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ASPEN position statement on the use of indirect calorimetry

SASPEN ABSTRACTS

Diagnostic accuracy of muscle mass surrogates within the GLIM criteria for resource-limited settings

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Background. In resource-limited settings, some components required for the Global Leadership Initiative on Malnutrition (GLIM) criteria have been reported a challenge to obtain, which may hamper the implementation thereof.

Objectives. To determine the validity of surrogate measures of skeletal muscle mass to diagnose malnutrition in adults in South African (SA) hospitals.

Methods. In a diagnostic accuracy study, adult patients with various diagnoses from five SA hospitals were consecutively sampled. The diagnosis of malnutrition according to the GLIM criteria, substituting the skeletal muscle mass index (SMI) with the proposed surrogates (mid-upper arm circumference (MUAC) and calf circumference (CC)), was evaluated. The SMI, used as the reference, was measured by bioelectrical impedance. Optimal cut-off points were determined with receiver operating curves, and the diagnostic accuracy of the surrogates within the GLIM phenotypic criteria was evaluated to diagnose malnutrition.

Results. Of 480 patients (51% male) screened, 73% ($n=350$) were at risk of malnutrition and represented the final study sample. More than half (53%; $n=184$) were diagnosed with malnutrition using the SMI for muscle mass. A moderate correlation existed between the SMI and MUAC ($r=0.645$; $p<0.001$) and CC ($r=0.515$; $p<0.001$). The optimal cut-off points to identify reduced muscle mass were determined at 24.9 cm and 29.1 cm for MUAC and CC, respectively. Substitution of the SMI with MUAC and CC resulted in a slightly higher malnutrition diagnosis of 58% with good diagnostic accuracy (MUAC: sensitivity 100%, specificity 91%, positive predictive value (PPV) 93%, negative predictive value (NPV) 100%; CC: sensitivity 100%, specificity 91%, PPV 93%, NPV 100%).

Conclusion. This study found MUAC and CC to be acceptable surrogates for measuring muscle mass when used within the GLIM phenotypic criteria.

Measured energy expenditure in the acute phase of critical illness: A prospective study undertaken in an adult surgical intensive care unit

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Background. Indirect calorimetry (IC) is the gold standard for measuring energy expenditure (EE).

Objectives. Limited data on measured EE are available in South Africa. We measured EE and energy intake during the first 10 ICU days.

Methods. IC was performed on a mean (standard deviation (SD)) of day 3 (1) and alternate days until day 10 on 50 ICU patients. Measured EE was modelled using linear mixed regression with two fractional polynomial terms to accommodate non-linear responses over time.

Results. Mean (SD) age was 36.9 (11.8) years, APACHE II score 13.5 (6.6), SOFA score 4.5 (3.2), mNUTRIC score 2.2 (1.82), and body mass index 24.8 (4.00) kg/m². Mean (SD) ventilation duration was 7.7 (2.7) days, and 72% were septic. Mean daily measured energy expenditure (MEE) was 1 963.6 (95% confidence interval (CI) 1 859.1 - 2 068.2) kcal/d (28.6 (95% CI 27.3 - 30.0) kcal/kg/d) in the early acute phase (<72 hours), 2 086.7 (95% CI 1 989.8 - 2 183.5) kcal/d (30.1 (95% CI 29.9 - 31.3) kcal/kg/d) in the late acute phase (72 - 168 hours), and 2 033.4 (95% CI 1 900.5 - 2 166.3) kcal/d (29.1 (95% CI 27.2 - 31.0) kcal/kg/d) in the post-acute phase (>168 hours). Mean daily measured EE was significantly lower in the early than in the late acute phases ($p=0.012$), whereas the late and post-acute phases were similar. EE increased over 4 days, peaking on day 5 then plateauing. Age and sex significantly influenced EE, but SOFA, APACHE II and mNUTRIC scores did not. Mean (SD) energy intake in the three phases was 9.19 (6.26), 25.56 (5.19) and 29.92 (10.08) kcal/kg/d, meeting 59.06% (20.91), 90.80% (16.33) and 98.09% (21.54) of MEE, respectively.

Conclusion. Measured EE increased over 4 days, peaking on day 5 then plateauing. Current weight-based energy recommendations for the acute phase should be revised for this study population.

Barriers and enablers to address adult hospital malnutrition: A (South) African perspective

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Background. Adult hospital malnutrition (AHM) is prevalent in African hospitals and is associated with poor clinical outcomes.

Objectives. To explore the enablers and barriers to the adoption of strategies to address AHM in Western Cape Province, South Africa.

Methods. In this phase of a larger study, semi-structured interviews with purposely selected role-players ($N=26$) were undertaken, and a self-administered electronic survey was distributed to hospital dietitians in the Western Cape ($N=51$). A triangulation-type design utilising a convergence model was used, and ethics approval was obtained from Stellenbosch University and the Western Cape Department of Health Research Committee.

