# FAMILY AND EMERGENCY MEDICINE RESEARCH

Department of Family and Emergency Medicine,
Faculty of Medicine and Health Sciences,

*Stellenbosch University*

## 2020



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*Family and Emergency Medicine Research: 2020*

# **INTRO**DUCTION

*T*his booklet presents the research output from the Department of Family and Emergency Medicine, Faculty of Medicine and Health Sciences at Stellenbosch University for the year 2020. The research projects that were completed or published during this year are presented in abstract format. An email address for one of the authors is given for each abstract and a link to the full publication where appropriate.

An important part of the research process is the dissemination of the findings to stakeholders and policymakers, particularly the Department of Health in the Western Cape where the majority of the research was performed.

We realise that many people may even be too busy to read the abstracts and therefore we have tried to capture the essential conclusions and key points in a series of "sound bites" below. Please refer to the abstract and underlying study for more details if you are interested.

We have framed this body of work in terms of a typology suggested by John Beasley and Barbara Starfield:

*Basic research:* Studies that develop the tools for research.

*Clinical Research:* Studies that focus on a particular disease or condition within the burden of disease.

*Health Services Research:* Studies that focus on service delivery and issues such as access, continuity, co-ordination, comprehensiveness, efficiency or quality.

*Health Systems Research:* Studies that speak more to the building blocks of the health system and development of policy.

*Educational Research:* Studies that focus on issues of education or training of health professions.

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***Prof Bob Mash***
rm@sun.ac.za
Executive Head: Department of Family and Emergency Medicine
Head: Division of Family Medicine and Primary Care

***Prof Heike Geduld***
hgeduld@sun.ac.za
Head: Division of Emergency Medicine

http://www.sun.ac.za/english/faculty/healthsciences/department-of-family-and-emergency-medicine

# "SOUND BITES" FOR POLICY AND DECISION MAKERS

### COVID-19

Mortality from COVID-19 was associated with being male, older age, diabetes, hypertension, chronic kidney disease, HIV and TB in population cohort data from health services in the Western Cape.

### HIV and TB

In the Eastern Cape substance use amongst people with HIV was evaluated. Overall 28% used alcohol (58% moderate-high risk), 19% used tobacco (86% moderate-high risk) and 1% other substances (75% moderate-high risk).

An evaluation of active TB surveillance in the Eastern Cape found that most surveillance was facility based and community health workers (CHW) were less active due to general problems with the implementation of community-orientated primary care (COPC) (e.g. poor coordination between organisations employing CHWs, security issues, lack of transport and problems with linking clients to care and investigation for TB).

A study looking at the diagnosis of childhood TB in rural district health services of the Western Cape found that an adult contact was identifiable in only 39% of cases and the chest radiograph was the main means of diagnosis in 93%. Only 31% had gastric washings and of these only 13% yielded a positive result. Overall 86% had a positive treatment outcome.

A web-based algorithm to assist physicians with diagnosing TB from chest radiographs showed a modest statistically significant improvement in diagnostic accuracy from 60% to 65%.

In the resuscitation area of the emergency centre at Khayelitsha Hospital 38% of patients were HIV positive, 14% had TB and 11% had both diagnoses. HIV is still a major issue in critically ill patients.

Point of care ultrasound (POCUS) in the emergency centre can be used to help diagnose TB in people who are HIV positive. POCUS had a moderate sensitivity (73%) and low specificity (54%) when one or more features were present. Key features were abdominal lymphadenopathy, ascites and pericardial effusion.

A multi-parameter clinical decision tree to facilitate rapid diagnosis of tuberculosis using point-of-care diagnostic tests in HIV-positive patients presenting to an emergency centre was developed based on symptoms, chest radiograph, urine lateral flow lipoarabinomannan (LF-LAM) assay and POCUS.

### Non-communicable diseases

The workplace is a neglected opportunity for health promotion. A workplace-based health promotion programme at a large power company in the Western Cape cost $1.15 per employee per year and resulted in a significant improvement in blood pressure, cholesterol, alcohol use, fruit and vegetable intake and physical activity. Key components included changes in food services, availability of opportunities for physical activity, risk assessment, feedback and counselling as well as engagement from management.

Training in brief behaviour change counselling (BBCC) is being embedded in undergraduate, postgraduate and continuing education. A tool to measure the performance of BBCC was validated and found to be reliable. This tool will be of use in training and research studies. One such study evaluated the use of BBCC by nurses in a primary care facility to change either unhealthy eating or physical inactivity. Overall BBCC was effective in 79% of participants who achieved the primary outcome of a 20% improvement in either dietary or activity score.

In people with very uncontrolled diabetes (HbA1c > 10%) an intentional and more intensive approach to treatment led to a significant reduction in HbA1c of 1.1%. The key ingredients were Group Empowerment and Training (GREAT) for diabetes, more visits and more HbA1c tests with feedback.

Stroke survivors in the Cape Winelands were sent home from district hospitals after brief admissions with little training of caregivers or rehabilitation. Home and community based care was delayed, fragmented and brief (median of 20 minutes). Dependence remained high and a third of caregivers had significant strain, which did not improve over time. Less than 50% of people received the needed assistive devices. Environmental factors were substantial in limiting function and caregiving. Satisfaction with services was low.

Community health workers, caregivers and stroke survivors reported that they tried to "figure things out" on their own because of a lack of knowledge, training and access to rehabilitation therapists. The most important issues they had to deal with were incontinence, lack of emotional support, contextual barriers and a lack of assistive devices.

In response to this situation an appropriate bespoke training programme was developed for community health workers (CHWs) to support and train family caregivers. This was not intended to replace the need for rehabilitation therapy, but to alleviate the situation by reducing strain on caregivers, improving care for survivors and equipping community health workers (CHWs) to handle a situation that they were inevitably confronted with. Initial evaluation of the training programme showed that it improved access to, continuity, coordination and person-centredness of services and empowered caregivers and community health workers (CHWs). Therapists needed to change their role from individual therapy in the hospital to also supporting community health worker (CHW) teams.

POCUS in the emergency centre setting was found to be useful in identifying left ventricular dysfunction as the cause of cardiogenic shock in people with undifferentiated hypotension. POCUS did not improve physiological or biochemical makers during resuscitation of such patients. Data was also collected on the possible use of POCUS to evaluate fluid requirements during resuscitation by imaging the inferior vena cava.

### Reproductive, maternal, child health

A quality improvement study for rape survivors in Botswana found that quality improved as a result of training doctors and nurses, making a dedicated consulting room available, giving rape survivors priority at triage, providing patient education materials, creating a standard operating procedure, supplying forensic kits, improving record keeping and providing immediate psychological support.

Essential resuscitation equipment for children is insufficiently available at district-level (41% of needed equipment) and higher hospitals (45% of needed equipment) in the Cape Town Metropole. This is a modifiable barrier to the provision of high-quality paediatric emergency care. A study from Nigeria also demonstrated the need for more attention to paediatric emergency care preparedness in tertiary hospitals.

### Trauma and violence

The injury severity score (ISS), revised trauma score (RTS), Kampala trauma score (KTS), and trauma and injury severity score (TRISS) systems performed similarly in predicting mortality in trauma-related patients at Khayelitsha District Hospital. The appropriate scoring system should be the simplest one which can be practically implemented and will likely differ between facilities.

### Community-orientated primary care

Household assessment data from community health workers (CHWs) was analysed from three COPC learning sites in Cape Town. While the data had great potential to support and monitor COPC the data was of poor quality (difficult to know if something was done or not), not captured (stored in a cupboard at one NPO), not analysed (captured on spreadsheets in different formats) and not comprehensive. The effort spent in collecting this data was wasted as it was not used to inform a community diagnosis, support individual care or monitor CHW performance. An internet based m-health solution would be ideal with a revision of the data collected to be more comprehensive.

The role of CHWs in non-communicable chronic diseases (NCD) was explored in the Eastern sub-district of Cape Town. The potential of CHWs to impact NCDs in the community was substantial but limited by the implementation of the COPC approach. Key aspects of the framework subsequently developed by the Metro Health Services were lacking – supportive supervision, training in

NCDs, clear roles with regard to rehabilitation and palliative care, adequate remuneration and benefits, poor relationships with the facility-based staff, inadequate information system and some deficiencies in terms of equipment and supplies.

## Service delivery

A study of private sector primary care clinics in Nairobi using the General Practice Assessment Questionnaire found that the practice population was largely young educated employed adults with few chronic conditions. They were very satisfied with both their consultations and the practice organisation. Employed patients were significantly more satisfied than unemployed and students.

During the COVID-19 lockdown there was a 15% decrease in overall workload at the Mitchells Plain District Hospital emergency centre. The largest decrease was in trauma patients (20%). The age of patients, acuity and mortality all increased. Process times, however, decreased. Paediatric visits to the EC also fell by 58% with less respiratory disease, injuries and infectious diseases presenting.

Doctors and nurses in Cape Town public sector emergency departments saw crowding as a consequence of three factors: 1) limited bed space in the EC, 2) insufficient health professionals to care for admitted patients, and 3) the presence of boarders (people waiting to be admitted to other departments). Systemic or organizational factors as well as human resource scarcity were determined to be the key reasons for crowding.

One study explored the potential role for emergency medical staff in pre-hospital palliative care.

## Human resources for health

In 2019 there were 969 family physicians on the specialist register (194 from the new training programmes). The numbers had increased to 0.16 per 10,000 population with 29% in the public sector. The number of new registrars was low (average 7 per year for each programme) and the throughput was also low (average 3 per year for each programme). Diversity of family physicians was increasing. Family physicians were unequally distributed between provinces. In order to meet the goal of one family physician per district hospital and one family physician per community health centre/subdistrict the output needs to triple over a 10-year period. The new human resources for health policy and provincial commitment to registrar posts and family physician posts should support this.

## Health professions education

Twelve priority research topics for health professions education in sub-Saharan Africa were identified and organised into three categories: (1) creating an enabling environment with sufficient resources and relevant training; (2) enhancing student learning; and (3) identifying and evaluating strategies to improve pedagogical practice.

Researchers developed a framework for distributed health professions training. The framework consists of a set of guiding principles, as well as the components essential to the effective implementation of distributed training. Analysis further pointed to the centrality of relationships, while emphasising the importance of involving all sectors relevant to the training of health professionals. A tool to facilitate the implementation of the framework was also developed, incorporating a set of 'simple rules for effective distributed health professions training'. A national consensus statement was adopted.

Research synthesis and expert opinion was used to develop educational goals concerning first aid for different age groups of children. A list of recommended educational approaches, and first aid teaching materials for children, based on the best available evidence was adapted to the African context.

