and motivation of advanced life support practitioners in South Africa.

P. Gangaram. UCT 2017. Supervisors: L.A. Wallis; R. Bhagwan

This research study aimed to investigate factors that influence Advanced Life Support (ALS) practitioner recruitment, retention and motivation in an effort to enhance these factors. This study followed a sequential, explanatory, mixed method design with the quantitative phase comprising questionnaires administered to ALS practitioners (n=1309) and EMS managers (n=60), and the qualitative phase of the study involving focus group (n=7) discussions with ALS practitioners and semi-structured interviews with EMS managers (n=6). The study identified 19 recruitment, 25 retention and 16 motivation factors that influence ALS practitioners. Strong recruitment factors that were identified include: ALS practitioner remuneration, skilled EMS management and organisation culture. Strong retention factors identified include: skilled EMS management, remuneration, resources, availability of health and wellness programmes, recognition of practitioners, working conditions and safety and security. Strong motivation factors included: remuneration, skilled EMS management and resources.

4.3 Prioritization of critically unwell children in low resource primary healthcare centres in Cape Town, South Africa.

B. Hansoti. UCT 2017. Supervisors: L.A. Wallis, I. Maconochie.

Delays in the recognition of critically unwell children are a key contributing factor to avoidable childhood mortality in Cape Town, South Africa. In this study, a stepped implementation approach was undertaken to develop and evaluate a context-appropriate prioritization tool to identify and expedite the care of critically ill children. A systematic review of paediatric triage and prioritization tools for low resource settings was conducted to evaluate the evidence supporting the use of these tools. An exploratory study was conducted to identify barriers to optimal care for critically ill children in the prehospital setting and a context-appropriate tool for identifying and expediting the care of critically ill children in primary health care was developed (SCREEN). The reliability of this tool was evaluated and compared to established triage tools currently used in this setting, and the impact of implementing this tool on waiting times for children presenting for care was evaluated. Lastly, the effectiveness of this tool post real-world implementation in identifying and expediting the care for critically ill children was evaluated. SCREEN was able to significantly reduce waiting times in primary health care for critically ill children.

4.4 Development of an e-learning platform to improve learning delivery in a low-resourced clinical ultrasound training setting.

H. Lamprecht. SU 2017. Supervisors: T. Kruger, L.A. Wallis.

In this study, an e-learning platform was designed and constructed using a participatory action research approach where clinical ultrasound trainees, e-learning developers and researchers collaborated to improve the trainees' access to learning delivery and enhancement, with the aim to eventually improve their low credentialing success rate. The diagnosis stage revealed that the poor credentialing performance was caused by learning delivery failure that reduced the trainees' academic engagement. The evaluation of the e-learning platform intervention identified context-specific resource savings, that all study participant groups accepted the reality of incorporating e-learning as part of a blended learning approach and that the learning access of trainees improved. Collaboration led to real practical and social change by creating a custom designed e-learning platform that changed the way clinical ultrasound trainees learn within a low resourced context.

5 Master of Science (MSc) in Emergency Medicine

5.1 Describing the categories of people that contribute to an emergency centre crowd at Khayelitsha Hospital, Western Cape, South Africa.

E. Ahiable. UCT 2017. Supervisors: S.R. Bruijns, S. Lahri.

This study aimed to describe the emergency centre crowd at Khayelitsha hospital by establishing the number and different categories of people at predefined times during the day over a four week period. Headcounts were made of predefined groups, including doctors, nurses, visitors, patients, and other allied health staff, at 09:00, 14:00 and 21:00 every day for four weeks. A total of 16353 people were counted during the study period. On average 39% of the groups were staff, 32% were patients and 29% were visitors. The emergency centre was consistently crowded with an average occupancy of 130%. Staff levels fluctuated predictably with less staff at night and over weekends whilst patient numbers remained constant.