Results. Strong agreement was found between survey and interview responses in terms of the enablers and barriers encountered to address AHM. Many of the same key themes, identified in some settings as enablers, emerged conversely as potential barriers in other settings, and included human resources, buy-in from key role-players, referral practices, education and training, patient screening, awareness, attitudes and collaboration. Additional barriers included lack of sufficient resources (finances, tools), time, understanding of AHM diagnosis and management, skills, advocacy and local data, as well as problems related to administration and logistics, food services and food/product delivery. Furthermore, resistance to change, stock limitations, issues with the supply chain, and challenges with private medical aids were identified as barriers.

Conclusion. Enablers and barriers to address AHM have been identified and provide insight into problematic areas that need attention. These barriers differ among settings and need to be considered in context when designing action plans and strategies.

parameters will be able to detect AKI as per the Acute Kidney Injury Network (AKIN) criteria.

Objectives. To evaluate the efficacy of the renal resistive index (RRI) and semiquantitative power Doppler ultrasound (PDU) done preoperatively and 24 hours postoperatively in prediction of AKI at day 3, persistent AKI at hospital discharge, need for renal replacement therapy, length of intensive care unit (ICU) stay, length of hospital stay, days on ventilator and days on vasopressors.

Methods. A total of 148 American Society of Anesthesiologists (ASA) 1/2 patients, aged 18 - 65 years and scheduled for surgery due to perforation peritonitis, were enrolled in the study. Patients with AKI or chronic kidney disease on admission and poor abdominal echogenicity were excluded from the trial. The RRI and PDU were done preoperatively and 24 hours postoperatively. The area under the receiver operating characteristic curve of renal Doppler ultrasound was assessed for prediction of AKI.

Results. The area under the curve (AUC) for preoperative RRI/PDU, 24 hours postoperative RRI and postoperative RRI/PDU was 0.904 (95% CI 0.845 - 0.946), 0.916 (95% CI 0.859 - 0.955) and 0.915 (95% CI 0.858 - 0.954), respectively. Among all the parameters, 24 hours postoperative RRI was the best predictor of AKI at a cut-off point of >0.6 with an AUC of 0.916 for predicting AKI.

Conclusion. The RRI/PDU ratio and 24 hours postoperative PDU score have the highest diagnostic accuracy for diagnosing AKI. Doppler parameters can predict secondary outcomes such as mortality, length of ICU stay and days of ventilator support.

The experiences of parents of children undergoing surgery for congenital heart defects: An integrative review

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Background. Congenital heart defects are among the most common congenital abnormalities in infants. A child's congenital heart disease diagnosis and hospitalisation affect both the child and the parent. Understanding the psychological impact of a child's hospitalisation and surgery for a congenital heart defect on the parent is necessary. Numerous studies have been conducted on the experiences of parents of hospitalised children with congenital heart disease undergoing cardiac surgery. This study aimed to collate and synthesise these research studies through an integrative review.

Objectives. To gather and synthesise the literature on parents' experiences of children undergoing surgery for congenital heart defects.

Methods. An integrative literature review using Whittemore and Knaff's (2005) framework was utilised. It comprised five stages: problem identification, searching available literature, data evaluation, data analysis, and presentation of the findings. A comprehensive literature search was conducted using Scopus, PubMed, CINAHL Plus and Google Scholar to locate primary studies published and unpublished in English from January 2002 to May 2020. A total of 273 articles were screened, with 83 read in depth and 35 selected for this review based on eligibility criteria.

Results. Six themes were identified from the review. These are fear of losing a child, increased stress and anxiety, fear of losing parental roles, decreased wellbeing of parents, difficulty caring for the child, and coping strategies and support.

CCSSA ABSTRACTS

ORAL PRESENTATIONS

The Doppler renal resistive index and semiquantitative power Doppler ultrasound for early detection of acute kidney injury after perforation peritonitis surgery: A prospective observational study

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Background. Perforation peritonitis is one of the most common surgical emergencies in the world and is associated with a high incidence of acute kidney injury (AKI). We hypothesised that renal artery ultrasound

Families' perceptions on communication in a South African adult intensive care unit: A qualitative study

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Background. Communication plays a significant role in addressing the needs of family members of critically ill patients admitted to the intensive care unit (ICU). Families experience anxiety and helplessness as a result of the sudden admission of their family members to the ICU. In order to address the informational needs of families, multidisciplinary team (MDT) members need to ensure regular, timeous and honest updates about the patient's diagnosis, treatment plan and prognosis.

Objectives. To explore families' perceptions regarding communication in an adult ICU.

Methods. A qualitative descriptive design was used to collect data from a purposely selected sample of 20 family members. Semi-structured interviews were conducted in one medical-surgical ICU of a private hospital in Free State Province, South Africa. Thematic analysis was used to analyse data. Ethical clearance (ref. no. M181166) was obtained from the University of the Witwatersrand.

Results. Communication emerged as a main theme underpinned by four subthemes, namely lack of regular updates, healthcare providers' attitudes, communication technology, and incomplete handover by healthcare providers. Family members were dissatisfied with communication from the physicians. It was suggested that the MDT members could use pamphlets, emails and phone calls to enhance communication with families.