Podcast-usage proved to be near-ubiquitous among Southern African EM registrars. Future context-specific podcast design should cater for mobile device-use, shorter duration podcasts (5-15 minutes), more video content, context-specific topics,

A systematic review of emergency medicine training programmes in low and middle income countries found that too much focus is given to trauma and ultrasound and broader evaluation is needed beyond individual students. Another study evaluated the experience of fellows in international emergency medicine.

# BASIC RESEARCH

*Dr Stefanie Perold, Family Physician, Hermanus Hospital*

# The psychometric properties of a tool to assess brief behaviour change counselling in South Africa

*Jani Fouche, Robert Mash (rm@sun.ac.za), Zelra Malan.*

**Background:** Primary care providers should be competent in brief behaviour change counselling (BBCC). A new model of BBCC was developed in South Africa. Tools are needed for training and research to evaluate BBCC.

**Aim:** To evaluate the validity and reliability of a tool to assess BBCC. Setting: Primary care providers in Western Cape, South Africa.

**Methods:** Exploratory sequential mixed methods included initial qualitative feedback from an expert panel to assess validity, followed by quantitative analysis of internal consistency, interand intra-rater reliability. Six raters assessed 33 randomly selected audiotapes from a repository of 123 tapes of BBCC at baseline and 1 month later.

**Results:** Changes to the existing tool involved item changes, added items and grammatical as well as layout changes. The 'Assessment of Brief Behavioural Change Counselling' tool (ABC tool) had good overall internal consistency (Cronbach's alpha 0.955), inter-rater (intra-class correlation coefficient [ICC] 0.813 at follow-up) and intra-rater reliability (Pearson's correlation 0.899 and $p < 0.001$). Sub-scores for the Assist (ICC 0.784) and Arrange (ICC 0.704) stages had lower inter-rater reliability than the sub-scores for Ask (ICC 0.920), Alert (ICC 0.925) and Assess (ICC 0.931) stages.

**Conclusion:** The ABC tool is sufficiently reliable for the assessment of BBCC. Minor revisions may further improve the reliability of the tool, particularly for the sub-scores measuring Assist and Arrange. The ABC tool can be used in clinical training or research studies to assess fidelity to this model of BBCC.

# Clinical evolution, management and outcomes of patients with COVID-19 admitted at Tygerberg Hospital, Cape Town, South Africa: a research protocol

Brian W Allwood, Coenraad FN Koegelenberg, Elvis Irusen, Usha Lalla, Razeen Davids, Yazied Chothia, Ryan Davids, Hans Prozesky, Jantjie Taljaard, Arifa Parker , Eric Decloedt, Portia Jordan, Sa'ad Lahri (slahri@sun.ac.za), and COVID-19 Research Response Team, Faculty of Medicine and Health Sciences, Stellenbosch University & Tygerberg Hospital

**Introduction:** The outbreak of the SARS-CoV-2 virus causing COVID-19, declared a global pandemic by the WHO, is a novel infection with a high rate of morbidity and mortality. In South Africa, 55 421 cases have been confirmed as of 10 June 2020, with most cases in the Western Cape Province. Coronavirus leaves us in a position of uncertainty regarding the best clinical approach to successfully manage the expected high number of severely ill patients with COVID-19. This presents a unique opportunity to gather data to inform best practices in clinical approach and public health interventions to control COVID-19 locally. Furthermore, this pandemic challenges our resolve due to the high burden of HIV and tuberculosis (TB) in our country as data are scarce. This study endeavours to determine the clinical presentation, severity and prognosis of patients with COVID-19 admitted to our hospital.

**Methods and analysis:** The study will use multiple approaches taking into account the evolving nature of the COVID-19 pandemic. Prospective observational design to describe specific patterns of risk predictors of poor outcomes among patients with severe COVID-19 admitted to Tygerberg Hospital. Data will be collected from medical records of patients with severe COVID-19 admitted at Tygerberg Hospital. Using the Cox proportional hazards model, we will investigate the association between the survival time of patients with COVID-19 in relation to one or more of the predictor variables including HIV and TB.

# CLINICAL RESEARCH

*Dr Gavin Hendricks, Family Physician, Swartland Hospital*

# Risk factors for COVID-19 death in a population cohort study from the Western Cape Province, South Africa

*Andrew Boulle, Mary-Ann Davies, Hannah Hussey, Muzzammil Ismail, Erna Morden, Ziyanda Vundle, Sa'ad Lahri (slahri@sun.ac.za), et al.*

**Background:** Risk factors for COVID-19 death in sub-Saharan Africa and the effects of HIV and tuberculosis on COVID-19 outcomes are unknown.

**Methods:** We conducted a population cohort study using linked data from adults attending public sector health facilities in the Western Cape, South Africa. We used Cox-proportional hazards models adjusted for age, sex, location and comorbidities to examine the association between HIV, tuberculosis and COVID-19 death from 1 March-9 June 2020 among (i) public sector "active patients" (≥1 visit in the 3 years before March 2020), (ii) laboratory-diagnosed COVID-19 cases and (iii) hospitalized COVID-19 cases. We calculated the standardized mortality ratio (SMR) for COVID-19 comparing HIV positive vs. negative adults using modelled population estimates.

**Results:** Among 3,460,932 patients (16% HIV positive), 22,308 were diagnosed with COVID-19, of whom 625 died. COVID-19 death was associated with male sex, increasing age, diabetes, hypertension and chronic kidney disease. HIV was associated with COVID-19 mortality (adjusted hazard ratio [aHR] 2.14; 95% confidence interval [CI] 1.70-2.70), with similar risks across strata of viral load and immunosuppression. Current and previous tuberculosis were associated with COVID-19 death (aHR [95%CI] 2.70 [1.81-4.04] and 1.51 [1.18-1.93] respectively). The SMR for COVID-19 death associated with HIV was 2.39 (95%CI 1.96-2.86); population attributable fraction 8.5% (95%CI 6.1-11.1).

**Conclusion:** While our findings may over-estimate HIV- and tuberculosis-associated COVID-19 mortality risks due to residual confounding, both HIV and current tuberculosis were independently associated with increased COVID-19 mortality. The associations between age, sex and other comorbidities and COVID-19 mortality were similar to other settings.

# Prevalence of substance use amongst people living with human immunodeficiency virus who attend primary healthcare services in Mthatha, South Africa

*Ramprakash Kaswa, Marietjie de Villiers (mrdv@sun.ac.za)*

**Background:** About 13.3% of the South African population use some kind of substance during their lifetime. The incidence of substance use disorders is twice the global average. The use of various substances amongst people living with human immunodeficiency virus (PLWH) has increased tremendously in recent years. The growing culture of substance use amongst PLWH is a serious threat adding to the human immunodeficiency virus (HIV) epidemic and is likely to compromise the continuity of HIV care.

**Methods:** A cross-sectional descriptive survey recruited adult PLWH who attended primary healthcare (PHC) services in Mthatha between 15 March and 15 April 2018. The Alcohol, Smoking and Substance Involvement Screening Test questionnaire (ASSIST), a tool validated by the World Health Organization, was used for data collection.

**Results:** Out of a total 347 participants, 53% reported lifetime substance use and 32% admitted current use of a substance. Alcohol was the most common substance reported, followed by tobacco and cannabis. Moderate risk was found for alcohol in 6.6%, for tobacco smoking in 12.6% and for other substances in 10.9%. High risk was found for alcohol in 0.4%, for tobacco smoking in 0.8% and for other substances in 5.5%. The mean age of the participants was 37.9 years (standard deviation [SD] ± 10.33); this was marginally higher for male (39.9 years; SD ± 10.92) than female (37.2 years; SD ± 10.06) participants.

**Conclusion:** This study demonstrated that there was a high prevalence of lifetime and current substance use amongst PLWH. Overall 16% had a moderate-high risk from substances such as cannabis, cocaine, amphetamine and others. There is potential for health care workers to intervene, particularly in those at moderate risk.

**Citation:** Kaswa R, De Villiers M. Prevalence of substance use amongst people living with human immunodeficiency virus who attend primary healthcare services in Mthatha, South Africa. S Afr Fam Pract. 2020;62(1), a5042. https://doi.org/10.4102/safp.v62i1.5042

# Implementing active surveillance for TB—The views of managers in a resource limited setting, South Africa

*Febisola I. Ajudua, Robert J. Mash (rm@sun.ac.za)*

**Background:** The achievement of the World Health Organization's END TB goals will depend on the successful implementation of strategies for early diagnosis and retention of patients on effective therapy until cure. An estimated 150,000 cases are missed annually in South Africa. It is necessary to look at means for identifying these missed cases. This requires the implementation of active surveillance for TB, a policy adopted by the National Department of Health.

**Aim:** To explore the views of managers of the TB program on the implementation of active surveillance for TB in the resource constrained setting of the Eastern Cape, South Africa.

**Methods:** A descriptive, explorative, thematically analysed qualitative study based on 10 semi-structured interviews of managers of the TB program. Interviews were transcribed verbatim and analysed using the framework method and Atlas-ti.

**Results:** Active case finding of people attending health facilities was the dominant approach, although screening by community health workers (CHWs) was available. Both government and non-government organisations employed CHWs to screen door to door and sometimes as part of campaigns or community events. Some CHWs focused only on contact tracing or people that were non-adherent to TB treatment. Challenges for CHWs included poor coordination and duplication of services, failure to investigate those identified in the community, lack of transport and supportive supervision as well as security issues. Successes included expanding coverage by government CHW teams, innovations to improve screening, strategies to improve CHW capability and attention to social determinants.

**Conclusion:** A multifaceted facility- and community-based approach was seen as ideal for active surveillance. More resources should be targeted at strengthening teams of CHWs, for whom this would be part of a comprehensive and integrated service in a community-orientated primary care framework, and community engagement to strengthen community level interventions

**Citation:** Ajudua FI, Mash RJ (2020) Implementing active surveillance for TB—The views of managers in a resource limited setting, South Africa. PLoS ONE 15(10): e0239430. https://doi.org/10.1371/ journal.pone.0239430

# Assessment, diagnosis and management of pulmonary tuberculosis in children under five years of age in the Langeberg sub-district, Western Cape, South Africa.

*Andrew Williams, Michael Pather (mpather@sun.ac.za)*

**Background:** TB remains one of the top 10 causes of death worldwide as millions of people still contract the disease annually. It is estimated that TB caused between 1.2 and 1.4 million deaths globally in 2017. The incidence of TB in children is a reflection of the underlying factors that fuel the TB epidemic, as these infections reflect ongoing TB-transmission.

**Aim:** To describe how the diagnosis of Pulmonary Tuberculosis (PTB) in children under 5 years is made in the Langeberg sub-district. A total of two district hospitals, nine primary health care (PHC) clinics, as well as two mobile clinics serving the farm areas, were included.

