



Emergency Medicine Cape Town
2015 research summary
(relevant to WCG Health, 2015)



RESEARCH OUTPUTS: 2015

Emergency Medicine research outputs

Relevant findings for the year 2015

This document summarises the most relevant research content from the academic Divisions of Emergency Medicine. This document was compiled from both research outputs through dissertation and publication (in some instances both). Where a publication resulted from a dissertation, the publication was referenced and not the dissertation. Unpublished papers and material have not been included in this report.

Reading this document

Findings are arranged alphabetically by the author's last name. Findings of particular interest are highlighted in the table of contents and clearly marked in the text. Original dissertations from the University of Cape Town are available on OpenUCT. Original dissertations from Stellenbosch University are available in the Tygerberg campus library. Publications are all available online.

There were 15 relevant published original research papers and 8 dissertations (part 3). Where a publication followed a dissertation, the summary is provided with the publication. Some findings from dissertations submitted in 2015 are scheduled for publication in 2016. These have not been included in this report and will be reported in the midyear report. In addition to these there were two opinion pieces (part 4), which included editorials and op-eds. Contributions to regular features and published conference proceedings are not included. A short summary is given of published papers and dissertations whilst only the references are listed for the opinion pieces. The research list is provided alphabetically by first letter of the first author's surname.



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1 Research outputs: original research publications

1.1 Different teaching techniques appears equal in providing skill and knowledge of manual defibrillation skill in medical students

From: Archer E, Van Hoving DJ, De Villiers A. In search of an effective teaching approach for skill acquisition and retention: Teaching manual defibrillation to junior medical students. *Afr J Emerg Med.* 2015;5(2):54-59

The study investigated the influence of three different instructional approaches (traditional, Peyton's four-stage, and a modified five-step method) on the acquisition and retention of manual defibrillation skills. It was unable to determine which method would be best suited for simulation-based teaching in a resource-constrained environment; none of the three instructional approaches proved to be superior.

1.2 Poor short-term outcomes regarding prehospital treatment for patients with symptomatic hypoglycaemia

From: Booley MR, Welzel T. A cross-sectional analysis of the short-term outcomes of patients receiving prehospital treatment for symptomatic hypoglycaemia in Cape Town. *Afr J Emerg Med.* 2015. doi:10.1016/j.afjem.2015.03.003

A total of 110 patients treated pre-hospital for hypoglycaemia were telephonically interviewed. It was found that 21 (19%) had subsequently died, 30 (34%) reactivated EMS within seven days of prehospital treatment, 48 (54%) had recurrent episodes within seven days of prehospital treatment and in 47 (53%) received no follow-up instructions. The current strategy of dealing with hypoglycaemia in the prehospital environment needs careful re-evaluation to improve the quality of management of this patient population.

1.3 Blood cultures in a high HIV prevalent setting and the emergency centre

From: Boyles TH, Davis K, Crede T, Malan J, Mendelson M, Lesosky M. Blood cultures taken from patients attending emergency departments in South Africa are an important antibiotic stewardship tool, which directly influences patient management. *BMC Infect Dis.* 2015;15:410

Blood cultures taken from patients attending emergency departments in a high HIV prevalent city in South Africa are frequently positive and almost always influence patient management. At least 8 ml of blood should be inoculated into each bottle. Blood cultures should be taken

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from all patients attending ECs in South Africa suspected of having blood stream infection particularly if diabetic, with hypotension, tachycardia or if biliary sepsis is suspected.

1.4 Investigation and management of foreign body ingestion in children

From: Delpont CD, Hodkinson PW, Cheema B. Investigation and management of foreign body ingestion in children at a major paediatric trauma unit in South Africa. *Afr J Emerg Med.* 2015;5(4):176-80

Foreign body ingestion in children is a common presentation to emergency centres. In South Africa, there are no established management guidelines. The study was a retrospective chart review of foreign body ingestion at a paediatric trauma centre, their presenting symptoms, investigations and subsequent management. It highlighted the need for the establishment of guidelines for the management of FB ingestion including hand held metal detectors (aimed at decreasing radiation exposure in this vulnerable population).

1.5 Chest ultrasound for military tuberculosis

Hunter L, B elard S, Janssen S, van Hoving DJ, Heller T. Military tuberculosis: sonographic pattern in chest ultrasound. *Infection.* 2015; doi:10.1007/s15010-015-0865-8

Military tuberculosis is characterized by a multitude of small nodular opacities on chest radiography. Despite ultrasound of the chest gaining wider acceptance as a diagnostic tool of lung infections, sonographic changes of pulmonary military TB have not yet been reported. B-lines and comet-tail artefacts disseminated throughout multiple lung areas and a pattern of sub-pleural granularity as consistent changes seen in lung ultrasound of ten patients with pulmonary military TB diagnosed by chest radiography are described.