Conclusion. It can be concluded that effective, timeous and consistent communication with family members of critically ill patients alleviates anxiety, improves family involvement in decision-making, and fulfils their satisfaction with informational needs.

Barriers and facilitators influencing implementation of patient safety incident reporting and learning guidelines in specialised care units in KwaZulu-Natal Province, South Africa: A qualitative study of healthcare professionals' views

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Background. Globally, increased occurrences of patient safety incidents (PSIs) have become a public concern. The implementation of incident reporting and learning guidelines is fundamental to reducing preventable patient harm. To improve the implementation of these guidelines in specialised care units (SCUs) in KwaZulu-Natal Province, South Africa, views of healthcare professionals were unearthed.

Objectives. To explore healthcare professionals' views about the implementation of PSI reporting and learning guidelines in SCUs.

Methods. The University of KwaZulu-Natal's Human Science Research Ethics Committee and the Department of Health (ref. no. HSSREC/00001651/2020) granted ethical clearance. The study was conducted in SCUs of three purposely selected public hospitals in two districts of KwaZulu-Natal. A descriptive qualitative design was used to collect data from focus group discussions involving 28 operational nurse

managers. Individual interviews were conducted with 3 assisting nurse managers, 3 monitoring and evaluation managers, and 7 consultant medical doctors. This study was part of a bigger study using a mixed-methods approach. Content data analysis was performed using Tesch's method.

Results. The main themes that emerged during data analysis were human resource constraints, punitive culture, inadequate institutional support, poor understanding of PSI guidelines and policies, and ineffective reporting systems. The findings highlighted that there were more major barriers to the implementation of PSI reporting and learning guidelines.

Conclusion. This study highlights the barriers that result in ineffective implementation of PSI reporting and learning guidelines. An implementation strategy to guide healthcare professionals is recommended.

Demystifying the dogma: A new method of acid-base interpretation

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Background. Acid-base evaluation is one of the most widely used and important tests in medicine, and particularly in critical care. However, it remains drenched in dogma and confusing unmemorable formulas, each with their own caveats. This situation has resulted in many clinicians feeling overwhelmed and confused about which method they should use to interpret acid-base disorders.

Objectives. There are still transcontinental discrepancies in how to evaluate acid-base that are more than half a century old. These range from Copenhagen origins and Boston methods to more 'modern' theories from a Canadian physicist. Application of these traditionally taught methods remains challenging and can become confusing, particularly in clinical settings. A lack of understanding about accurate acid-base interpretation could influence decision-making and management of complicated critically ill patients. The objective of improved evaluation and diagnostics may lead to increased accuracy, which is needed to improve decision-making and management strategies.

Methods. This audiovisual in-person presentation will describe a new way to interpret acid-base. It aims to be easier to understand and more accurate, and can offer explanations where previous models are lacking. It requires a break from traditional methods and challenging what was previously thought to be fact. Real-life cases will be used as examples.

Intensive care unit nurses' experiences regarding withdrawal of treatment and end-of-life care

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Background. Withdrawal of treatment and end-of-life care (EOLC) in the intensive care unit (ICU) often evokes mixed emotions in intensive care nurses. These emotions are related to caring for the dying patient and the obstacles encountered during the withdrawal of treatment and EOLC. Providing high-quality EOLC is important for both patients and families, yet ICU nurses face many obstacles that hinder EOLC.

Objectives. To explore and describe ICU nurses' experiences of

withdrawal of treatment and EOLC in adult ICUs in Gauteng Province, South Africa.

Methods. A qualitative descriptive design was used to recruit 15 ICU nurses, who were purposely selected. In-depth semi-structured interviews were used to collect data from four ICUs in an academic hospital in Gauteng. Thematic analysis was used to analyse data. Ethical clearance (ref. no. M190640) was obtained from the University of the Witwatersrand, Johannesburg.

Results. Three major themes emerged in this study. These were obstacles to the withdrawal of treatment and EOLC, emotional burden, and coping mechanisms.

Conclusion. This study concluded that ICU nurses are not adequately prepared to provide skilled and competent care to dying patients in an environment supercharged with advanced technology. Lack of psychological and organisational support may influence the care provided to patients and their families by ICU nurses. ICU nurses should have access to support structures to ensure that they continue to provide quality EOLC to dying patients and their family members.

Bereaved families' experiences of treatment withdrawal in the adult intensive care unit: A qualitative study

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Background. In South Africa, the mortality rate in adult intensive care units (ICUs) is 20%. Many of these deaths are preceded by the withdrawal of life-sustaining treatments. Families form part of the care provided for patients after the withdrawal of treatment. Little is known about family members' experiences after the decision is made to withdraw treatment.

Objectives. To explore the experiences of bereaved family members after the withdrawal of treatment in the adult ICU.

Methods. An exploratory descriptive qualitative study design was used. Seven family members whose relatives died in the ICU after treatment withdrawal were purposely sampled from one academic hospital adult ICU. Interviews were transcribed verbatim and analysed using thematic analysis. Ethical clearance (ref. no. M210229) was obtained.