**Methods:** A retrospective descriptive study was conducted. The researcher obtained statistics from the information management department of the Langeberg sub-district and utilised information of all known and notified cases of tuberculosis in the district. All cases of PTB diagnosed from 1st January 2018 to 31st December 2018, in children under 5 years of age were included.

**Results:** A total sample of 166 folders were reviewed. A proven positive adult contact was identified in 39% of cases. A suggestive chest x-ray was found in 93% of cases although specific CXR findings were not documented. Gastric washings were done in 52 of the children and had a positive yield of 13%. A total of 5% had HIV/TB co-infection and 12% had comorbid malnutrition. 86% of children had a positive treatment outcome (treatment completed or cured).

**Conclusion:** The diagnosis of PTB in children primarily remains a radiological diagnosis, but clinical factors like symptoms and their duration, weight trends and the presence of an adult contact have also been considered. Microbiological confirmation was absent in the majority of cases started on TB treatment. Comorbid HIV infection, malnutrition or asthma did not contribute to increased risk for adverse outcomes. Contact tracing needs to be improved within the sub-district.

**Sun-Scholar citation:** https://scholar.sun.ac.za/handle/10019.1/109058

# CheXaid: deep learning assistance for physician diagnosis of tuberculosis using chest x-rays in patients with HIV

*Pranav Rajpurkar, Chloe O'Connell, Amit Schechter, Nishit Asnani, Jason Li1, Amirhossein Kiani, Robyn L. Ball, Marc Mendelson, Gary Maartens, Daniël J. van Hoving (nvhoving@sun.ac.za), Rulan Griesel, Andrew Y. Ng, Tom H. Boyles and Matthew P. Lungren.*

**Abstract:** Tuberculosis (TB) is the leading cause of preventable death in HIV-positive patients, and yet often remains undiagnosed and untreated. Chest x-ray is often used to assist in diagnosis, yet this presents additional challenges due to atypical radiographic presentation and radiologist shortages in regions where co-infection is most common. We developed a deep learning algorithm to diagnose TB using clinical information and chest x-ray images from 677 HIV-positive patients with suspected TB from two hospitals in South Africa. We then sought to determine whether the algorithm could assist clinicians in the diagnosis of TB in HIV-positive patients as a web-based diagnostic assistant. Use of the algorithm resulted in a modest but statistically significant improvement in clinician accuracy (p = 0.002), increasing the mean clinician accuracy from 0.60 (95% CI 0.57, 0.63) without assistance to 0.65 (95% CI 0.60, 0.70) with assistance. However, the accuracy of assisted clinicians was significantly lower (p < 0.001) than that of the standalone algorithm, which had an accuracy of 0.79 (95% CI 0.77, 0.82) on the same unseen test cases. These results suggest that deep learning assistance may improve clinician accuracy in TB diagnosis using chest x-rays, which would be valuable in settings with a high burden of HIV/TB co-infection. Moreover, the high accuracy of the stand-alone algorithm suggests a potential value particularly in settings with a scarcity of radiological expertise.

# The burden of HIV and tuberculosis on the resuscitation area of an urban district-level hospital in Cape Town

*Lynne Swarts, Sa'ad Lahri, Daniël J. van Hoving (nvhoving@sun.ac.za)*

***Introduction:*** Many patients present to emergency centres with HIV and tuberculosis related emergencies. Little is known about the influence of HIV and tuberculosis on the resuscitation areas of district-level hospitals. The primary objective was to determine the burden of non-trauma patients with HIV and/or tuberculosis presenting to the resuscitation area of Khayelitsha Hospital, Cape Town.

***Methods:*** A retrospective analysis was performed on a prospectively collected observational database. A randomly selected 12-week sample of data from the resuscitation area was used. Trauma and paediatric (<13 years) cases were excluded. Patient demographics, HIV and tuberculosis status, disease category, investigations and procedures undertaken, disposition and in-hospital mortality were assessed. HIV and tuberculosis status were determined by laboratory confirmation or from clinical records. Descriptive statistics are presented and comparisons were done using the $x^2$ -test or independent t-test.

***Results:*** A total of 370 patients were included. HIV prevalence was 38.4% (n = 142; unknown n = 78, 21.1%), tuberculosis prevalence 13.5% (n = 50; unknown n = 233, 63%), and HIV/ tuberculosis co-infection 10.8% (n = 40). HIV and tuberculosis were more likely in younger patients (both p < 0.01) and more females were HIV positive (p < 0.01). Patients with tuberculosis spend 93 min longer in the resuscitation area than those without (p = 0.02). The acuity of patients did not differ by HIV or tuberculosis status. Infectious-related diseases and diseases of the digestive system occurred significantly more in the HIV-positive group, and endocrine-related diseases and diseases of the nervous system in HIV-negative patients. HIV-positive patients received more abdominal ultrasound examinations (p < 0.01), blood cultures (p < 0.01) and intravenous antibiotics (p < 0.01). In-hospital mortality was 17% and was not influenced by HIV status (p = 0.36) or tuberculosis status (p = 0.29).

***Conclusion:*** This study highlights the burden of HIV and tuberculosis on the resuscitation area of a district level hospital. Neither HIV nor tuberculosis status were associated with in-hospital mortality.

# Point-of-Care Ultrasound Predictors for the Diagnosis of Tuberculosis in HIV-Positive Patients Presenting to an Emergency Center

*Daniël J. Van Hoving (nvhoving@sun.ac.za), Andre P. Kenge, Gary Maartens, Graeme Meintjes*

**Background:** The performance of point-of-care ultrasound (PoCUS) to diagnose HIV-associated tuberculosis has not been evaluated in large prospective studies. We determined the diagnostic accuracy of individual PoCUS features, performed an external validation of the focused assessment with sonography for HIV/TB (FASH) protocol, and determined independent PoCUS predictors of HIV-associated tuberculosis appropriate for use by emergency center practitioners.

**Setting:** A cross-sectional diagnostic study was performed at the emergency center of Khayelitsha Hospital (Cape Town, South Africa).

**Methods:** HIV-positive adults with the suspicion of having tuberculosis were prospectively enrolled. PoCUS was performed according to a standardized protocol. Reference standard was the detection of Mycobacterium tuberculosis using Xpert MTB/RIF or culture.

**Results:** We enrolled 414 participants: 243 female, median age 36 years, median CD4 cell count 86/mm3, and 172 (42%) had tuberculosis.

Sensitivity and specificity were >1 individual PoCUS feature [73% (95% CI: 65 to 79), 54% (95% CI: 47 to 60)], FASH protocol [71% (95% CI: 64 to 78), 57% (95% CI: 50 to 63)]. Independent PoCUS predictors identified were intra-abdominal lymphadenopathy of any size (aDOR 3.7 (95% CI: 2.0 to 6.7)], ascites [aDOR 3.0 (95% CI: 1.5 to 5.7)], and pericardial effusion of any size [aDOR 1.9 (95% CI: 1.2 to 3.0)]. The c-statistic for the derivation model was 0.680 (95% CI: 0.631 to 0.729), compared with 0.630 (95% CI: 0.576 to 0.684) of the FASH protocol. Two or more independent PoCUS predictors had 91% (95% CI: 86 to 94) specificity.

**Conclusion:** The presence of two or more independent PoCUS predictors (intra-abdominal lymphadenopathy, ascites, and pericardial effusion) had moderate discrimination for HIV-associated tuberculosis in patients presenting to the emergency center.

# A multi-parameter diagnostic clinical decision tree for the rapid diagnosis of tuberculosis in HIV-positive patients presenting to an emergency centre

*Daniël J. van Hoving (nvhoving@sun.ac.za), Graeme Meintjes, Gary Maartens, Andre Pascal Kengne*

**Background:** Early diagnosis is essential to reduce the morbidity and mortality of HIV-associated tuberculosis. We developed a multi-parameter clinical decision tree to facilitate rapid diagnosis of tuberculosis using point-of-care diagnostic tests in HIV-positive patients presenting to an emergency centre.

**Methods:** A cross-sectional study was performed in a district hospital emergency centre in a high-HIV-prevalence community in South Africa. Consecutive HIV-positive adults with ≥1 WHO tuberculosis symptoms were enrolled over a 16-month period. Point-of-care ultrasound (PoCUS) and urine lateral flow lipoarabinomannan (LF-LAM) assay were done according to standardized protocols. Participants also received a chest X-ray. Reference standard was the detection of Mycobacterium tuberculosis using Xpert MTB/RIF or culture. Logistic regressions models were used to investigate the independent association between prevalent microbiologically confirmed tuberculosis and clinical and biological variables of interest. A decision tree model to predict tuberculosis was developed using the classification and regression tree algorithm.

**Results:** There were 414 participants enrolled: 171 male, median age 36 years, median CD4 cell count 86 cells/mm. Tuberculosis prevalence was 42% (n=172). Significant variables used to build the classification tree included ≥2 WHO symptoms, antiretroviral therapy use, LF-LAM, PoCUS independent features (pericardial effusion, ascites, intra-abdominal lymphadenopathy) and chest X-ray. LF-LAM was positioned after WHO symptoms (75% true positive rate, representing 17% of study population). Chest X-ray should be performed next if LF-LAM is negative. The presence of ≤1 PoCUS independent feature in those with 'possible or unlikely tuberculosis' on chest x-ray represented 47% of non-tuberculosis participants (true negative rate 83%). In a prediction tree, which only included true point-of-care tests, a negative LF-LAM and the presence of ≤2 independent PoCUS features had a 71% true negative rate (representing 53% of sample).

**Conclusions:** LF-LAM should be performed in all adults with suspected HIV-associated tuberculosis (regardless of CD4 cell count) presenting to the emergency centre.

# The impact of intensified clinical care on glycaemic control in patients with type 2 diabetes at Khayelitsha Community Health Centre, South Africa: Quasi-experimental study

*Joshua Allerton, Robert Mash (rm@sun.ac.za)*

**Aim:** The aim was to evaluate the effect on glycaemic control of more intensive care for patients with very uncontrolled type-2 diabetes (HbA1c > 10%) at Khayelitsha Community Health Centre, South Africa.

**Methods:** A pragmatic, quasi-experimental study. Patients with HBA1c > 10% were consecutively selected into a 6-month programme of intensified care involving monthly visits to a doctor, diabetes group education, escalation of treatment, and more frequent HbA1c testing by either point-of-care (POC) or laboratory. Participants were their own controls in a retrospective analysis of usual care during the previous year.

**Results:** At baseline 236 patients had a mean HbA1c of 12.1%. The mean difference in HbA1c in the intervention group was −1.1% (p < 0.001).

The intervention group were exposed to group diabetes education (100% vs 0%), more visits (3.8 vs 3.2, p < 0.001), more HbA1c tests (2.2 vs 0.9, p < 0.001). There was no difference in increased dose of insulin between the groups or between POC and standard laboratory intervention sub-groups.

