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THE EFFECT OF BODY POSITION ON REGIONAL DISTRIBUTION OF VENTILATION IN INFANTS AND CHILDREN USING ELECTRICAL IMPEDANCE TOMOGRAPHY A Lupton-Smith, B M Morrow, A C Argent

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Introduction. Although the adult pattern of ventilation distribution towards the dependent lung is well established, recent neonatal studies contradict the common belief that ventilation preferentially distributes to the non-dependent lung in children. There are no recent applicable studies in older infants and children.

Aim. To determine the effect of body position on the regional distribution of ventilation in healthy children.

Methods. Thoracic electrical impedance tomography (EIT) measurements were taken in spontaneously breathing healthy children in supine and right- and left-side lying positions. Functional EIT images were produced offline and total regional relative tidal impedance (ΔZ) in the right lung (proportional to tidal volume) was calculated for each patient per position.

Results. We present preliminary data from the first 10 patients (5 male; aged 11 months - 6 years). Positional changes in ΔZ were highly variable. In left-side lying, mean ΔZ in the right lung was 11.4 (SD ± 6.6). Only 5 (50%) children followed the expected 'paediatric pattern' of ventilation in side lying.

Conclusions. The paediatric pattern of ventilation is not straightforward; research is underway to determine the associated role of age, disease state, pulmonary mechanics, respiratory muscle strength and individual variability.

OPEN VISITING: BELIEFS AND ATTITUDES OF INTENSIVE CARE CLINICIANS

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Background. Despite much research and discussion about intensive care unit (ICU) visitation over the last 25 years, the topic remains controversial. Three policies discussed in the relevant literature include open, restrictive and liberalised visiting policies.

Aim. To determine the beliefs and attitudes of ICU clinicians regarding visiting, visiting hours and open visiting in ICUs, to advise changes to existing policies in the best interests of patient care.

Methods. A quantitative, descriptive, comparative and contextual 2-phase study design was utilised, consisting of 3 steps. The study was conducted in the adult ICUs of a large quaternary public sector hospital in Johannesburg, Gauteng Province. Phase 1 (step 1) involved validation – judgement and quantification stage of the already developed data collection questionnaire, beliefs and attitudes towards visitation in an ICU questionnaire (BAVIQ) – using Lynn's model. Phase 1 (step 2) involved questionnaire restructuring according to the validation results. In phase 2 (step 3), the data collection stage, the restructured questionnaire was handed out to the comparative ICU clinicians for completion.

Results. There appeared to be similarities as well as significant differences between the beliefs and attitudes of ICU clinicians (doctors and nurses) and nurses (trained and untrained) regarding open visiting.

Conclusions. The majority of ICU clinicians claimed not to want to have an open visiting policy implemented in their unit. Their main concern was that such a policy would decrease staff and patient safety, especially in Gauteng Province.

PROSPECTIVE EVALUATION OF PATIENTS REFERRED FOR ADMISSION TO A SOUTH AFRICAN PAEDIATRIC INTENSIVE CARE UNIT: PATIENT PROFILES, REASON FOR ADMISSION OR REFUSAL, AND OUTCOME

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Background. Patients referred for paediatric intensive care unit (PICU) admission are triaged according to predetermined criteria, or clinicians' clinical judgement. Regular audit is needed for appropriate PICU resource utilisation.

Aim. To profile all patients referred for PICU admission, compare the outcome of admissions v. refusals, and document factors influencing triage decisions.

Methods. We performed a prospective observational single-centre study of all patients referred for PICU admission from 1 January to 30 June 2008.

Results. Referrals ($N=764$) included 618 admissions and 146 (19.1%) refusals. Sources: Red Cross War Memorial Children's Hospital (RCWMCH) – 82.5% (20% refused); Cape Town Metropole (excluding RCWMCH) – 14% (17% refused); rest of the Western Cape – 3.5% (15% refused). RCWMCH referrals: general medical wards – 30% refused; emergency/acute care services – 10% refused. Time of day: day – 75% of referrals (20% refused); night – 25% of referrals (12.7% refused). Urgency of referrals: elective – 32% of referrals (20.1% refused); emergency – 68% of referrals (18.6% refused). Reason for refusal: elective referrals – no beds available (98%); emergency referrals – no beds available (50%), futile/too ill (25%), not ill enough (25%). Outcome: hospital mortality – 15.3% (admissions); 8.1% (refusals).