Results. Two main themes emerged, namely emotional suffering and unmet needs. Bereaved families described the decision to withdraw treatment as one they were not prepared for; it was therefore received as a big shock. The moment was difficult and chaotic. Certain aspects of care needed to be met prior to and after treatment withdrawal. Most families wanted to know what was happening at all times, to be there for their loved ones till the end, and to hold their hands.

Conclusion. Bereaved family members described the treatment withdrawal process in the ICU as emotionally stressful. Most families are not well prepared for treatment withdrawal and have unmet needs. Healthcare providers need to recognise the patient and family as a unit of care and to support them throughout the treatment withdrawal process.

Analysis of orthopaedic injuries in computed tomography pan-scans of polytrauma patients at a quaternary academic hospital

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Background. Doctors in South Africa often treat patients who have sustained major trauma, many of whom have multiple injuries, which necessitates the demand for a rapid diagnostic assessment. Whole-body computed tomography (CT pan-scan) allows for rapid multisystem injury diagnosis.

Objectives. To evaluate the local epidemiology of orthopaedic injuries in polytrauma patients who underwent a CT pan-scan.

Methods. A retrospective observational analysis, based at an academic hospital, was done of polytrauma patients who underwent a CT pan-scan over a 2-year period.

Results. There was a total of 296 polytrauma patients, 85% male and 15% female, with a median age of 33 years. The most common mechanism of injury was motor vehicle accidents (33.1%). Of a total of 1 012 injuries, 196 were spinal fractures (mostly cervical), 137 pelvic/sacral fractures, and 101 long-bone fractures. The most frequent non-orthopaedic injury sustained was chest injury. Interpersonal and intentional injuries were significantly associated with an increased risk of thoracic spine fractures (relative risk (RR) 1.8; 95% confidence interval (CI) 1.1 - 2.9), while road traffic accidents were significantly associated with an increased risk of scapular/clavicular fractures (RR 2.0; 95% CI 1.2 - 3.5) and tibial/fibula fractures (RR 3.5; 95% CI 1.2 - 10.3).

Conclusion. An individual involved in a road traffic accident was 3.5 times more likely to sustain a tibial/fibular fracture as opposed to any other fracture. One in four patients who sustained a chest injury had an associated cervical spine injury, and one in three patients had pelvic/sacral injuries, similarly with head injuries. The findings of this study highlight injury patterns that should be anticipated in polytrauma patients.

Long-term outcome of COVID-19 critical care survivors

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Background. The reported prevalence of post-intensive care syndrome in intensive care unit (ICU) survivors varies from 25% to 80%. The long-term health outcomes and rehabilitation needs of COVID-19 ICU survivors are unclear.

Objectives. To describe the demographic profile, outcomes, and health-related quality of life (HRQoL) of COVID-19 ICU survivors within 12 months of hospital discharge.

Methods. The study had a descriptive cross-sectional design. Approval was obtained from the institutional health research ethics committee (ref. no. S22/02/0030). Physical, cognitive and mental function and HRQoL were assessed using a variety of validated tools.

Results. A total of 115 participants were assessed; 57% were female, and the mean (standard deviation (SD)) age was 51 (11.9) years. Of the survivors, 40% ($n=46$) were at risk of developing physical disability

(mean (SD) Short Physical Performance Battery score 9.7 (1.79)), 49.5% ($n=57$) reported functional disability associated with dyspnoea (mean Modified Medical Research Council dyspnoea score 1.7 (1.1)), 86.9% ($n=100$) reported abnormal fatigue (mean Fatigue Severity Scale score 5.6 (1.9)), 32.1% ($n=37$) reported poor sleep (mean Richard Campbell Sleep Questionnaire score 62.3 (22.7)), 33% ($n=38$) had probable presence of anxiety (mean Hospital Anxiety and Depression Scale (HADS) score 8.3 (6.0)) and 19.1% ($n=22$) had probable presence of depression (mean HADS score 5.6 (5.1)), with normal cognitive function (mean South African Brief Cognitive score 28.7 (1.4)). Sixty-four percent ($n=74$) reported moderate to extreme pain (mean EQ-5D-5L score 2.7 (1.0)), and 60% ($n=69$) reported moderate and severe problems with doing usual activities.

Conclusion. COVID-19 ICU survivors presented with physical, mental and sleep dysfunction 1 year after hospital discharge. Interventions are needed to address these healthcare needs.

Assessment of current practices of intrahospital transportation in critically ill patients at an academic hospital in South Africa

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Background. While many guidelines for safe intrahospital transportation (IHT) of critically ill patients exist in high-income countries, there is a paucity of standardised guidelines in resource-limited settings.

Objectives. To describe the current practices of safe IHT of critically ill patients perioperatively by anaesthetists in a quaternary hospital in South Africa.

Methods. We conducted a prospective, cross-sectional study including 101 IHTs between theatre and ICU. Approval was obtained from the institutional human research ethics committee (ref. no. M210708) and relevant authorities. An adapted questionnaire was completed by the most senior anaesthetist, and completion of the questionnaire implied consent. Chi-square/Fisher's exact tests were performed to identify associations between IHT practices and categorical variables with anaesthetist seniority and first and subsequent IHTs.