**Conclusion:** The introduction of group diabetes education was the most likely explanation for improved glycaemic control in this poor, under-resourced, public sector, peri-urban setting. The study demonstrates a feasible approach to improving diabetes care in the South African context

**Citation:** Primary Care Diabetes 2020; 14: 97-103. https://doi.org/10.1016/j.pcd.2019.08.006

# Evaluating the effectiveness of brief behaviour change counselling on diet and physical activity in overweight/obese patients in a primary care facility

*Johan Ganzevoort, Bob Mash (rm@sun.ac.za)*

**Introduction:** Non-communicable diseases are associated with four risky behaviours, an unhealthy diet, physical inactivity, tobacco use and harmful use of alcohol. A new model of brief behaviour change counselling (BBCC) was developed in South Africa for primary care providers. There is South African evidence that BBCC can be effective with harmful use of alcohol and tobacco, but no local evidence with regard to unhealthy diet and physical inactivity. The aim of the study was to evaluate the effect of BBCC on diet and physical activity in patients with overweight/obesity and a moderate to high cardiovascular disease (CVD) risk at a primary care clinic within the Cape Winelands district.

**Methods:** This was a before-and-after quantitative study that measured change in diet, physical activity and body mass index (BMI) associated with BBCC delivered by primary care providers to 145 patients. Participants completed physical activity and diet questionnaires as well as measures of blood pressure, weight and BMI at baseline and 4-8 months later. Two sessions of BBCC were given over a period of 2-4 months. Data was analysed with the Statistical Package for the Social Sciences.

**Results:** Paired data was obtained from 139 patients, mean age was 53.5 years (SD ±10.0), and 75.9% were female with a mean BMI of 36.6 kg/m2 (SD ±8.0). Overall 78.5% of patients achieved the primary outcome (20% improvement in dietary score or a 20% improvement in the metabolic equivalent of task (MET) minutes score), 77.0% improved their diet score by >20% and 8.9% improved their MET minutes score by >20%. The mean diet score and mean MET minutes score also significantly improved (p<0.001). There were no significant changes in BMI, weight or blood pressure

**Conclusion:** This study shows the potential of BBCC in the primary care setting and adds to the evidence for the effectiveness of BBCC across all four key risk behaviours for non-communicable diseases. Training of primary care providers in BBCC should continue and further clinical trials to assess the effect of this model of BBCC in our context are needed.

**Sun-Scholar citation:** https://scholar.sun.ac.za/handle/10019.1/109057

# Cost and consequence analysis of the Healthy Choices at Work programme to prevent non-communicable diseases in a commercial power plant, South Africa

*Darcelle Schouw, Bob Mash (rm@sun.ac.za)*

**Background:** The workplace is an ideal setting for the implementation of a health promotion programmes to prevent non-communicable diseases (NCD). There are limited resources assigned to workplace health promotion programmes in low-and middle-income countries (LMIC).

**Aim:** This study aimed to conduct a cost and consequence analysis of the Healthy Choices at Work programme. Setting: This study was conducted at a commercial power plant in South Africa.

**Methods:** Incremental costs were obtained for the activities of the Healthy Choices at Work programme over a two-year period. A total of 156 employees were evaluated in the intervention, although the effect was experienced by all employees. An annual health risk factor assessment at baseline and follow up evaluated the consequences of the programme.

**Results:** The total incremental costs over the two-year period accumulated to $4015 for 1743 employees. The cost per employee on an annual basis was $1.15 and was associated with a -10.2mmHg decrease in systolic blood pressure, -3.87mmHg in diastolic blood pressure, -0.45mmol/l in total cholesterol and significant improvement in harmful alcohol use, fruit and vegetable intake and physical inactivity ( p < 0.001). There was no correlation between sickness absenteeism and risk factors for NCDs.

**Conclusion:** The cost to implement the multicomponent HCW programme was low with significant beneficial consequences in transforming the workplace environment and reducing risks factors for NCDs. Findings of this study will be useful for small, medium and large organisations, the national department of health, and similar settings in LMICs.

# Changes in risk factors for non-communicable diseases associated with the 'Healthy choices at work' programme, South Africa

*Darcelle Schouw, Robert Mash (rm@sun.ac.za), Tracy Kolbe-Alexander*

**Background:** Globally 71% of deaths are attributed to non-communicable diseases (NCD). The workplace is an opportune setting for health promotion programs and interventions that aim to prevent NCDs. However, much of the current evidence is from high-income countries.

**Objective:** The aim of this study was to evaluate changes in NCD risk factors, associated with the Healthy Choices at Work programme (HCWP), at a commercial power plant in South Africa.

**Methods:** This was a before-and-after study in a randomly selected sample of 156 employees at baseline and 137 employees at 2-years. The HCWP focused on food services, physical activity, health and wellness services and managerial support. Participants completed questionnaires on tobacco smoking, harmful alcohol use, fruit and vegetable intake, physical activity, psychosocial stress and history of NCDs. Clinical measures included blood pressure, total cholesterol, random blood glucose, body mass index, waist circumference and waist-to-hip ratio. The 10-year cardiovascular risk was calculated using a validated algorithm. Sample size calculations evaluated the power of the sample to detect meaningful changes in risk factors

**Results:** Paired data was obtained for 137 employees, the mean age was 42.7 years (SD 9.7) and 64% were male. The prevalence of sufficient fruit and vegetable intake increased from 27% to 64% (p < 0.001), those meeting physical activity guidelines increased from 44% to 65% (p < 0.001). Harmful alcohol use decreased from 21% to 5% (p = 0.001). There were clinical and statistically significant improvements in systolic and diastolic blood pressure (mean difference −10.2 mmHg (95%CI: −7.3 to −13.2); and −3.9 mmHg (95%CI: −1.8 to −5.8); p < 0.001) and total cholesterol (mean difference −0.45 mmol/l (−0.3 to −0.6)). There were no significant improvements in BMI. Psychosocial stress from relationships with colleagues, personal finances, and personal health improved significantly. The cardiovascular risk score decreased by 4.5% (> 0.05).

**Conclusion:** The HCWP was associated with clinically significant reductions in behavioural, metabolic and psychosocial risk factors for NCDs.

# The design, development, and evaluation of an appropriate homebased stroke rehabilitation program for a rural primary health care setting in the Western Cape, South Africa

*Elsje S. Scheffler, Bob Mash (rm@sun.ac.za)*

## Abstract for dissertation

Globally, stroke is a leading cause of mortality and disability and this burden is increasing in low- and middle-income countries (LMICs). Whilst rehabilitation is a basic right and international best practice promotes organised stroke care models with a continuum of coordinated services, such rehabilitation services are poorly developed, fragmented, and limited in LMICs. Stroke survivors are often discharged home to untrained family members at a time when they need the most assistance. Being ill-prepared to take over this responsibility, caregivers are overwhelmed with a range of caregiving duties, financial strain, uncertainty, their own emotions, and taking over the stroke survivor's roles and responsibilities. The burden of care may place strain on caregivers' physical and emotional health, negatively impacting on their quality of life. Caregiver training and support are recognised as an integral part of stroke care services. Caregiver training must be specific to the context, caregiver needs, and the problems presented by the stroke survivor.

In the Cape Winelands, community health workers (CHWs) at primary care level provide support to stroke survivors and caregivers despite not having any stroke rehabilitation training. There is very little evidence on stroke caregiver training at primary care level. This dissertation therefore attempted to contribute to the knowledge on needs of stroke survivors and their caregivers in the South African context, where rehabilitation services do not exist or are not accessible, and to contribute to the understanding of how to design and develop a contextually appropriate training program for CHWs to train family caregivers of stroke survivors. The abstracts for the four articles presented for the doctoral degree are provided here.

***Sun-Scholar citation:*** https://scholar.sun. ac.za/handle/10019.1/109290

# Surviving a stroke in South Africa: outcomes of home-based care in a low-resource rural setting

*Elsje Scheffler, Bob Mash (rm@sun.ac.za)*

**Background:** Little is known of stroke outcomes in low- and middle-income countries with limited formal stroke rehabilitation services and of homebased-stroke services delivered within the primary health care (PHC) context by community health workers (CHWs).

**Objectives:** To describe and analyze the outcomes of patients with stroke from a rural PHC setting in the Western Cape, South Africa.

**Methods:** In a longitudinal survey, 93 stroke patients, referred to home and community-based care services (HCBC) between June 2015 and December 2017, were assessed at baseline, one month and three months. Changes in function (Barthel Index (BI)), caregiver strain (Caregiver Strain Index (CSI)), impact of environmental factors and satisfaction with stroke care were measured.

**Results:** HCBC was delayed, fragmented and brief (median session duration 20 minutes (IQR 15.0–30.0)). Although function improved significantly, dependence remained high: median BI score changed from 40.0 (IQR 15.0–70.0) to 62.5 (IQR 30.0–81.25) (p = .019). A third (33.0% (30/91)) of caregivers initially experienced strain and the median CSI score remained 3.0 (IQR 0.0–7.0) (p = .672). Overall, patient and caregiver satisfaction with HCBC was low with only 46.9% (31/66) of caregivers and 17.4% (12/69) of patients satisfied with all aspects of care. Only 47.6% of assistive product needs were met. Environmental factors negatively impacted on patient function and caregiving.

**Conclusions:** Clinical practice pathways and referral guidelines should be developed for the HCBC platform. Specific training of CHWs, focusing on how to educate, support and train family caregivers, provide assistive devices and refer to health services is needed.Background: Little is known of stroke outcomes in low- and middle-income countries with limited formal stroke rehabilitation services and of homebased-stroke services delivered within the primary health care (PHC) context by community health workers (CHWs).

# Figuring it out by yourself: Perceptions of home-based care of stroke survivors, family caregivers and community health workers in a low-resourced setting, South Africa

Elsje Scheffler, Bob Mash (rm@sun.ac.za)

**Background:** In less resourced settings, formal rehabilitation services for stroke survivors were often absent. Stroke survivors were referred to community health workers (CHWs) who were untrained in rehabilitation.

**Aim:** To describe the experience and perceived needs of stroke survivors, their caregivers and CHWs in a context with limited access to and support from formal rehabilitation services. Setting: The Breede Valley subdistrict, Western Cape, South Africa, a rural, less resourced setting.

**Methods:** A descriptive exploratory qualitative study. Four focus group interviews were held with purposively selected stroke survivors and caregivers and four with CHWs. A thematic approach and the framework method were used to analyse the transcripts.

**Findings:** A total of 41 CHWs, 21 caregivers and 26 stroke survivors participated. Four main themes and 11 sub-themes were identified. Because of the lack of knowledge, training and rehabilitation services, the main theme for all groups was having to 'figure things out'

independently, with incontinence management being particularly challenging. Secondly was the need for emotional support for stroke survivors and caregivers. Thirdly, contextual factors such as architectural barriers and lack of assistive products negatively impacted care and function. Lastly, the organisation of health and rehabilitation services negatively impacted home-based services and professional support.