1.6 Huge variability in the availability of alternative devices for the management of the difficult airway

From: Jooste WJL, Van Hoving DJ. The availability of alternative devices for the management of the difficult airway in public emergency centres in the Western Cape. *Afr J Emerg Med.* 2015;5(1):19-23

The study demonstrated that Western Cape public emergency centres are currently inadequately stocked with regard to alternative airway devices. Three centres (20%) had no alternative airway device; five centres (33.3%) stocked only one device; three centres (20%)

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had two devices and four centres (26.7%) had more than two devices. A guideline regarding the procurement and implementation of these devices is needed.

1.7 Patient satisfaction with emergency departments

From: Mahomed Z, Wallis LA, Motara F. Patient satisfaction with emergency departments. *S Afr Med J*. 2015;105(6)

In NSH, found that orange, yellow and green priority patients spend an average 295, 286 and 451 minutes respectively in the EC. Despite their 451 minute total time, Green patients needed an average of 24 minutes of clinician time. Fast tracking in ECs would help alleviate much of the Green patient “burden” on these units.

1.8 Experiences and coping mechanism of EMS personnel to trauma

From: Minnie L, Goodman S, Wallis LA. Exposure to daily trauma: The experiences and coping mechanism of Emergency Medical Personnel. A cross-sectional study. *Afr J Emerg Med*. 2015;5(1):12-18

Qualitative work showed that EMS personnel face many traumatic experiences in their daily jobs, and that injured children are the most traumatic events. Staff experience avoidance symptoms and have no structured coping mechanisms. Very little or no training has been received to prepare them for the emotional effects. Integrated intervention programmes are needed.

1.9 Developing emergency medical dispatch systems in Africa

From: Mould-Millman NK, de Vries S, Stein C, Kafwamfwa M, Dixon J, Yancey A, Laba B, Overton J, McDaniel R, Wallis LA. Developing emergency medical dispatch systems in Africa – Recommendations of the African Federation for Emergency Medicine/International Academies of Emergency Dispatch Working Group. *Afr J Emerg Med*. 2015;5(3):141-7

Emergency medical dispatch (EMD) systems are a crucial component of effective Emergency Medical Services (EMS) systems. They provide a means of public access to emergency care information and out-of-hospital emergency care resources and expertise. EMD systems also link various components of EMS, thereby improving efficiency and performance. As EMS systems are rapidly developing across many parts of Africa, EMD systems which are context appropriate are in great need, but are mostly absent despite the wide availability of telecommunications technology. To facilitate the development of EMD systems appropriate



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for the African setting, the African Federation for Emergency Medicine (AFEM) and the International Academies of Emergency Dispatch (IAED) convened a working group in November 2014 to provide conceptual, technical, and innovative recommendations for contextually appropriate EMD systems for African settings. It is hoped that these recommendations will augment efficiency, effectiveness, and standardisation within and among African EMD systems, thereby improving health outcomes for sufferers of acute illness or injury.

1.10 Electronic Medical Records

From: Ohuabunwaa EC, Sun J, Jubanyika KJ, Wallis LA. Electronic Medical Records in low to middle income countries: The case of Khayelitsha Hospital, South Africa. *Afr J Emerg Med.* 2015. doi:10.1016/j.afjem.2015.06.003

There is a growing need and tremendous push towards electronic medical records (EMRs) even in developing areas. This study sought to learn from the implementation process at one hospital in South Africa. In this hospital, EMRs were limited by paper charts needing to be scanned into a system, with limited record clerk and scanning equipment available. This resulted in a backlog of missing records. Future implementations of EMRs should strive for a fully electronic EMR that does not depend on scanning of paper records, and the upfront costs are expected to save the hospitals tremendously in the future.

1.11 Burn services in the Western Cape, South Africa

From: Rode H, Rogers AD, Numanoglu A, Wallis L, Allgaier R, Laflamme L, Hasselberg M, Blom L, Duvenage R. A review of primary and secondary burn services in the Western Cape, South Africa. *S Afr Med J.* 2015;105(10):853-7

The incidence of burns was highest in the winter months, more than half of those affected were children, and the majority of burns were scalds from hot liquids. Most burn injuries managed at primary level were minor, with 75% of patients treated by nurse practitioners and discharged. The four regional secondary hospitals managed the majority of moderate to severe burns. There is room for improvement in terms of treatment facilities and consumables at all levels, regional hospitals being particularly restricted in terms of outdated equipment, a shortage of intensive care unit beds, and difficulties in transferring patients with major burns to a burns unit when indicated. The community management of paediatric burns was satisfactory, although considerable delays in transfer and insufficient pain control hampered