Results. The majority (72.97%) of the variables investigated were below the expected compliance rate (75%). Only 22.80% of anaesthetists were aware of IHT guidelines. There were statistically significant differences in IHT practices and anaesthetist seniority for the following: airway equipment taken (odds ratio (OR) 0.25; 95% confidence interval (CI) 0.08 - 0.84), emergency drugs taken (inotropes (OR 1.49; 95% CI 1.29 - 1.73), muscle relaxants (OR 5.81; 95% CI 1.70 - 19.83), induction agents (OR 7.23; 95% CI 1.86 - 28.13)), and awareness of IHT guidelines (OR 1.35; 95% CI 1.20 - 1.53); and between first and subsequent transfers for the following: notification of the current condition (OR 0.23; 95% CI 0.08 - 0.71), use of manual resuscitation bag (OR 3.64; 95% CI 1.21 - 11.00), and awareness of IHT guidelines (OR 0.14; 95% CI 0.04 - 0.49).

Conclusion. The majority of IHT practices interrogated during this study were below the expected compliance level, irrespective of the

seniority of the anaesthetist or the number of IHTs. Although this is multifactorial, resource limitations, lack of significance placed on IHT practices and education seem to be major contributors.

Rate, causes, characteristics and outcomes of intensive care refusal at Nelson Mandela Academic Hospital, Mthatha, South Africa

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Background. Patients who require intensive care unit (ICU) admission may be denied it owing to lack of resources, including trained personnel and beds, complicating ICU triage decisions. Data on ICU refusal rates and factors influencing refusal in resource-limited settings are scarce. **Objectives.** To ascertain ICU refusal rates and factors influencing refusal rates at Nelson Mandela Academic Hospital, Mthatha, South Africa.

Methods. This was a 3-month retrospective cross-sectional record review of refused and admitted patients from January to March 2022. Patients with COVID-19 and those aged <13 years were excluded. Refusal rates, reasons for refusal, and characteristics and outcomes of refused patients were analysed quantitatively using the Statistical Package for the Social Sciences (SPSS) version 20 software. Reasons for refusal were categorised as 'too well', 'too sick', and 'no resources'.

Results. A total of 135 patients were discussed for ICU admission during the study period; 73 (54.1%) were admitted and 62 (45.9%) were refused. Too sick to benefit from intensive care was the most common reason for refusal (53.2%). Too well and no resources contributed 27.4% and 19.4%, respectively. Poor functional status, comorbidities, medical diagnoses, and patients referred from the ward or the accident and emergency unit rather than the operating room were more likely to be refused. Refused patients had a 7-day mortality rate of 47%.

Conclusion. ICU services and tools to help clinicians make objective triage decisions are needed. Improved quality of services provided outside of the ICU for refused patients can improve their survival outcomes.

The use of multiplex polymerase chain reaction for the detection of respiratory pathogens in hospitalised adults with community-acquired pneumonia during the pre-COVID era in South Africa

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Background. *Streptococcus pneumoniae* is the leading cause of community-acquired pneumonia (CAP) worldwide and in people living with HIV (PLWH), who are at increased risk of severe pneumococcal disease. However, the concurrent viral epidemiology of CAP is less well described. Multiplex polymerase chain reaction pneumonia panels (MPPPs) increase the microbiological diagnosis of CAP.

Objectives. To describe respiratory pathogens detected by MPPPs

in adults admitted with CAP. Secondary objectives were to stratify pathogen distribution by HIV status, and to assess mortality risk.

Methods. In a substudy of the PotPrev trial (ethics ref. no. 171009), stored sputum specimens were analysed with the BioFire FilmArray MPPP. Samples were collected between August and December 2019 from adults hospitalised with CAP.

Results. In 146 samples analysed, MPPPs detected 261 pathogens in 116 patients (79.5%), 36.2% being atypical. Eight micro-organisms accounted for 85.4% of pathogens: *Haemophilus influenzae* (18.8%), *S. pneumoniae* (17.6%), *Mycobacterium tuberculosis* (MTB) (14.2%), rhinovirus (10.3%), *Staphylococcus aureus* (9.6%), *Moraxella catarrhalis* (8.8%), *Pneumocystis jirovecii* (PJP) (6.1%), and influenza (4.6%). A higher proportion of MTB and PJP were diagnosed among PLWH (22.4%) compared with the seronegative group (9.5%) ($p=0.058$). There were no differences in bacterial ($p=0.26$) or viral infection ($p=0.5$) or in mortality (7.5% v. 10.3%) ($p=0.6$) in PLWH compared with HIV-seronegative patients. Both groups had a 6-day median length of hospital stay (LoS) (range 4 - 11 days) ($p=0.96$). Survivors and non-survivors also had a similar LoS ($p=0.68$). Mortality risk with *Klebsiella pneumoniae* was 2.35-fold higher (95% confidence interval 1.11 - 4.99) compared with other pathogens.