Conclusion. The mortality of PICU admissions and refusals was similar. The main reason for refusal was limited PICU bed space.

SOUTH AFRICAN CRITICAL CARE NURSES' VIEWS ON END-OF-LIFE DECISION-MAKING AND PRACTICES

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Background. Patient care at the end of life (EOL) may be influenced by the experiences, attitudes and beliefs of nurses involved in this care.

Aim. To investigate the experiences and perceptions of South African (SA) critical care nurses in EOL care.

Methods. A cross-sectional study design was used. SA critical care nurses completed a modified version of the VENICE survey tool. Data were collected concerning attitudes toward EOL care, involvement in EOL decision-making, and beliefs about EOL practices.

Results. Of 149 distributed surveys, 100 were completed (67% response rate); 76% of nurses had direct involvement in EOL patient care, but only a minority (29%) had participated in EOL decision-making processes. Most nurses (86%) were committed to family involvement in EOL decisions, but less than two-thirds (62%) reported this as routine practice. When withdrawing treatment, approximately half (54%) of the respondents indicated that they would decrease the inspired oxygen level to room air, and the majority (84%) recommended giving effective pain relief. Continued nutritional support (84%) and hydration (85%) were advocated, with most nurses (62%) indicating being against keeping patients deeply sedated. Most respondents (68%) felt EOL patients should remain in intensive care, with the majority (72%) supporting open-visiting, no restriction on the number of visiting family members (70%), and the practising of religious or traditional cultural EOL rituals (93%).

Conclusions. The involvement of Johannesburg critical nurses in EOL care discussions and decisions is infrequent, despite their participation and definite views about the process.

Relevance. Formal guidelines and education are recommended to increase the involvement and confidence of nurses in EOL decisions. The multi-disciplinary team (consisting of educators, managers, senior nurses, etc.) should collaborate to enable critical care nurses to become more involved in EOL care.

HOW PROFICIENT ARE NIGERIAN-TRAINED PHYSIOTHERAPISTS IN CARDIOPULMONARY SKILLS NEEDED IN CRITICAL CARE

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Introduction. The need for physiotherapy in critical care cannot be over-emphasised; in particular, cardiopulmonary physiotherapy – an essential non-invasive intervention that can mitigate or reverse insults on oxygen transport. Cardiopulmonary physiotherapists are involved in the management of cardiopulmonary conditions from intensive care to community level.

Aim. To investigate the proficiency of physiotherapists in southwestern Nigeria in cardiopulmonary physiotherapy skills and techniques.

Methods. A total of 65 participants from 7 selected hospitals in southwestern Nigeria participated in the study. Data were collected via a 3-tiered questionnaire developed by the researcher and validated (face and content validity).

Results. Twelve (18.4%) participants rated themselves 'good' and 'excellent' in more than 10 (>50%) of the basic cardiopulmonary physiotherapy skills and techniques. Six (9.2%) participants employed more than 10 (76.9%) of the basic cardiopulmonary assessment tools. Insufficient knowledge and lack of proficiency in cardiopulmonary physiotherapy techniques and skills were barriers to critical care among the physiotherapists.

Conclusions. Physiotherapists in southwestern Nigeria are not proficient in the cardiopulmonary skills and techniques needed in critical care. There is need for an improved curriculum to facilitate appropriate training.

CHALLENGES IN THE MANAGEMENT OF A LARGE CRITICAL CARE UNIT

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Background. Critical care unit (CCU) nurses are regularly exposed to the demands of fulfilling the many roles expected of them. In particular, unit managers are responsible for the efficient management of units.

Objective. To explore and describe the challenges experienced by CCU managers in the management of large CCUs.

Methods. We used a qualitative approach, with an exploratory and descriptive design. A purposive sample of CCU managers was selected from a population of registered critical care nurses working in large CCUs in selected hospitals in Gauteng Province. Audio-taped in-depth individual interviews were conducted and open coding was used to analyse the transcribed data.