5.2 Facility-based capacity assessment of emergency care services in public hospitals in Zambia.

C. Chavula. UCT 2017. Supervisors: L.A. Wallis.

The aim of this descriptive, cross-sectional study was to determine facility-based emergency care capacity in 23 public hospitals in Zambia. Data were collected using a standardised Emergency Care Assessment Tool (ECAT) developed in 2013 by AFEM to ascertain facilities' strengths and weaknesses in the delivery of the emergency care services for five sentinel conditions and maternal health. Overall, most facilities were able to offer basic emergency care services. However, there is limited capacity of training and supplies across all facilities, as well as a lack of infrastructure and policies for emergency care in lower-level facilities. In Zambia, capacity building should be focused at district and general hospitals to improve emergency care across all levels of health facilities, as it will reduce the burden at central level and improve patient outcomes.

5.3 Exploring the appropriateness of the Emergency First Aid Responder curriculum in Zambia

J. Pigoga. UCT 2017. Supervisors: L.A. Wallis, C. Cunningham. Awarded with distinction.

The Emergency First Aid Responder (EFAR) training programme has previously been implemented in South Africa and is based on a community-specific course curriculum. The aim of this study was to refine the existing Zambian EFAR curriculum for future implementation through assessing its relevance. Curriculum mapping and blueprinting methodologies were utilised to generate a refined EFAR curriculum. A refined curriculum was generated covering 54 topics and 25 practical skills. When compared to the original EFAR curriculum, time devoted to mastering the knowledge and skills for the care of injuries was increased in the refined curriculum, while time for obstetric and gynaecological emergencies was decreased.

5.4 Emergency Care Assessment Tool for health facilities: A validity study in Cameroon

P. Kim. UCT 2017. Supervisors: L.A. Wallis, E. Calvello-Hynes.

The African Federation for Emergency Medicine (AFEM) previously developed the Emergency Care Assessment Tool (ECAT), a tool that assesses the provision of key medical interventions. The aim of this study was to determine the content, construct, and face validity of the AFEM Emergency Care Assessment Tool in Cameroon. This observational study was perfomed at a convenience sample of five hospitals in Cameroon: three district, one regional, and one central. In general, the higher the level of facility, the greater the emergency care capacity and the greater the number of signal functions that could be performed correctly and consistently. The ECAT has good potential for facility level assessment of emergency care provision, and collects meaningful information that can guide effective improvements in the delivery of emergency care.

6 Master of Medicine (MMed) dissertations

6.1 Clinical presentation and diagnostic work up of suspected pulmonary embolism in a district hospital emergency centre serving a high HIV/TB burden population.

B. Bulajic. UCT 2017. Supervisors: T. Welzel, K. Vallabh.

The diagnosis of Pulmonary Embolism (PE) is challenging to make and is often missed in the Emergency Centre. This study was a retrospective chart review of patients with suspected pulmonary embolism who had CTPAs performed at Mitchell's Plain Hospital, South Africa. A Revised Geneva Score was calculated retrospectively and correlated to the CTPA result. The CTPA yield for PE in the study population was 32%. The most common presenting complaint was dyspnoea (83%), followed by cough and chest pain. Among patients with confirmed PE, 37% were HIV positive and 52% had current TB. The retrospective, revised Geneva Scores correlated poorly with the CTPA results. Pulmonary embolism remains a diagnostic challenge.

6.2 Emergency medicine registrars' attitudes towards youth violence prevention interventions in Cape Town emergency centres.

M. de Man. UCT 2017. Supervisors: C. Ward, H. Geduld.

There is a growing evidence to support the role of emergency centres (ECs) and EC personnel in youth violence prevention (YVP). This study explored the perceptions and attitudes of Cape Town emergency medicine doctors on youth violence, their role in YVP and how it applies to their practice in the EC. Semi-structured focus groups were conducted with Cape Town emergency medicine (EM) registrars using five basis questions for discussion to elicit participants' perceptions of and attitudes towards YVP. EM registrars in Cape Town have a very limited knowledge of YVP. They are faced with immense challenges that relate to patient load, violence directed at EC personnel, and a sense of despair or despondence in terms of ability to effect change.

6.3 Teleconsultation for diagnosis and care of burn injuries in the Western Cape: Evaluation of healthcare providers' intention to use mHealth technology.