**Conclusions:** With appropriate training, the CHWs can be pivotal in the training and support of family caregivers and stroke survivors. Care pathways and the role and scope of both CHWs and therapists in home-based stroke rehabilitation should be defined and restructured, including the links with formal services

**Citation:** Scheffler E, Mash R. Figuring it out by yourself: Perceptions of home-based care of stroke survivors, family caregivers and community health workers in a low-resourced setting, South Africa. Afr J Prm Health Care Fam Med. 2020;12(1), a2629. https://doi.org/10.4102/phcfm.v12i1.2629

# Developing a homebased stroke rehabilitation programme for community-based services in a low-resourced primary healthcare setting, South Africa: Participatory action research

*Elsje S. Scheffler, Bob Mash (rm@sun.ac.za)*

**Objective:** To describe the design and development of a contextually appropriate homebased stroke training programme to be delivered by community health workers in a low-resourced primary health care setting.

**Methods:** Twenty-six professional service providers and community health workers from the local health services participated in two cooperative inquiry groups over a 15-month period. The inquiry followed the cyclical steps of planning, action, observation, and reflection and was aligned with the ADDIE instructional design model for development of a training programme.

**Results:** This article reports only on the analysis, design, and development steps of the process. The training programme was based on the needs of the caregivers and vii stroke survivors. An in-depth analysis and knowledge of the local context resulted in the development of an appropriate training programme utilising appropriate technology, language, instructional methodology and resources.

**Conclusions:** This inquiry provided a structured systematic approach to design a training program to address a community health problem at primary healthcare level and incorporated local health services, professionals, and community health workers. Practice Implications Within a primary healthcare approach, a participative approach and the ADDIE instructional design model may be useful for local service providers to design contextually appropriate team-based community-oriented interventions.

# 'A step-by-step guide for everyone': Evaluation of a homebased stroke rehabilitation programme for a low-resourced primary health care setting: Cooperative inquiry

*Elsje S. Scheffler, Bob Mash (rm@sun.ac.za)*

**Introduction:** This study forms the second part of a cooperative inquiry aimed at developing an appropriate homebased stroke rehabilitation training program to equip community health workers to train family caregivers. The study was conducted in a low-resourced South African rural primary healthcare setting with limited medical and rehabilitation services.

**Aim:** To evaluate the implementation of the training program.

**Methods:** Participatory action research involved two cooperative inquiry groups (CIGs). The inquiry involved a planning, action, observation and reflection. This article reports on the action, observation and reflection of the CIGs as they implemented the training program. Three groups of 24 community health workers (CHW) received training over 10 weeks. CIGs directly observed the training, obtained written and verbal feedback and interviewed CHWs. CIGs reflected on their observations and reached a final consensus on their learning.

**Results:** The CIGs categorized their learning into four areas: the effect on home and community based care, the training program's design and development, how training was delivered, and implications for service delivery. CHWs were seen to empower and motivate both caregivers and stroke survivors. Training needed to focus on experiential learning and follow a spiral curriculum. Therapists needed a different set of skills to design the program, deliver training and support CHWs in practice. Service delivery was improved by CHWs who enabled access to care, better continuity and coordination and a person-centred approach. A systems approach and leadership is needed to embed the intervention in service delivery.

**Conclusions:** The training program successfully equipped CHWs to support family caregivers and stroke survivors. The program should be integrated into the training of CHWs and the new roles included in their scope of practice. Further evaluation of the program as it is implemented in district health services will be needed.

**Sun-Scholar citation:** https://scholar.sun.ac.za/handle/10019.1/109290

# Do point of care ultrasound findings of left ventricular dysfunction predict cardiogenic shock in undifferentiated hypotensive patients?

P Atkinson, J Fraser, D Lewis, C Pham, H Lamprecht (hl@sun.ac.za), M Stander, J French, A Sibley, R Henneberry

**Introduction:** Patients presenting to the emergency department (ED) with hypotension have a high mortality rate and require careful yet rapid resuscitation. The use of cardiac point of care ultrasound (PoCUS) in the ED has progressed beyond the basic indications of detecting pericardial fluid and activity in cardiac arrest. We examine if finding left ventricular dysfunction (LVD) on emergency physician performed PoCUS reliably predicts the presence of cardiogenic shock in hypotensive ED patients.

**Methods:** We prospectively collected PoCUS findings performed in 135 ED patients with undifferentiated hypotension as part of an international study. Patients with clearly identified etiologies for hypotension were excluded, along with other specific presumptive diagnoses. LVD was defined as identification of a generally hypodynamic LV in the setting of shock. PoCUS findings were collected using a standardized protocol and data collection form. All scans were performed by PoCUS-trained emergency physicians. Final shock type was defined as cardiogenic or non-cardiogenic by independent specialist blinded chart review.

**Results:** All 135 patients had complete follow up. Median age was 56 years, 53% of patients were male. Disease prevalence for cardiogenic shock was 12% and the mortality rate was 24%. The presence of LVD on PoCUS had a sensitivity of 62.50% (95%CI 35.43% to 84.80%), specificity of 94.12% (88.26% to 97.60%), positive-LR 10.62 (4.71 to 23.95), negative-LR 0.40 (0.21 to 0.75) and accuracy of 90.37% (84.10% to 94.77%) for detecting cardiogenic shock.

**Conclusion:** Detecting left ventricular dysfunction on PoCUS in the ED may be useful in confirming the underlying shock type as cardiogenic in otherwise undifferentiated hypotensive patients.

# Improving the quality of care for female rape survivors at Scottish Livingstone Hospital, Molepolole, Botswana: A quality improvement cycle

*Orleans A. Debley, Zelra Malan (zmalan@sun.ac.za)*

**Background:** Rape is prevalent in Botswana, but there has been limited research undertaken to improve the quality of healthcare for female rape survivors in this clinical setting. Research can not only influence the health outcomes of victims but also has the potential to inform policy.

**Aim:** The aim of this study was to improve the quality of care for female rape survivors in Scottish Livingstone Hospital, Molepolole, Botswana.

**Setting:** The setting is Scottish Livingstone Hospital, Molepolole, Botswana.

Methods: This study was a qualitative cycle, using the normal steps of performing a baseline audit of clinical practice, planning and implementing changes and re-audit.

**Results:** The audit examined 62 patient records at baseline and follow up. The mean age of victims was 23 years. Seven out of 10 structural standards improved and six out of 10 process standards (p<0.05). Quality of care improved through training clinical staff, introducing a standardised operating procedure for HIV and pregnancy testing, post-exposure HIV and sexually transmitted infection prophylaxis, and emergency contraception. Other interventions included priority triage, a dedicated consulting room, patient resource materials, better health information and immediate psychological support.

**Conclusion:** The quality of care for female rape survivors is suboptimal in our setting. However, simple interventions to improve the structure in place for patients and upskilling the entire practice team to align care to current international standards can improve the overall quality of healthcare

# A feasibility analysis for successful completion of IVC ultrasound in hypotensive emergency department patients

R Dunfield, P Ross, C Keyes, J Fraser, D Lewis, P Boreskie, C Pham, S Ali Alrobaian, F Scheuermeyer, H Lamprecht (hl@sun.ac.za), M Stander, R Henneberry, A Sibley, P Atkinson

**Introduction:** Determining fluid status prior to resuscitation provides a more accurate guide for appropriate fluid administration in the setting of undifferentiated hypotension. Emergency Department (ED) point of care ultrasound (PoCUS) has been proposed as a potential non-invasive, rapid, repeatable investigation to ascertain inferior vena cava (IVC) characteristics. Our goal was to determine the feasibility of using PoCUS to measure IVC size and collapsibility.

**Methods:** This was a planned secondary analysis of data from a prospective multicentre international study investigating PoCUS in ED patients with undifferentiated hypotension. We prospectively collected data on IVC size and collapsibility using a standard data collection form in 6 centres. The primary outcome was the proportion of patients with a clinically useful (determinate) scan defined as a clearly visible intrahepatic IVC, measurable for size and collapse. Descriptive statistics are provided.

**Results:** A total of 138 scans were attempted on 138 patients; 45.7% were women and the median age was 58 years old. Overall, one hundred twenty-nine scans (93.5%; 95% CI 87.9 to 96.7%) were determinate. 131 (94.9%; 89.7 to 97.7%) were determinate for IVC size, and 131 (94.9%; 89.7 to 97.7%) were determinate for collapsibility.

**Conclusion:** In this analysis of 138 ED patients with undifferentiated hypotension, the vast majority of PoCUS scans to investigate IVC characteristics were determinate. Future work should include analysis of the value of IVC size and collapsibility in determining fluid status in this group.

**Citation:** Canadian Journal of Emergency Medicine 2020;22(S1): S62-S62. doi:10.1017/cem.2020.201

# Does Point of Care Ultrasound Improve Resuscitation Markers in Undifferentiated Hypotension? An International Randomized Controlled Trial From The Sonography in Hypotension and Cardiac Arrest in the Emergency Department (SHoC-ED) Series

*Atkinson P, Taylor L, Milne J, Diegelmann L, Lamprecht H (hl@sun.ac.za), Stander M, Lussier, C Pham, R.J. Henneberry, J Fraser, M Howlett, J Mekwan, J Ramrattan, B, Middleton, D.J. Van Hoving, M Peach, T dahn, S Hurley, K MacSween, L Richardson, G Stoica, S Hunter, JP Atkinson, P Olszynski, A Banerjee, D Lewis*

**Introduction:** Point of Care Ultrasound (PoCUS) protocols are commonly used to guide resuscitation for patients with undifferentiated hypotension, yet there is a paucity of evidence for any outcome benefit. We undertook an international multicenter randomized controlled trial (RCT) to assess the impact of a PoCUS protocol on key clinical outcomes. Here we report on resuscitation markers.

**Methods:** Adult patients presenting to six emergency departments (ED) in Canada and South Africa with undifferentiated hypotension (systolic blood pressure (SBP) <100mmHg or a Shock Index >1.0) were randomized to receive a PoCUS protocol or standard care (control). Reported physiological markers include shock index (SI), and modified early warning score (MEWS), with biochemical markers including venous bicarbonate and lactate, at baseline and four hours.

**Results:** A total of 273 patients were enrolled, with data collected for 270. Baseline characteristics were similar for each group. Improvements in mean values for each marker during initial treatment were similar between groups: Shock Index; mean reduction in Control 0.39, 95% CI 0.34 to 0.44 vs. PoCUS 0.33, 0.29 to 0.38; MEWS, mean reduction in Control 2.56, 2.22 to 2.89 vs. PoCUS 2.91, 2.49 to 3.32; Bicarbonate, mean reduction in Control 2.71 mmol/L, 2.12 to 3.30 mmol/L vs. PoCUS 2.30 mmol/L, 1.75 to 2.84 mmol/L, and venous lactate, mean reduction in Control 1.39 mmol/L, 0.93 to 1.85 mmol/L vs. PoCUS 1.31 mmol/L, 0.88 to 1.74 mmol/L.