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appropriate care. A great need for ongoing education at all levels was identified. Ten strategies are presented that could, if implemented, lead to tangible improvements in the management of burn patients at primary and secondary levels in the Western Cape

1.12 More ambulances are not the answer to improve key performance

From: Stein C, Wallis L, Adetunji O. Meeting national response time targets for priority 1 incidents in an urban emergency medical services system in South Africa: More ambulances won't help. *S Afr Med J.* 2015;105(10):840-4

A simulation model was created, based on input data from part of the EMS operations. Two different versions of the model were used, one with primary response vehicles and ambulances and one with only ambulances. In both cases the models were run in seven different scenarios. The first scenario used the actual number of emergency vehicles in the real system, and in each subsequent scenario vehicle numbers were increased by adding the baseline number to the cumulative total. The model using only ambulances had shorter response times and a greater number of responses meeting national response time targets than models using primary response vehicles and ambulances. In both cases an improvement in response times and the number of responses meeting national response time targets was observed with the first incremental addition of vehicles. After this the improvements rapidly diminished and eventually became negligible with each successive increase in vehicle numbers. The national response time target for urban areas was never met, even with a seven-fold increase in vehicle numbers.

1.13 The effect of the emergency medical services vehicle location and response strategy on response times

From: Stein C, Wallis L, Adetunji O. The effect of the emergency medical services vehicle location and response strategy on response times. *The South African Journal of Industrial Engineering.* 2015;26(2):26-40

Response time is currently considered to be an important performance indicator in Emergency Medical Services (EMS) systems. A number of factors may affect response times, including the location of emergency vehicles and the type of response system design used. This study aimed to assess the effects of emergency vehicle location and response system design on response time performance in a model of a large South African urban EMS system,



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using discrete-event simulation. Results indicated that both the emergency vehicle location and response system design factors had a significant effect on response time performance, with more decentralised vehicle location having a greater effect.

1.14 Emergency care research priorities in South Africa

From: Van Hoving DJ, Barnetson BK, Wallis LA. Emergency care research priorities in South Africa. *S Afr Med J.* 2015;105(3)

Using expert consensus, Barnetson defined research priorities which the 2 Divisions in Cape Town now use to drive their research areas. The expert group were primarily working in the Public Sector and so the results are appropriate for our context.

1.15 Major incidents in the Western Cape Province, South Africa

From: van Hoving DJ, Lategan HJ, Wallis LA, Smith WP. The epidemiology of major incidents in the Western Cape Province, South Africa. *S Afr Med J.* 2015;105(10):831-4

Most major incidents occurred in the City of Cape Town, but the Central Karoo district had the highest incidence. Transport-related incidents occurred most frequently; minibus taxis were involved in 312 major incidents. There was no significant difference between times of day when incidents occurred. Major incidents occurred more often than would have been expected compared with other countries, with road traffic crashes the biggest contributor. A national database will provide a better perspective of the burden of major incidents.

2 Research outputs: dissertations

2.1 Community-based perceptions of emergency care in communities lacking formalised emergency medicine systems

From: Broccoli M. Community-based perceptions of emergency care in communities lacking formalised emergency medicine systems. MSc thesis. University of Cape Town; 2015 (see publications for summary)

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2.2 Poor knowledge amongst all levels of emergency care providers regarding child abuse

From: Dessena B. A study to determine perceived and actual knowledge of Cape Town Emergency Care Providers with regard to child abuse. MSc thesis. University of Cape Town; 2015

This study looked at the actual and perceived knowledge of Cape Town emergency Medical Care Providers in dealing with child abuse. It highlights that treatment of child abuse is mainly confined to treating of physical injuries at all levels of care and not dealing with disclosure of abuse. Responses across all 120 respondents revealed a huge gap in the training of this area.

2.3 Lack of first aid and basic life support skills in early childhood development workers and educators

From: Evans D. Evaluating the need for first aid and basic life support training in early childhood development workers and educators in Cape Town, South Africa. MMed thesis. University of Cape Town; 2015

The BLS and first aid knowledge of 214 ECD practitioners working in the Western Cape was evaluated in this study. The predefined pass mark of 75% was only achieved by 12.1% of the participants. The majority of participants reported that emergency incidents had taken place in their environment. 99% of the participants indicated a desire to pursue further education and training in first aid and BLS and all acknowledged the importance of training. There is a pressing need to train and educate staff regarding first aid and BLS practices.