Results. The problems associated with large CCUs relate to unit size, and encompassing characteristics such as physical layout and environment, which lead to challenges in planning according to staffing shortages, insufficient provision of equipment and supplies, and organising and co-ordinating processes of care.

Conclusion. Challenges identified call for multiple strategies to help unit managers manage large CCUs efficiently.

DEVELOPMENT AND IMPLEMENTATION OF A MULTI-CENTRE INTENSIVE CARE UNIT DATABASE

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Introduction. Critical care medicine is a developing specialty in South Africa. Increasing pressure on healthcare budgets and the implementation of the National Health Insurance (NHI) support an evaluation of current intensive care unit (ICU) practices and resources. Data are required to assist with this appraisal, as well as aid with audit, research and quality improvement.

Objectives. To develop and implement a free customisable database for adult critical care units that assists with data collection, is easily incorporated into daily ICU practice, and can be used at multiple sites.

Methods. The database was developed without funding over 2 years with the help of computer programmers.

Results. Initial data collection has enabled accurate tracking, collection and analysis of referrals, admissions, discharges and clinical data. The database is customisable, can incorporate data from multiple centres, and generate referral, admission, and discharge summaries.

Conclusion. Development of the database was successful. Early results indicated that it will enable collaborative research between multiple ICUs, thereby supporting the development of critical care medicine in South Africa.

HOSPITAL-ACQUIRED INFECTIONS IN PAEDIATRIC POST-OPERATIVE CARDIAC PATIENTS IN A SOUTH AFRICAN PAEDIATRIC INTENSIVE CARE UNIT

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Introduction. Hospital-acquired infections (HAIs) are a major cause of morbidity and mortality following paediatric cardiac surgery.

Aim. To determine the incidence, risk factors and outcomes of post-operative HAIs.

Methods. We performed a prospective observational review of all post-operative cardiac patients admitted to the paediatric intensive care unit (PICU) of the Red Cross War Memorial Children's Hospital from September 2011 to March 2012.

Results. A total of 110 patients were enrolled; 43% were male, median age was 19 months, and the cohort underwent 126 surgical procedures. Nine patients (8.2%) died; 6 had HAIs ($p=0.2$). Sixty HAIs (mainly bacterial; 68.3% pulmonary; 13.3% blood; 11.7% wound; 3.3% urine; and 3.3% tissue) occurred in 43 (39%) patients. Multivariate analysis revealed an association between HAIs and factors including underweight for age (adjusted odds ratio (OR) 4.07; 95% confidence interval (CI) 1.23 - 13.48; $p=0.02$), low cardiopulmonary bypass temperature (OR 0.86; 95% CI 0.75 - 0.98; $p=0.03$), increased duration of arterial lines (OR 1.51; 95% CI 1.04 - 2.20; $p=0.03$) and intercostal drain (ICD) (OR 1.29; 95% CI 1.014 - 164; $p=0.04$). Patients with HAIs spent a median of 6 (IQR 4 - 13) and 21 (IQR 9 - 38) days in PICU and hospital, compared with 3 (2 - 5) and 9 (7 - 13) days in uninfected patients ($p<0.0001$).

Conclusions. HAI incidence was high in the study population; associative factors were identified, with significant resource and clinical implications.

AN AUDIT OF THE QUALITY OF INITIAL TRAUMA RESUSCITATION IN A REGIONAL HOSPITAL

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Introduction. The initial appropriate resuscitation of trauma patients impacts positively on their subsequent clinical course.

Aim. To review the quality of initial trauma resuscitation in a regional hospital and determine quality indicators to measure improvements after potential interventions.

Methods. We performed a prospective descriptive study of all trauma patients who were admitted to the intensive care unit and received initial resuscitation in our institution. Admission notes were reviewed independently by 2 investigators not involved in the initial patient management.

Results. A total of 100 cases were audited. Cervical spines were assessed with appropriate collar placement in 26%; airway assessment was performed in 25%; oxygen was administered to 20 patients; pulse and blood pressure measurements were performed in >75%; and GCS was assessed in 75% of patients. Temperature was not assessed in a single patient. Intravenous lines were inserted in 56%; 45% received fluids. A urinary catheter was inserted in 52% of patients; 2 patients had urine output measured.