K. Diango. UCT 2017. Supervisors: L.A. Wallis.

A mobile application for teleconsultation in burn care was previously developed and tested in the Western Cape. This study aimed to identify healthcare providers' intention to use this mHealth technology and the factors influencing its adoption. Following training in the use of the app, 48 healthcare providers working in Emergency Centres at three healthcare facilities answered a questionnaire. The majority of participants already used smartphones and found the Vula app useful, easy to use, well designed, beneficial in burn care and compatible with their routine work. These factors led them to express the intention to use the app.

6.4 Describing final diagnosis and outcome for patients investigated for suspected acute coronary syndrome at a regional, public South African emergency centre.

D. Kabongo. SU 2017. Supervisors: R. Allgaier, S. Bruijns, M. Kalla.

The aim of this study was to describe the diagnosis, prevalence and outcome of acute coronary syndrome at an urban, public emergency centre in Cape Town, South Africa where an older assay is in use. A retrospective, cross-sectional design was used to compare the diagnosis, outcome and troponin result. Nine hundred and sixty-nine patients were included. Two hundred and fifty-six patients were diagnosed with acute coronary syndrome, of which only 54 were troponin positive (Chi^2 = 22.1, $p<0.001$). However, 76.9% of acute coronary syndrome diagnoses turned out to be unstable angina.

6.5 Utilisation of emergency blood in a cohort of emergency centres in Cape Town, South Africa.

D. Morris. SU 2017. Supervisors: S. Bruijns, M. Stander, D.J. van Hoving.

This study aimed to describe the indications for which emergency blood was utilised in selected emergency centres in the Cape Town Metropole. Practice at secondary level emergency centres was compared with the tertiary Groote Schuur Hospital. Data from all recipients of emergency blood from the emergency centre blood reserve at three secondary level emergency centres and a tertiary hospital were recorded in study registers over the three month study period. Trauma was the most frequent indication and accounted for the greatest volume of emergency blood transfused. Upper gastrointestinal bleeding, early pregnancy complications and anaemia were the next most common indications. Perioperative bleeding was the most common reason for emergency blood to be used outside of the emergency centre.

6.6 The availability and perceived knowledge of use of airway management devices in emergency centres at referral hospitals in Namibia.

K. Sikuvi. UCT 2017. Supervisors: T. Welzel, D.J. van Hoving.

The aim of this study was to identify which airway devices are available in public emergency centres of four referral hospitals in Namibia and to determine the perceived level of knowledge regarding these devices. Twenty-three different airway devices were documented at study hospitals. All centres had some form of basic airway device. Only one had venturi-masks and none of the centres had introducers, video laryngoscopes, surgical airway devices or laryngeal tubes. Only 32.4% of participants had received formal training on airway devices. The study indicates that basic airway devices are available in referral emergency centres in Namibia, however most of the alternative airway devices are not adequately stocked in the sampled emergency centres.

6.7 Attrition amongst emergency medicine registrars in the Western Cape: an exploration of contributing factors

C. van Koningsbruggen. UCT 2017. Supervisors: H. Geduld, C. Hendrikse. Awarded with distinction.

Attrition of trainee specialists negatively impacts the development and progression of emergency medicine in South Africa, and has a negative effect on health systems strengthening. This study aimed to explore the factors contributing to the attrition of emergency medicine registrars in the Western Cape, in order to develop a framework for formal exit interviews. This exploratory qualitative study was conducted using semi-structured interviews of seven emergency medicine registrars with varying time spent in the program. The concerns raised included lack of support within the training program itself, unsociable hours, concerns relating to the impact on relationships and family, as well as issues relating to work-life balance and burnout. The study highlights the need for the development of a formal exit interview to address the issues contributing to attrition.

6.8 Poor adherence to tranexamic acid guidelines for adult, injured patients presenting to a district, public, South African hospital.