**Conclusion:** We found no meaningful difference in physiological and biochemical resuscitation markers with or without the use of a PoCUS protocol in the resuscitation of undifferentiated hypotensive ED patients. We are unable to exclude improvements in individual patients or in specific shock types.

**Citation:** Cureus 12(8): e9899. doi 10.7759/ cureus.9899

# HEALTH SERVICES RESEARCH

*Dr Michelle Allen, Family Physician, Helderberg Hospital*

# Evaluation of household assessment data collected by community health workers in Cape Town, South Africa

*Bob Mash (rm@sun.ac.za), Louiso Du Pisanie, Carla Swart, Ella Van der Merwe.*

**Background:** South Africa has implemented ward-based outreach teams as part of re-engineering primary health care with teams of community health workers (CHWs). In Cape Town, such a community-orientated primary care (COPC) approach was developed at four learning sites. Community health workers registered and assessed the households they were responsible for, but a year later the data were not analysed or converted into useful information. The aim was to analyse the household data and evaluate its contribution to a community diagnosis, its quality and any implications for the performance of CHWs.

**Methods:** This article used descriptive secondary analysis of household data collected by CHWs at three COPC learning sites in Cape Town (Nomzamo, Eastridge and Mamre).

**Results:** Data were analysed for 16 852 people from Eastridge, 1338 people from Mamre and 1008 people from Nomzamo. Data were compared in terms of household composition and demographics, type of dwelling, identification of people on treatment for chronic conditions, identification of health risks (e.g. tuberculosis symptoms, tobacco smoking, missed immunisations, missed vitamin A prophylaxis, need for human immunodeficiency virus (HIV) testing or family planning, pregnant or postnatal, and wound care) and for referrals.

**Conclusion:** Household assessment visits have great potential. Data collected is currently of poor quality, inconsistent or not captured, infrequently analysed and not comprehensive. There is a need to introduce an electronic m-health solution to assist the health information system, to revise the contents of the household assessment form and to ensure that CHWs are competent to identify risks and respond appropriately

**Citation:** Evaluation of household assessment data collected by community health workers in Cape Town, South Africa. S Afr Fam Pract. 2020;62(1), a5168. https://doi.org/ 10.4102/ safp.v62i1.5168

# The role of community health workers in non-communicable disease in the Helderberg sub-district, Cape Town.

*Doresha Williams, Bob Mash (rm@sun.ac.za)*

**Introduction:** Community health workers (CHWs) have been part of primary health care (PHC) for many years and are integral to the Department of Health's (DOH) strategy for the re-engineering of PHC. The DOH envision that the role of CHWs should be comprehensive, covering the breadth of health care issues and including health promotion and disease prevention interventions, treatment adherence support as well as rehabilitation and palliative care. However, their roles in non-communicable diseases (NCDs), are less clear. The aim of this study was to explore the current role of CHWs with regard to NCDs. The research was conducted at a non-governmental organisation, in the Helderberg sub-district of Cape Town, South Africa.

**Methods:** The study design was a qualitative exploratory descriptive study that made use of non-participant observation and qualitative interviews with community health workers, non-governmental organisation manager and nurse coordinator, and the sub-district manager of community-based services at the DOH.

**Findings:** CHWs displayed a strong sense of significance and pride in their work because they were embedded in the communities they served. Their role with regard to NCDs was potentially comprehensive, but limited by a lack of sufficient training, inadequate supportive supervision, poor inter-sectoral support from social services and a need for more clarity on their roles in rehabilitation and palliative care. Training might also have been limited by low educational backgrounds.

A number of opportunities and threats were identified such as poor remuneration and labour law issues, poor integration of community- and facility-based teams, the need for a more functional and electronic data collection system that was linked to the district health information system, and some deficiencies in terms of equipment and resources.

**Conclusion:** CHWs have the foundation to provide a comprehensive approach to NCDs, but their work needs to be strengthened in many of the key areas to support their activities. In relation to NCDs, they need training in basic and brief behaviour change counselling and risk factors as well as in the areas of rehabilitation and palliative care.

**Sun-Scholar citation:** https://scholar.sun.ac.za/handle/10019.1/109300

# Evaluation of the quality of service delivery in private sector, primary care clinics in Kenya: A descriptive patient survey

*Gulnaz Mohamoud, Bob Mash (rm@sun.ac.za)*

**Background:** The quality of service delivery in primary care (PC) is an important determinant of clinical outcomes. The patients' perspective is one significant predictor of this quality. Little is known of the quality of such service delivery in the private sector in Kenya. The aim of the study was to evaluate the quality of service delivery in private sector, PC clinics in Nairobi, Kenya.

**Methods:** The study employed a descriptive cross-sectional survey by using the General Practice Assessment Questionnaire in 378 randomly selected patients from 13 PC clinics. Data were analysed using the Statistical Package for Social Sciences.

**Results:** Overall, 76% were below 45 years, 74% employed and 73% without chronic diseases. Majority (97%) were happy to see the general practitioner (GP) again, 99% were satisfied with their consultation and 83% likely to recommend the GP to others. Participants (97%) found in receptionist helpful and the majority were happy with the opening hours (73%) and waiting times (85%). Although 84% thought appointments were important, only 48% felt this was easy to make, and only 44% were able to access a particular GP on the same day. Overall satisfaction was higher in employed (98%) versus those unemployed (95%), studying (93%) or retired (94%) (p < 0.001).

**Conclusion:** Patients reported a high quality of service delivery. Utilisation was skewed towards younger, employed adults, without chronic conditions, suggesting that PC was not fully comprehensive. Services were easily accessible, although with little expectation of relational continuity. Further studies should continue to evaluate the quality of service delivery from other perspectives and tools. Keywords: consultation; General Practice A

# *A human resources for health analysis of registered family medicine specialists in South Africa: 2002–19*

*Ritika Tiwaria, Robert Mash (rm@sun.ac.za), Innocent Karangwa, Usuf Chikte*

**Background:** In South Africa, there is a need to clarify the human resources for health policy on family physicians (FPs) and to ensure that the educational and health systems are well aligned in terms of the production and employment of FPs.

**Objective:** To analyse the human resource situation with regard to family medicine in South Africa and evaluate the requirements for the future.

**Methods:** A retrospective review of the Health Professions Council of South Africa's (HPCSA) database on registered family medicine practitioners from 2002 until 2019. Additional data were obtained from the South African Academy of Family Physicians and published research.

**Results:** A total of 1247 family medicine practitioners were registered with the HPCSA in 2019, including 969 specialist FPs and 278 medical practitioners on a discontinued register.

Of the 969, 194 were new graduates and 775 from older programmes. The number of FPs increased from 0.04/10 000 population in 2009 to 0.16/10 000 in 2019, with only 29% in the public sector. On average, seven registrars entered each of nine training programmes per year and three graduated. New graduates and registrars reflect a growing diversity and more female FPs. The number of FPs differed significantly in terms of age, gender, provincial location and population groups.

**Conclusions:** South Africa has an inadequate supply of FPs with substantial inequalities. Training programmes need to triple their output over the next 10 years. Human resources for health policy should substantially increase opportunities for training and employment of FPs.

**Citation:** Family Practice, 2020, 1–7 doi:10.1093/ fampra/cmaa084 Health Service Research

# A descriptive analysis of the effect of the national COVID-19 lockdown on the workload and case mix of patients presenting to a district-level emergency centre in Cape Town, South Africa

C Hendrikse, M Parak; D J van Hoving (nvhoving@sun.ac.za)

**Background:** The global COVID-19 pandemic caused many countries to institute nationwide lockdowns to limit the spread of the disease. Objectives. To describe the effect of the national COVID-19 lockdown in South Africa (SA) on the workload and case mix of patients presenting to a district-level emergency centre.

**Methods:** The electronic patient tracking and registration database at Mitchells Plain Hospital, a district-level hospital in Cape Town, was retrospectively analysed. The 5-week lockdown period (27 March - 30 April 2020) was compared with a similar period immediately before the lockdown (21 February - 26 March). A comparison was also made with corresponding time periods during 2018 and 2019. Patient demographics, characteristics, diagnoses and disposition, as well as process times, were compared.

**Results:** A total of 26 164 emergency centre visits were analysed (8 297 in 2020, 9 726 in 2019, 8 141 in 2018). There was a reduction of 15% in overall emergency centre visits from 2019 to 2020 (non-trauma 14%, trauma 20%). A 35% decrease was seen between the 2020 lockdown period and the 5-week period before lockdown (non-trauma 33%, trauma 43%), and the reduced number of visits stayed similar throughout the lockdown period. The median age increased by 5 years during the 2020 lockdown period, along with an 8% decrease in patients aged < 12 years. High-acuity patients increased by 6% and the emergency centre mortality rate increased by 1%. All process times were shorter during the lockdown period (time to triage −24%, time to consultation −56%, time to disposition decision −29%, time in the emergency centre −20%).

**Conclusions:** The SA national COVID-19 lockdown resulted in a substantial decrease in the number of patients presenting to the emergency centre. It is yet to be seen how quickly emergency centre volumes will recover as lockdown measures are eased.

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# Cross-sectional study of paediatric case mix presenting to an emergency centre in Cape Town, South Africa, during COVID-19

*Lembi M Akuaake, Clint Hendrikse, Graeme Spittal, Katya Evans,*
*Daniël J van Hoving (nvhoving@sun.ac.za)*

**Objective:** To describe and compare the effect of level 5 lockdown measures on the workload and case mix of paediatric patients presenting to a district-level emergency centre in Cape Town, South Africa.

**Methods:** Paediatric patients (<13 years) presenting to Mitchells Plain Hospital were included. The level 5 lockdown period (27 March 2020–30 April 2020) was compared with similar 5-week periods immediately before (21 February 2020–26 March 2020) and after the lockdown (1 May 2020–4 June 2020), and to similar time periods during 2018 and 2019. Patient demographics, characteristics, International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) diagnosis, disposition and process times were collected from an electronic patient tracking and registration database. The $x^2$ test and the independent samples median test were used for comparisons.

**Results:** Emergency centre visits during the lockdown period (n=592) decreased by 58% compared with 2019 (n=1413) and by 56% compared with the 2020 pre-lockdown period (n=1342). The proportion of under 1 year olds increased by 10.4% (p<0.001), with a 7.4% increase in self-referrals (p<0.001) and a 6.9% reduction in referrals from clinics (p<0.001). Proportionally more children were referred to inpatient disciplines (5.6%, p=0.001) and to a higher level of care (3.9%, p=0.004). Significant reductions occurred in respiratory diseases (66.9%, p<0.001), injuries (36.1%, p<0.001) and infectious diseases (34.1%, p<0.001). All process times were significantly different between the various study periods.