Conclusion. Although poor record-keeping made accurate assessment of the quality of resuscitation difficult, it appeared that the doctors in our study were unable to assess and manage acutely ill trauma patients.

INCIDENCE OF COMPLICATIONS AFTER IMPLEMENTATION OF AN INTUBATION CHECKLIST IN A SOUTH AFRICAN PAEDIATRIC INTENSIVE CARE UNIT: A RETROSPECTIVE AUDIT

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Introduction. Children admitted to paediatric intensive care units (PICUs) frequently require endotracheal intubation and mechanical ventilation. Accurate assessment and safe airway management is fundamental to the care of critically ill children. In July 2010 an intubation checklist was introduced as a clinical improvement measure.

Aim. To audit the incidence, risk factors and outcome of peri-intubation complications after implementation of the standardised pre-intubation safety checklist.

Methods. A retrospective descriptive study was performed of all children undergoing intubation in PICU from July to December 2010.

Results. One hundred and twenty-eight patients (56.25% male; median age 5.3 months, IQR 1.9 - 18.4) underwent 157 intubations in 134 PICU admissions. The mortality rate was 13.4%; no deaths were directly related to intubation events. The checklist was completed in 68.2% of cases. Reasons for non-completion were not available. Patients had a median predicted mortality of 0.07 (IQR 0.03 - 0.17) in the absence of completed checklists, compared with 0.12 (0.05 - 0.25) in cases where checklists were completed ($p=0.02$). One hundred and eleven complications occurred in 60 intubations (38%) with completed checklists. Desaturation was most common ($n=52$, 46.8%). Patients experiencing peri-intubation complications were older than those without complications (4.2 (2.6 - 8.4) v. 1.7 (0.6 - 4.8) months; $p=0.001$).

Conclusions. Peri-intubation complications occurred frequently. Intubation checklist completion should become standard of care.

THE HI-MAP SCAN: USE OF EMERGENCY ULTRASOUND TO EVALUATE HYDRATION STATUS IN UNSTABLE PATIENTS

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Background. The HI-MAP scan is a focussed ultrasound examination designed to assess patient hydration status by looking at the heart, inferior vena cava, abdomen, aorta and chest. This non-invasive tool can assist in early accurate diagnosis of critically ill patients in the emergency department (ED).

Aim. To demonstrate the use of the HI-MAP scan in a regional ED in KwaZulu-Natal in assessing the hydration status of critically ill patients.

Methods. We performed a cross-sectional retrospective descriptive study of HI-MAP scans performed on haemodynamically unstable patients admitted to the Ngwelezane Hospital ED from January 2010

to October 2011. Diagnosis before and after ultrasound, times and specific ultrasound findings were documented and analysed.

Results. When clinical provisional diagnosis was compared with final diagnosis after ultrasound in the 133 included participants, 87 patients had the same diagnosis and 46 had a different diagnosis confirmed by HI-MAP. In fluid-overloaded patients (e.g. cardiac failure) 95% had poor contractility or an inferior vena cava collapsibility index (IVC-CI) <25%. Among hypovolaemic patients, 96% had either hyperdynamic cardiac contractility or an IVC-CI <50%.

Conclusion. The HI-MAP scan is a good non-invasive tool for volume assessment; cardiac contractility and IVC-CI are the 2 most sensitive components predicting hydration status.

CHANGES IN B-TYPE NATRIURETIC PEPTIDE AND RELATED HAEMODYNAMIC PARAMETERS FOLLOWING A FLUID CHALLENGE IN PATIENTS WITH SEVERE SEPSIS OR SEPTIC SHOCK

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Aim. To describe the haemodynamic changes and relate them to changes in B-type natriuretic peptide (BNP) following a fluid challenge in patients with severe sepsis and septic shock.

Methods. In this prospective observational study, 30 patients with severe sepsis or septic shock who required a fluid challenge within 48 hours of intensive care unit (ICU) admission were enrolled. A basic cardiac echocardiogram, BNP blood test and baseline haemodynamic measurements were performed for each patient. A 500 ml colloid challenge was administered within 30 minutes, at which point the echocardiogram and haemodynamic measurements were repeated. The BNP test was repeated 1 hour after the fluid challenge.