Conclusion. The addition of multiplex PCR to the diagnostic work-up of CAP increased the microbiological detection rate to ~80%, with possible therapeutic implications.

Critical care resiliency during COVID-19-related capacity strain in a resource-limited setting: A report from South Africa

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Background. Hospital adaptation and resiliency during public health emergencies are understudied in resource-limited settings (RLSs).

Objectives. To measure pre-pandemic and pandemic critical illness epidemiology in an RLS in the context of capacity strain.

Methods. We performed a retrospective cohort study among patients admitted to intensive care units (ICUs) at two public hospitals in KwaZulu-Natal Province, South Africa, preceding and during the COVID-19 pandemic. We used multivariable logistic regression to analyse ICU capacity strain and ICU mortality among three patient cohorts (pre-pandemic non-COVID-19, pandemic non-COVID-19, and pandemic COVID-19).

Results. A total of 3 221 patients were admitted to the ICU during the pre-pandemic period and 2 539 patients were admitted during the pandemic period (375 (14.8%) with COVID-19 and 2 164 (85.2%) without COVID-19). Compared with the pre-pandemic non-COVID-19 cohort, the pandemic non-COVID-19 cohort had similar odds of ICU mortality (odds ratio (OR) 1.06; 95% confidence interval (CI) 0.90 - 1.25; $p=0.50$),

while the pandemic COVID-19 cohort had significantly increased odds of ICU mortality (OR 3.89; 95% CI 3.02 - 5.02; $p<0.0005$). ICU occupancy was not associated with ICU mortality in either the COVID-19 cohort (OR 0.99 per 10% change in ICU occupancy; 95% CI 0.93 - 1.06; $p=0.81$) or the pooled non-COVID-19 cohort (OR 1.01 per 10% change in ICU occupancy; 95% CI 0.99 - 1.04; $p=0.39$).

Conclusion. Pre-pandemic and pandemic non-COVID-19 ICU patients were broadly similar in clinical characteristics and outcomes, suggesting critical care resiliency, while pandemic COVID-19 ICU patients had important clinical differences and had significantly higher mortality.

POSTERS

The experiences of critical care nurses working in the private sector in Western Cape Province, South Africa, during the COVID-19 pandemic

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Background. The World Health Organization declared COVID-19 a pandemic on 11 March 2020. The pandemic caused significant subsequent global disruptions, especially in the healthcare sector, with an influx of critically ill patients and an increased demand for critical care beds, resulting in a severe shortage of beds and skilled critical care nurses (CCNs).

Objectives. To explore the experiences of CCNs working at private hospitals in Western Cape Province, South Africa, during the COVID-19 pandemic, to describe CCNs' experience of how the COVID-19 pandemic influenced caring for critical ill patients, and to describe CCNs' experiences of organisational management strategies during the COVID-19 pandemic.

Methods. A descriptive design with a qualitative approach was applied. Purposive sampling was used to select a sample size of 10 from a total population of 58. A pilot test was also completed. Data were analysed using Braun and Clarke's (2006) steps for thematic data analysis. Lincoln and Guba's criteria of credibility, transferability, dependability and confirmability were used to ensure trustworthiness. All ethical principles were met.

Results. Owing to a shortage of staff and personal protective equipment, CCNs could not provide holistic care. Despite the challenges faced during the COVID-19 pandemic, respondents reported personal and professional growth.

Conclusion. The COVID-19 pandemic had a significant global impact, and this was especially severe in the critical care environment.

The experiences of professional nurses in two private critical care units in Eastern Cape Province, South Africa, during the COVID-19 pandemic

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Background. Professional nurses working in critical care units during the COVID-19 pandemic experienced high levels of stress while caring for COVID-19 patients. Patients were critically ill, requiring respiratory support, management with advanced technological modalities, and knowledgeable and skilled nurses to care for them.

Objectives. To explore and describe the ongoing experiences of professional nurses, including the support they experienced, while working in two South African private critical care units during the COVID-19 pandemic in 2020 - 2022.

Methods. A qualitative, explorative, descriptive design was used. A purposive non-probability sampling method was used to collect data from 19 critical care professional nurses by means of in-depth, semi-structured interviews. Inductive thematic analysis, using Tesch's principles and ATLAS.ti, was applied to analyse the data. Ethical principles applied were based on the Declaration of Helsinki and the Declaration of Belmont.

Results. Professional nurses reported their experiences to be terrible, tough and traumatising, like a war zone. The intensive care environment became more stressful than before, with high levels of uncertainties due to lack of knowledge about the management of the disease, and increased traumatising effects from dealing with more frequent deaths than usual, lack of hospital management support, understaffing, lack of sufficient equipment, conflict with colleagues, lack of mental health support, changes in self-care priorities, and enhanced assertiveness.

Conclusion. Critical care professional nurses experienced economic, personal and environmental stressors while caring for COVID-19 patients. A lack of mental health support warrants further investigation and review of current employee wellness.