**Conclusion:** Significantly less children presented to the emergency centre since the implementation of the COVID-19 lockdown, with marked reductions in respiratory and infectious-related diseases and in injuries.

# A cross sectional study of the availability of paediatric emergency equipment in South African emergency units

*Lauren Lai King, Baljit Cheema, Daniël J. van Hoving (nvhoving@sun.ac.za)*

**Background:** Despite children representing a significant proportion of Emergency Unit (EU) attendances globally, it is concerning that many healthcare facilities are inadequately equipped to deliver paediatric resuscitation. The rapid availability of a full range of paediatric emergency equipment is critical for delivery of effective, best-practice resuscitation. This study aimed to describe the availability of essential, functional paediatric emergency resuscitation equipment on or close to the resuscitation trolley, in 24-hour EUs in Cape Town, South Africa.

**Methods:** A cross sectional study was conducted over a six-month period in government funded hospital EUs, providing 24-hour emergency paediatric care within the Cape Town Metropole. A standardised data collection sheet of essential resuscitation equipment expected to be available in the resuscitation area, was used. Items were considered to be available if at least one piece of equipment was present. Functionality of available equipment was defined as: equipment that hadn't expired, whose original packaging was not outwardly damaged or compromised and all components were present and intact

**Results:** Overall, a mean of 43% (30/69) of equipment was available on the resuscitation trolley across all hospitals. The overall mean availability of equipment in the resuscitation area was 49% (34/69) across all hospitals. Mean availability of functional equipment was 42% (29/69) overall, 41% (28/69) at district-level hospitals, and 45% (31/69) at regional/tertiary hospitals.

**Conclusion:** Essential resuscitation equipment for children is insufficiently available at district-level and higher hospitals in the Cape Town Metropole. This is a modifiable barrier to the provision of high-quality paediatric emergency care.

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# Paediatric Emergency Department preparedness in Nigeria: A prospective cross-sectional study

*Callistus OA Enyuma, Muhammed Moolla, Feroza Motara, Gbenga Olorunfemi,*
*Heike Geduld (hgeduld@sun.ac.za), Abdullah E Laher*

*Introduction:* Paediatric emergency medicine (PEM) is poorly developed in low and middle-income countries. The magnitude of challenges facing Paediatric Emergency Departments (PEDs) in Nigeria has not been well described. This study aimed to assess paediatric emergency care preparedness across PEDs in Nigeria.

*Methods:* This was a prospective cross-sectional study that utilized a self-administered questionnaire and a check list to assess three key domains (managerial, medication and equipment) in tertiary care PED facilities that were recruited across Nigeria. Preparedness scores and other institutional attributes were compared between zones and regions.

*Results:* Thirty-four tertiary-level PEDs across Nigeria were included. The mean number of patient visits over the 30-day period prior to data collection was 253.2 (±261.2). The mean (SD) managerial, medication and equipment performance scores of the included PEDs were 42.9% (±14.3%), 50.7% (±22.3%) and 43.9% (±11.8%) respectively. The mean (SD) total performance score was 46.9% (±15.3%). Only 13 PEDs had a total performance score of >50%. There was a statistically significant higher mean equipment score (p = 0.029) in the Southern region (47.6 ± 3.1) compared to the Northern region (38.9 ± 2.3) of the country.

*Conclusions:* This study reports a global but remediable deficiency in emergency care preparedness amongst PEDs in tertiary care facilities in Nigeria. This study highlights the need for training of PED managers in basic and advanced life support and for the improvement in medication and equipment procurement across Nigeria.

# A comparison of trauma scoring systems for trauma-related injuries presenting to a district-level urban public hospital in Western Cape, South Africa

SN Mukonkole, L Hunter, A Möller, M Mccaul, S Lahri, DJ Van Hoving (nvhoving@sun.ac.za)

**Background:** Trauma is a major public health issue and has an extensive burden on the health system in South Africa. Many trauma scoring systems have been developed to estimate trauma severity and predict mortality. The prediction of mortality between different trauma scoring systems have not been compared at district-level health facilities in South Africa. The objective was to compare four trauma scoring systems (injury severity score (ISS), revised trauma score (RTS), Kampala trauma score (KTS), trauma and injury severity score (TRISS)) in predicting mortality in trauma-related patients presenting to a district-level hospital in Cape Town.

**Methods:** A retrospective analysis of all trauma patients managed in the resuscitation unit of Khayelitsha Hospital during a six-month period. Logistic regression was done, and empirical cut of points used to maximise sensitivity and specificity on receiver operating characteristic curves. The outcome was all-cause in-hospital mortality.

**Results:** In total, 868 participants were analysed after 50 were excluded due to missing data. The mean (± SD) age was 28±11 years, 726 (83.6%) were males, and penetrating injuries (n = 492, 56.6%) dominated. The mortality rate was 5.2% (n = 45). TRISS was the best mortality predictor (c-statistic 0.93, sensitivity 90%, specificity 87%). All scoring systems had overlapping confidence intervals.

**Conclusion:** TRISS, ISS, RTS and KTS performed similarly in predicting mortality in trauma-related patients managed at a district-level facility. The appropriate scoring system should be the simplest one which can be practically implemented and will likely differ between facilities.

# Clinical teams' experiences of crowding in public emergency centres in Cape Town, South Africa

*Catherine van de Ruit, Sa'ad Lahri (slahri@sun.ac.za), Lee A. Wallis*

**Introduction:** Crowding is a significant challenge for emergency centres (ECs) globally. While South Africa is not alone in reckoning with high patient demand and insufficient resources to treat these patients; staff-to-patient ratios are generally lower than in the Global North. The study of crowding and its consequences for patient care is a key research priority for strengthening the quality and efficacy of emergency care in South Africa. The study set out to understand frontline staff's perspectives on crowding in Cape Town public ECs to learn how they cope in such high- pressure working conditions, determine what they see as the factors contributing to crowding, and obtain their recommendations for reform.

**Methods:** This research is a qualitative study from interviews and observations at five ECs in Cape Town, conducted in June and July 2017. In total 43 staff were interviewed individually or in pairs. The interviews included physicians of varying levels of experience (25), and registered or enrolled nurses (18). Data were analysed with the qualitative text-analysis software NVivo.

**Results:** Both doctors and nurses saw crowding as a consequence of three factors: 1) limited bed space in the EC, 2) insufficient health professionals to care for admitted patients, and 3) the presence of boarders. Systemic or organizational factors as well as human resource scarcity were determined to be the key reasons for crowding.

**Discussion:** With its high patient acuity and volume and its limited human and material resources, South Africa is an important case study for understanding how emergency care providers manage working in crowded conditions. The solutions to crowding recommended by interviewees were to expand the EC workforce and to add discharge lounges and examination tables

# *South African paramedic perspectives on prehospital palliative care*

*Caleb Hanson Gage, Heike Geduld (hgeduld@sun.ac.za), Willem Stassen*
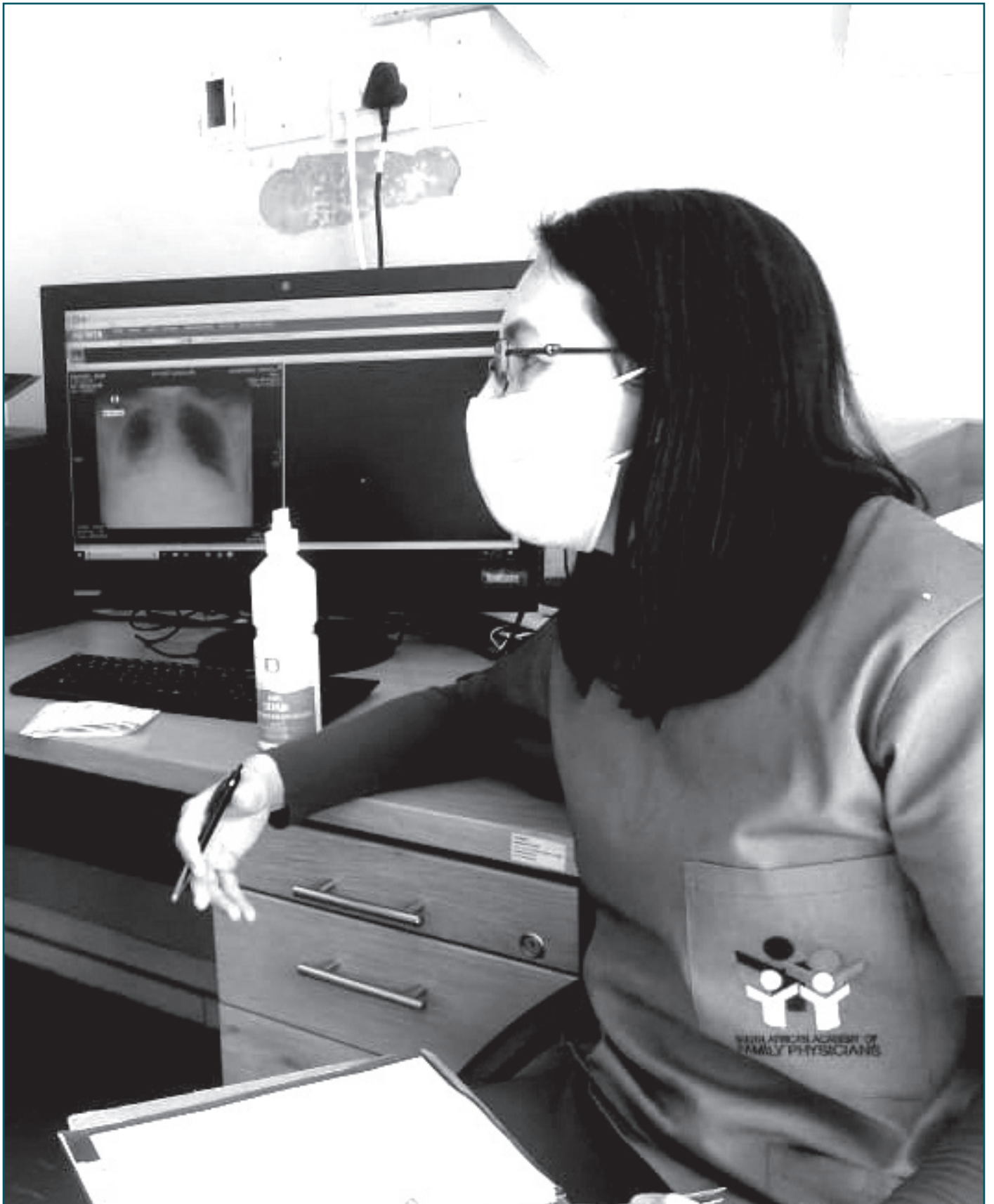
**Background:** Palliative care is typically performed in-hospital. However, Emergency Medical Service (EMS) providers are uniquely positioned to deliver early palliative care as they are often the first point of medical contact. The aim of this study was to gather the perspectives of advanced life support (ALS) providers within the South African private EMS sector regarding pre-hospital palliative care in terms of its importance, feasibility and barriers to its practice.