Results. One patient was excluded due to missing data. There were significant increases in mean arterial pressure (MAP), left ventricular dimensions at the end of diastole and systole, stroke volume (SV), cardiac output (CO) and BNP after the fluid challenge, while heart rate decreased. Impaired cardiac contractility was defined as an ejection fraction (EF) <50%. The left ventricular end systolic dimension (LVESd) before (4 cm v. 2.9 cm) and after the fluid challenge (4.2 cm v. 3.29 cm) was significantly greater (statistically and beyond reference intervals) in the EF <50% group than in the EF >50% group. In the EF <50% group, the median LVEDd2 and LVESd2 post fluid challenge increased to 5.72 cm and 4.28 cm, respectively (above the reference thresholds). In the EF >50% group, the median post challenge LVEDd2 and LVESd2 increased significantly ($p=0.01$) to 5.38 cm and 3.39 cm, respectively (within the reference thresholds). BNP increased by 53.6% in the EF <50% group, in contrast to a decrease by 12.7% in the EF >50% cohort. The median EF was significantly different between groups (0.44 in the EF <50% group v. 0.66 in the EF >50% group). Multiple regression analysis revealed that LV dimension at end diastole at baseline was 1 of 4 independent predictors of BNP increase.

Conclusions. A significant BNP increase after a fluid challenge (irrespective of initial value) may indicate that cardiac contractility

is impaired and the left ventricle is dilated, indicating a strategy away from fluid resuscitation and towards inotrope use.

RAPID, DIRECTED AND NON-SEDATING ANALGESIA IN THE EMERGENCY DEPARTMENT – CAN EMERGENCY PHYSICIANS USE ULTRASOUND-GUIDED NERVE BLOCKS SAFELY AND EFFECTIVELY?

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Background. Doctors in emergency departments are often faced with patients with significant limb injuries, necessitating large doses of sedating analgesia for procedures and pain control. However, the use of non-sedating regional analgesia is underutilised. The addition of ultrasound to guide regional analgesia techniques, offers a rapid, safe and effective method of pain control.

Aim. To assess the effectiveness of regional anaesthesia under ultrasound guidance for pain control in emergencies.

Methods. A prospective observational outcome study was performed using ultrasound-guided regional nerve blocks for pain control in patients presenting to the Ngwelezane Emergency Department with limb trauma or infection. The absence of pain at rest following a nerve block and during a procedure, were the primary and secondary outcome measures, respectively. Analgesic effect was assessed at 10 and 30 minutes post nerve block.

Results. Of 112 patients, 67 and 45 had upper and lower limb injuries, respectively. The majority of upper limb nerve blocks (36/42) were indicated for procedural analgesia. In contrast, the majority of lower limb nerve blocks (39/45) were indicated for analgesia at rest only. The primary end-point was reached in 98.2% of all nerve blocks; reaching the secondary end-point was lower at 91%. No serious adverse events were recorded.

Conclusion. Ultrasound-guided regional anaesthesia is a safe, rapid and effective means to provide pain relief to patients with limb injury. A wide range of limb injuries can be adequately managed for pain control using ultrasound-guided regional nerve blocks in a busy emergency department.

DEMOGRAPHICS OF INTENSIVE CARE UNIT ADMISSIONS IN A BUSY REGIONAL HOSPITAL IN WESTERN KWAZULU-NATAL

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Background. The intensive care unit (ICU) at Edendale Hospital has 6 ventilated beds and provides general critical care that serves a population of 3 million.

Aim. To conduct a detailed study on the demographics of patients admitted to our ICU.

Methods. A prospective database was retrospectively interrogated. All admissions from December 2010 to December 2011 were reviewed.

Results. Admissions totalled 534 over the 12-month period: 294 (55%) were male and 240 (45%) were female; mean age was 35.3 years; 47.2% were local patients, 24.3% were from the drainage peripheral hospitals, and 27% were from other areas. Admission by speciality: 40% trauma (215), 28% surgery (148), 18% medicine (96), 13% obstetrics and gynaecology (69) and 1% burns (7). Mean length of stay was 4.6 days. Bed occupancy rate was >90% at any one time. The mean time on ventilation was 6.8 day. Overall mortality was 20%; deaths included 41% local patients (44/108) and 59% peripheral hospital patients (64/108).