Nephrogenic diabetes insipidus after prolonged sevoflurane sedation in the ICU: A case report

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Background. Advances in technology have seen increased use of volatile anaesthetic agents (VAs) for sedation in the intensive care unit (ICU). The reporting of emerging complications will become increasingly important.

Case report. We report the case of a known asthmatic woman in her 20s admitted to an ICU for severe acute asthma without a clear precipitant, and requiring mechanical ventilation. Initial treatment included hydrocortisone, beta-2-agonist therapy, and infusions of ketamine, midazolam and cisatracurium. Upon cessation of the paralytic agent, ventilator dysynchrony ensued. Sevoflurane, favoured for its sedative and bronchodilator effects, was delivered using the Mirus system (Pall Medical, Germany), targeting a Richmond Agitation Sedation Scale score of -2 - 0 by administering an end-tidal concentration of 0.4 - 0.8 vol% of the VA. On day 8 of VA sedation, the patient developed features of nephrogenic diabetes insipidus (NDI) including polyuria, hypernatraemia, and elevation of plasma osmolarity without a response to desmopressin. There was no associated hyperglycaemia, hypercalcaemia or hypokalaemia.

A mild transaminitis was also noted. The introduction of tap water and aldactone with discontinuation of the VA resulted in resolution of the diabetes insipidus. Mechanisms postulated for sevoflurane-associated NDI include interruptions in aquaporin 2 expression and toxic metabolites from sevoflurane metabolism by cytochrome P450 enzymes. This study was approved by the University of the Witwatersrand Human Research Ethics Committee (Medical).

Conclusion. We report a rare incident of NDI associated with prolonged sevoflurane use in a patient with acute severe asthma, responding to discontinuation.

Nurse-reported perceptions of medication safety in private hospitals in Gauteng Province, South Africa

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Background. Medication administration errors remain a global patient safety problem targeted by the World Health Organization, yet research on this matter is scarce in the South African context.

Objectives. To explore and describe private sector nurses' perceptions on medication administration safety-related culture, incidence, causes and reporting in Gauteng Province.

Methods. Online surveys were utilised ($N=768$, $n=217$) in a quantitative research design. The Statistical Package for the Social Sciences (SPSS) was used for descriptive and inferential data analysis.

Results. Although teamwork within units (mean (standard deviation (SD)) 3.58 (0.89)) was deemed satisfactory, a punitive response to errors (mean 3.14 (0.96)) was highlighted. Of the respondents, 70.7% ($n=152$) reported working in 'crisis mode', while 61.6% ($n=133$) worried that their mistakes were recorded. More than half of the respondents (57.7%; $n=124$) reported long working hours as impacting on patient safety. Most respondents (80.7%; $n=175$) graded overall medication safety positively, with the exception perceiving medication administration errors as a daily problem (3.6%; $n=8$). Work overload (mean (SD) 3.38 (0.80)), high patient-nurse ratios (mean 3.28 (0.90)) and inadequate staffing (mean 3.25 (0.84)) were most often implicated as error inducing. Medication administration errors were reported most of the time (mean (SD) 3.76 (1.06)), irrespective of harm being caused or not. Fear (mean (SD) 3.80 (1.62)) and administrative response to errors (mean 3.70 (1.40)) were the major reasons for non-reporting. Correlations suggested that reasons for non-reporting of errors were affected by a non-punitive safety culture ($r=0.422 - 0.466$; $p<0.001$).

Conclusion. Medication administration safety improvement is contingent on fostering a non-punitive safety culture in units. Anonymous medication error reporting systems and auditing nurses' workload are recommended in the quest for improved medication safety in Gauteng private hospitals.

Sleep quality and quality work life of registered nurses practising in high-intensity work environments in an academic hospital in Gauteng Province, South Africa

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Background. High-intensity work environments are chaotic, strenuous and dynamic. Registered nurses practising in these environments are expected to render quality care to critically ill patients. Quality of sleep and a quality work life are therefore essential for nurses practising in high-intensity work environments.

Objectives. To explore the sleep quality and the quality of work life of registered nurses practising in high-intensity work environments in Gauteng Province, South Africa.

Methods. A qualitative descriptive design was used. Data were collected through three focus group discussions. Purposive sampling was used to select study participants. Thematic analysis was used to analyse data. Ethical clearance was obtained from the University of the Witwatersrand (ref. no. M210177).

Results. Six major themes emerged. For quality of sleep, these themes were physical and psychological barriers, compromised patient care, and coping mechanisms. Lack of resources, consequences of working under pressure, and support emerged under quality of work life. All the participants experienced inadequate sleep owing to physical and psychological barriers. The majority of the participants delineated the challenges of long working hours and high workload. They highlighted that staff turnover was attributable to low monthly income and high workload.

Conclusion. The study concluded that registered nurses working in high-intensity environments face various challenges, ranging from high workload to long working hours. These challenges affect the quality of sleep and quality of work life, leading to compromised patient care.

Sepsis in the developing world: A descriptive study in a tertiary intensive care unit

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Background. Sepsis is a major cause of morbidity and mortality in intensive care units (ICUs) worldwide. Data on the burden of sepsis in developing world settings are limited.