**Methods:** A qualitative study design employing semi-structured one-on-one interviews was used. Six interviews with experienced, higher education qualified, South African ALS providers were conducted. Content analysis, with an inductive-dominant approach, was performed to identify categories within verbatim transcripts of the interview audio-recordings.

**Results:** Four categories arose from analysis of six interviews: 1) need for pre-hospital palliative care, 2) function of pre-hospital health-care providers concerning palliative care, 3) challenges to pre-hospital palliative care and 4) ideas for implementing pre-hospital palliative care. According to the interviewees of this study, pre-hospital palliative care in South Africa is needed and EMS providers can play a valuable role, however, many challenges such as a lack of education and EMS system and mindset barriers exist.

**Conclusion:** Challenges to pre-hospital palliative care may be overcome by development of guidelines, training, and a multi-disciplinary approach to pre-hospital palliative care.

# EDUCATIONAL RESEARCH

*Dr Vanessa Lomas, Family Physician, Helderberg Hospital*

# Identifying research priorities for health professions education research in sub–Saharan Africa using a modified Delphi method

*Susan C. Van Schalkwyk, Elsie Kiguli-Malwadde, Jehan Z. Budak, Michael J. A. Reid,*
*Marietjie R. de Villiers (mrdv@sun.ac.za)*

**Background:** Recent increases in health professions education (HPE) research in sub-Saharan Africa (SSA), though substantial, have predominantly originated from single institutions and remained uncoordinated. A shared research agenda can guide the implementation of HPE practices to ultimately influence the recruitment and retention of the health workforce. Thus, the authors aimed to generate and prioritise a list of research topics for HPE research (HPER) in SSA.

**Methods:** A modified Delphi process was designed to prioritise a shared agenda. Members of the African Forum for Research and Education in Health (AFREhealth) technical working group (TWG) were asked to first list potential research topics. Then, members of the same TWG and attendees at the annual AFREhealth academic symposium held in Lagos, Nigeria in August 2019 rated the importance of including each topic on a 3-point Likert scale, through two rounds of consensus seeking. Consensus for inclusion was predefined as ≥70% of respondents rating the topic as "must be included."

**Results:** Health professions educators representing a variety of professions and 13 countries responded to the survey rounds. Twenty-three TWG members suggested 26 initial HPER topics; subsequently 90 respondents completed round one, and 51 completed round 2 of the modified Delphi. ;

**Conclusions:** Establishing research priorities for HPE is important to ensure efficient and appropriate allocation of resources. This study serves as a reminder of how the prevailing context within which HPE, and by implication research in the field, is undertaken will inevitably influence choices about research foci. It further points to a potential advocacy role for research that generates regionally relevant evidence.

**Citation:** Van Schalkwyk, S.C., Kiguli-Malwadde, E., Budak, J.Z. et al. Identifying research priorities for health professions education research in sub-Saharan Africa using a modified Delphi method. BMC Med Educ 20, 443 (2020). https://doi.org/10.1186/s12909-020-02367-z

# An educational pathway and teaching materials for first aid training of children in sub–Saharan Africa based on the best available evidence

*Emmy De Buck, Jorien Laermans, Anne-Catherine Vanhove, Kim Dock, Philippe Vandekerckhove and Heike Geduld (hgeduld@sun.ac.za)*

**Background:** First aid training is a cost-effective way to decrease the burden of disease and injury in low- and middle-income countries (LMIC). Since evidence from Western countries has shown that children are able to learn first aid, first aid training of children in LMIC may be a promising way forward. Hence, our project aim was to develop contextualized materials to train sub-Saharan African children in first aid, based on the best available evidence.

**Methods:** Systematic literature searches were conducted to identify studies on first aid education to children up to 18 years old (research question one), and studies investigating different teaching approaches (broader than first aid) in LMIC (research question two). A multidisciplinary expert panel translated the evidence to the context of sub-Saharan Africa, and evidence and expert input were used to develop teaching materials.

**Results:** For question one, we identified 58 studies, measuring the effect of training children in resuscitation, first aid for skin wounds, poisoning etc. For question two, two systematic reviews were included from which we selected 36 studies, revealing the effectiveness of several pedagogical methods, such as problem-solving instruction and small-group instruction. However, the certainty of the evidence was low to very low. Hence expert input was necessary to formulate training objectives and age ranges based on "good practice" whenever the quantity or quality of the evidence was limited. The experts also placed the available evidence against the African context.

**Conclusions:** The above approach resulted in an educational pathway (i.e. a scheme with educational goals concerning first aid for different age groups), a list of recommended educational approaches, and first aid teaching materials for children, based on the best available evidence and adapted to the African context.

# An electronic survey of preferred podcast format and content requirements among trainee emergency medicine specialists in four Southern African universities

K. Ekambaram, H. Lamprecht (hl@sun.ac.za), V. Lalloo, N. Caruso, A. Engelbrecht, W. Jooste

**Introduction:** Global usage of educational Emergency Medicine (EM) podcasts is popular and ever-increasing. This study aims to explore the desired content, format and delivery characteristics of a potential educational, context-specific Southern African EM podcast, by investigating current podcast usages, trends and preferences among Southern African EM registrars of varying seniority.

**Methods:** We developed an electronic survey - using a combination of existing literature, context-specific specialist-training guidance, and input from local experts – exploring preferred podcast characteristics among EM registrars from four Southern African universities.

**Results:** The study's response rate was 75%, with 24 of the 39 respondents being junior registrars. Ninety-four percent (94%) of respondents used EM podcasts as an educational medium: 64% predominantly using podcasts to supplement a personal EM study program. The primary mode of accessing podcasts was via personal mobile devices (84%). Additionally, respondents preferred a shorter podcast duration (5–15 min), favoured multimedia podcasts (56%) and showed an apparent aversion toward recorded faculty lectures (5%). Eighty-two percent (82%) of respondents preferred context-specific podcast content, with popular topics including toxicology (95%), cardiovascular emergencies (79%) and medico-legal matters (74%). Just-in-Time learning proved an unpopular learning strategy in our study population, despite its substantial educational value.

**Conclusion:** Podcast-usage proved to be near-ubiquitous among the studied Southern African EM registrars. Quintessentially, future context-specific podcast design should cater for mobile device-use, shorter duration podcasts, more video content, context-specific topics, and content optimised for both Just-in-Time learning.

# Emergency Medicine Training Programs in Low- and Middle-Income Countries: A Systematic Review

Megan M. Rybarczyk, Nicholas Ludmer, Morgan C. Broccoli, Sean M. Kivlehan, Michelle Niescierenko, Mark Bisanzo, Keegan A. Checkett, Shada A. Rouhani, Andrea G. Tenner, Heike Geduld (hgeduld@sun.ac.za), Teri Reynolds.

**Background:** Despite the growing interest in the development of emergency care systems and emergency medicine (EM) as a specialty globally, there still exists a significant gap between the need for and the provision of emergency care by specialty trained providers. Many efforts to date to expand the practice of EM have focused on programs developed through partnerships between higher- and lower-resource settings.

**Objective:** To systematically review the literature to evaluate the composition of EM training programs in low- and middle-income countries (LMICs) developed through partnerships.

**Methods:** An electronic search was conducted using four databases for manuscripts on EM training programs – defined as structured education and/or training in the methods, procedures, and techniques of acute or emergency care – developed through partnerships. The search produced 7702 results. Using a priori inclusion and exclusion criteria, 94 manuscripts were included. After scoring these manuscripts, a more in-depth examination of 26 of the high-scoring manuscripts was conducted.

**Findings:** Fifteen highlight programs with a focus on specific EM content (i.e. ultrasound) and 11 cover EM programs with broader scopes. All outline programs with diverse curricula and varied educational and evaluative methods spanning from short courses to full residency programs, and they target learners from medical students and nurses to mid-level providers and physicians. Challenges of EM program development through partnerships include local adaptation of international materials; addressing the local culture(s) of learning, assessment, and practice; evaluation of impact; sustainability; and funding.

**Conclusions:** Overall, this review describes a diverse group of programs that have been or are currently being implemented through partnerships. Additionally, it highlights several areas for program development, including addressing other topic areas within EM beyond trauma and ultrasound and evaluating outcomes beyond the level of the learner. These steps to develop effective programs will further the advancement of EM as a specialty and enhance the development of effective emergency care systems globally.

# Cross-Sectional Survey of Former International Emergency Medicine Fellows 2010–19

*Shama Patel, Alyssa Green, Michelle Feltes, Heike Geduld (hgeduld@sun.ac.za), Andrea G Tenner*

**Introduction:** International emergency medicine is a new subspecialty within emergency medicine. International emergency medicine (EM) fellowships have been in existence for more than 10 years, but data is limited on the experiences of the fellows. Our goal in this study was to understand the fellowship experience.

**Methods:** The study employed a cross-sectional survey in which participants were asked about their demographics, fellowship program, and advanced degree. Participants consisted of former fellows who completed the fellowship between 2010–19. The survey consisted of both closed and open-ended questions to allow for further explanation of former fellows' experience. Descriptive analysis was conducted on the quantitative survey data while content analysis was conducted to ascertain salient themes from the open-ended questions.

**Results:** We contacted 71 former fellows, of whom 40 started and 36 completed surveys, for a 51% response rate (55.6% women). Two-year fellowships predominated, with 69.4% of respondents. Prior to fellowship, a subset of fellows spoke the native languages of their service sites: French, Spanish, Haitian Creole, Mandarin, or Kiswahili. Half the respondents spent 26–50% of their fellowship in field work, with 83.3% of institutions providing direct funding for this component. Many respondents stated a need for further institutional support (money or infrastructure) for fieldwork and mentoring. Non-governmental organizations comprised 29.7% of respondents' work partners, while 28.6% were with academic institutions in country, focused mostly on education, health systems development, and research. The vast majority (92%) of respondents continued working in global EM, with the majority based in American academic institutions. Those who did not cited finances and lack of institutional support as main reasons.

**Conclusion:** This study describes the fellow experience in international EM. The majority of fellows completed a two-year fellowship with 26–50% of their time spent in fieldwork with 83.3% of institutions providing funding. The challenges in pursuing a long-term career in global EM included the cost of international work, inadequate mentorship, and departmental funding.

# FAMILY AND EMERGENCY MEDICINE RESEARCH: 2020

*Department of Family and Emergency Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University*