C. WIese. UCT 2017. Supervisors: S. Bruijns, D.J. van Hoving. Awarded with distinction.

The 2013 Western Cape Emergency Medicine Guidelines adopted the use of Tranexamic acid (TXA) in severe injury. This study aimed to describe compliance with these guidelines. A retrospective study of TXA use in 301 adult injury patients presenting to Khayelitsha Hospital was performed. Overall compliance was 58%. For those without an indication, overall compliance was 96% (172 of 180). Of the 115 patients who had an indication, only eight (18%) received the first dose of TXA and none received a follow-up infusion. Compliance with the protocol was significantly better if an indication for TXA did not exist, compared to when one did ($p < 0.001$). This study concluded that TXA was not used in accordance with local guidelines. Reasons for this are multifactorial and likely include stock levels, lack of administration equipment, time to reach definitive care, poor documentation and hesitancy to use.

7 Masters of Philosophy (MPhil) dissertations

7.1 Non-invasive ventilation during paediatric retrieval: A systematised review

B. Cheema. UCT 2017. Supervisor: T. Welzel. Awarded with distinction.

The aim of this study was to assess the evidence on the safety and effectiveness of non-invasive ventilation (NIV) in children during transportation. A systematised review of the available literature was conducted to identify the evidence describing safety (intubation; escalation of ventilation mode; adverse event occurrence) and effectiveness (improvement in clinical parameters) outcome measures during transfer. A total of 1287 records were identified of which 12 met the inclusion criteria, and eight were included in the review following quality assessment. The included studies were all observational in design, seven of which evaluated in-transport use of continuous positive airway pressure (CPAP) and one reported on use of high-flow nasal cannula (HFNC) in children during transport. Although the evidence identified was of limited reliability, this study observed that NIV use in children during transport is likely to be safe, and recommends a minimum data set for the standardised reporting of observational studies of paediatric NIV use during transport.

7.2 Patient waiting times within public Emergency Centres in the Western Cape: describing key performance indicators with respect to waiting times within Western Cape Emergency Centres in 2013-2014

K. Cohen. UCT 2017. Supervisors: S. Bruijns.

Key Performance Indicators (KPIs) are used to measure and monitor quality of care. A retrospective, descriptive study was conducted on data collected in the six monthly Western Cape, Emergency Center (EC) triage and waiting time audits for 2013-2014. There was no significant difference for the triage acuity proportions between hospitaland community health centre (CHC) ECs. Waiting times were longer than recommended by the South Africa Triage Scale, however, higher acuity patients were seen faster than lower acuity patients. Waiting times were significantly longer at hospitals compared to CHCs. A red priority patient presenting to a CHC would take 6.1 times longer to reach definitive care than if the patient presented to the hospital EC.

7.3 Case mix and workload of patients seen at three private emergency centres in Cape Town, South Africa.

Z. Moolla. UCT 2017. Supervisor: T. Welzel.

This study aimed to describe the case mix and workload of patients presenting to three private emergency centres in Cape Town, Melomed Gatesville, Melomed Bellville, and Melomed Mitchell's Plain. Third party funding was responsible for 91% of patients seen. The patient profiles consisted primarily of lower acuity presentations. There were clear attendance peaks with lower acuity presentations decreasing after 10 pm. The majority of patients were discharged and very few required specialist follow up.

7.4 Clinical interventions and patient stability account for scene time in a helicopter emergency medical service in South Africa.

G. van Niekerk. UCT 2017. Supervisors: T. Welzel, W. Stassen.

This study aimed to establish whether helicopter Emergency Medical Service scene time was associated with the number of clinical interventions performed and improved patient stability. A retrospective chart review of all primary medical and trauma cases seen by a South African private helicopter medical service between June 2013 and May 2015 was performed. The number of clinical interventions and patient stability as indicated by the Mainz Emergency Evaluation Score was extracted and correlated with scene time. A total of 514 clinical interventions were performed on 204 patients over the study period. Performing one additional clinical intervention was associated with an approximate 4-minute increase in on-scene time. This study concluded that the number of clinical interventions performed by helicopter crews can account for scene time in a Helicopter Emergency Medical Service in South Africa. Moreover, the clinical interventions performed by helicopter crews tend to have a positive effect on patient stability.