Objectives. To describe the burden and pattern of sepsis in a multidisciplinary ICU, including adult and paediatric patients.

Methods. We performed a retrospective observational chart review of patients admitted to our ICU at Chris Hani Baragwanath Academic Hospital for the year 2020. Patients who met diagnostic criteria for sepsis using the Sepsis-3 definition were included. Ethics clearance was obtained (ref. no. M190836).

Results. Of 878 admissions, 496 files were retrieved and screened. Sepsis was present in 279 patients (56.3%), of whom 204 (73%) were adults. The prevalence of sepsis was higher in paediatric patients (63%) compared with adults (54.1%). Septic shock occurred in 39.7% of patients. Sepsis was present at admission in more than 80% of patients. Cultures were positive in 140 patients (50.1%), Gram-negative bacteria predominating (65.7%). The incidence of multidrug-resistant/extensively

drug-resistant organisms was 2.4-fold higher (95% confidence interval 1.42 - 4.3) during the final sepsis episode compared with the initial sepsis episode. HIV prevalence was 25%, and positive HIV status was not associated with microbiological resistance or outcomes. The overall mortality was 13.6%, higher in patients with septic shock.

Conclusion. Sepsis is a common reason for admission to the ICU. Septic shock is associated with a five-fold increase in mortality. HIV infection did not affect resistance patterns or increase mortality. Gram-negative organisms predominated, with resistance increasing during the ICU stay. Paperless record keeping may limit missing records.

Nurses' knowledge, attitudes and practices of logrolling patients with spinal cord injury in the Western Cape metropole, South Africa

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Background. A spinal cord injury (SCI) is potentially life-threatening. Inconsistencies in logrolling practices and nursing practices, a lack of standard operating procedures (SOPs), staff shortages and differences in nurses' attitudes towards SCIs are of global concern.

Objectives. To determine nurses' knowledge of and attitudes towards SCI patients and logrolling of SCI patients, and to determine the practices of nurses when logrolling SCI patients.

Methods. A non-experimental, descriptive research approach was employed, and 304 nurses (all nursing categories) in two tertiary hospitals formed the study sample. Data were collected using a structured self-administered questionnaire. A pre-test was done with seven participants. These results were excluded from the final data analyses. Descriptive and inferential statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 27. All ethical principles were met.

Results. The results indicated that nurses generally had good KAP (knowledge, attitude and practices) scores: 88.5% had good knowledge, 93.1% had positive attitudes, and 81.9% had good practices. Only 23% of participants reported good management strategies, owing to low levels of training (41.1%), lack of SOPs (35.6%) and insufficient staff (48.4%). Registered nurses and those with more nursing experience were more likely to be knowledgeable ($p < 0.01$ and $p = 0.01$, respectively). Participants with positive attitudes were more likely to be knowledgeable ($p < 0.01$), to have positive practices ($p < 0.01$) and to report good management strategies ($p < 0.01$). There was no association between knowledge and practice ($p = 0.21$).

Conclusion. The results indicated good KAP scores. Insufficient training, lack of SOPs and staff shortages may lead to inconsistent practices.

Bed occupancy and nosocomial infections in the intensive care unit: A retrospective observational study in a tertiary hospital

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Background. Healthcare-associated infections (HAIs) are a major problem globally, contributing to prolonged hospital admissions and poor outcomes.

Objectives. To examine HAI incidence and risk factors in an intensive care unit (ICU) during high v. low occupancy periods.

Methods. A retrospective, descriptive analysis of HAIs among adult patients admitted to the ICU at Chris Hani Baragwanath Academic Hospital, Johannesburg, South Africa, during a high (H2019) and a low (L2020) occupancy period was conducted. Data were abstracted from the clinical records of 440 eligible patients. Approval from the university ethics committee was obtained.

Results. We found an increased risk of HAIs during H2019 compared with L2020 (relative risk 1.42; 95% confidence interval (CI) 1.03 - 1.94). The overall frequency density of HAI was 25/1 000 ICU days. There was no difference in the distribution of the site of infection (blood v. other) ($p=0.27$) or bacterial category (Gram stain) ($p=0.62$). Five organisms accounted for 89% of pathogens: *Klebsiella* 26%, *Staphylococcus* 21%, *Acinetobacter baumannii* 16%, *Candida* 16%, and *Enterobacter* 10%. The incidence of multidrug-resistant/extensively drug-resistant (MDR/XDR) organisms was 4.2-fold higher (95% CI 1.3 - 13.4) during H2019 compared with L2020. Using a logistic regression model, there were two independent predictors of nosocomial infection: ICU length of stay (odds ratio (OR) 1.12; 95% CI 1.02 - 1.22), and intercostal drain (ICD) duration in days (OR 1.27; 95% CI 1.09 - 1.47).

Conclusion. High occupancy was associated with an increased risk of HAI and a greater incidence of MDR and XDR pathogens. Increasing ICU length of stay and invasive device duration (ICD) were independent predictors of HAI.