2.4 Poor adherence to mental health act when dealing with the patient with a suicide attempt refusing care

From: Evans K. Prehospital care providers' decision to transport the patient with a suicide attempt refusing care: A survey based on the Mental Healthcare Act of 2002. MMed thesis. University of Cape Town; 2015

A vignette-based survey was used to collect data related to training and knowledge of the mental health act in the prehospital environment. Key findings included negative attitudes towards suicidal patients, lack of use of formal suicide evaluation tools and finding suicidal patients dead on later return. Only 7% had specific training in the mental health act whilst



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80% had no training in the management of suicidal patients. This did not correlate with qualification level. It is essential that training be addressed to promote a better understanding of care requirements in this vulnerable group.

2.5 Paediatric critical care pathways in the Western Cape

From: Hodkinson PW. Developing a patient centred care pathway for paediatric critical care in the Western Cape. PhD thesis. University of Cape Town; 2015

The Pathways to Care Project examined the journey through the health system of a cohort of critically ill children through expert review of each step from first access to healthcare through admission to Red Cross PICU or death in EC. Of 282 children, 85% were medical and 15% trauma. Global quality of care was graded poor in 20% and 50% had at least 1 major impact modifiable factor. Key modifiable factors related to access and identification of the critically ill, assessment of severity, inadequate resuscitation, delays in decision making and referral, and access to PICU. Standards compliance increased with increasing level of facility, as did caregiver satisfaction. Children (median age 7.8 months) presented primarily to PHC (54%), largely after hours (65%), and were transferred with median time from first presentation to PICU admission of 12.3 hours. There was potentially avoidable severity of illness in 74% of children, indicating room for improvement. More effective and objective ways of identifying and fast tracking acutely ill children are needed (especially in PHC). Common diagnoses such as respiratory tract infections were inadequately managed, particularly in infants, suggesting educational interventions could be focussed on a small group of conditions. Rationalization (such as fast tracking of patients directly from PHC to PICU) and better prioritization of EMS services could improve referral delays, and review of the overall process and the system at the referral hospital would optimize scarce PICU resources. Many of the findings will almost certainly be generalizable to other sick children, and to adults too, although this was not explicitly investigated.

2.6 The role of online resources and social media in formal educational activities within Emergency Medicine Cape Town

From: Kleynhans AC. The utilisation of educational resources within the Divisions of Emergency Medicine at Stellenbosch University and the University of Cape Town. MMed thesis. Stellenbosch University. 2015



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The thesis describes the usage of various educational resources by members of the Divisions of Emergency Medicine at Stellenbosch University and the University of Cape Town. Only 47% and 25% of division members, respectively, utilize Facebook and Twitter daily as an educational resource. The top international Emergency Medicine and Critical Care blogs are frequently being used (71%). YouTube (35%) and podcasts (21%) were the most commonly utilized multimedia resources. The majority (94.6%) still make use of textbooks. Smartphones and tablets are the primary means of accessing electronic resources, a trend explained in part by general availability, convenience and ease of use. An opportunity exists for greater integration of online resources and social media in formal educational activities to enhance multimodal and self-directed learning. Specific training in the use of these resources, as well as how to appraise them, may further improve their utility.

2.7 Risk adjusted mortality rates, hospital standardised mortality ratio and APACHE IV

From: Toua RE. Risk adjusted mortality rates: Do they differ if based on administrative data (hospital standardised mortality ratio) versus a physiological predictive model (APACHE IV[®])? MPhil thesis. University of Cape Town; 2015

Predicted mortality as calculated with the Hospital Standardised Mortality Ratio was compared to a physiological model (APACHE[®]IV) and stratified by prediction level (<10% predicted mortality, 10-50% predicted mortality or >50% predicted mortality). The administrative predictive model correlate well at equal or less to 50% predicted mortality rate, while not showing a correlation at high predicted mortality rates (>50%) and is not suitable for predicting mortality in the highest stratum

2.8 Knowledge and skills of Basic Life Support CPR by EMS

From: Veronese JP. An Assessment of theoretical knowledge and psychomotor skills of Basic Life Support Cardio-pulmonary Resuscitation provision by Emergency Medical Services in a province in South Africa. MSc thesis. University of Cape Town; 2015

Both the skills and theoretical knowledge of BLS CPR were assessed in EMS providers in the Eastern Cape. Median knowledge score was 50% and median skills 22%. Continuous and tailored BLS CPR instruction is required to bring EMS up to international competency standards. The findings raise a concern for BLS CPR skill and knowledge of EMS providers in



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other provinces including the Western Cape. It is recommended that quality checks on skill and knowledge of BLS CPR be initiated.

3 Opinion pieces

- 3.1 De Vries S, Geduld H. Geography should be taught at medical school. *S Afr Med J.* 2015;105(10):816
- 3.2 Wallis LA. Introduction to algorithms for managing the common trauma patient. *S Afr Med J.* 2015;105(6):501