Conclusion. Surgical diseases continue to represent a significant burden, with trauma-related diseases being the most common reason for admission. This represents a significant proportion of workload in an already resource-limited general ICU. Investment in a more specialised trauma surgical intensive care service may allow better utilisation of current resources.

A COMPARISON OF CONTINUOUS AND INTERMITTENT ENDOTRACHEAL TUBE CUFF PRESSURE MEASUREMENTS IN AN ADULT INTENSIVE CARE UNIT

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Background. Most patients admitted to an intensive care unit (ICU) require endotracheal intubation. Endotracheal tubes with cuffs are commonly utilised as they provide a better seal to facilitate ventilation and minimise aspiration. Cuff pressure (P_{cuff}) is monitored in order to prevent under- or over-inflation.

Aims. To establish the most reliable standard method for monitoring endotracheal tube P_{cuff} in an ICU.

Methods. The study was conducted at the King Edward VIII Hospital ICU among adult patients undergoing prolonged ventilation. Consent was obtained from each patient's next of kin. P_{cuff} was recorded in 2 ways simultaneously for 12 hours during the day; 3 times using the mechanical manometer and continuous monitoring using a pressure transducer. Factors causing changes in P_{cuff} were documented.

Results. Seventeen of 35 subjects were studied for the entire 720-minute period (mean 667 minutes). Of continuous P_{cuff} readings, 64%, 13% and 23% were within, below and above the recommended range (20 cmH₂O - 30 cmH₂O), respectively. The most frequently encountered events causing pressure changes were body movement (26.2%), coughing (20/1%), head movement (19.2%) and suctioning (9.4%). Of intermittent P_{cuff} readings, 83%, 12% and 5% were within, below and above the recommended range, respectively. The correlation between simultaneous intermittent and continuous reading was $r=0.87$.

Discussion. Continuous monitoring indicated that P_{cuff} varied extensively during mechanical ventilation in critically ill patients. A good correlation between intermittent and continuous readings was demonstrated; therefore, differences were not due to measuring techniques. However, P_{cuff} variations would not have been detected with intermittent monitoring. Hence, pressure changes may be detected early with continuous monitoring.

Conclusion. Continuous P_{cuff} monitoring during mechanical ventilation in ICUs is recommended for all patients. If intermittent monitoring is used, it should be performed more frequently.

SUCCESSFUL EXTENDED PRONE POSITION VENTILATION IN A MORBIDLY OBESE PATIENT WITH AN OPEN ABDOMEN AND UNSTABLE SPINAL FRACTURES

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Background. Prone positioning, an advanced technique of mechanical ventilation, is reported to reduce mortality in severe acute respiratory distress syndrome (ARDS) ($\text{PaO}_2/\text{FiO}_2$ ratio <100 mmHg) by 10%. An open abdomen is a relative contra-indication, and few studies have assessed extended proning. We present a case of a trauma patient who required 8 episodes of prone ventilation (each 24/48 hours) with open abdomen, requiring 10 relooks at the intensive care unit (ICU) of Union Hospital Trauma Unit.

Case. A morbidly obese 41-year-old male (body mass index of 42 kg/m^2) sustained serious injuries in a car crash (acetabular fractures, diastasis of the pubis and sacroiliac joints, extraperitoneal bladder neck rupture and unstable L2 fracture, normal spleen and no abdominal fluid). One week after admission he deteriorated suddenly, with acute abdomen and shock, and computed tomography revealed a shattered spleen and large amount of abdominal free fluid, requiring splenectomy. Two days later he could not be ventilated, with a $\text{PaO}_2/\text{FiO}_2$ ratio of 74. Prone ventilation was performed for 48 hours with good improvement. At day 10 he developed a large pancreatic collection and wound dehiscence, requiring a relook laparotomy, drains and open abdomen. After 9 subsequent relooks, 7 further pronings, ocreotide and sepsis management, he could be meshed and grafted. The patient was discharged following 4 months in intensive care and 30 kg of weight loss.

Conclusion. This case illustrated the viability of prone ventilation despite open abdomen, unstable spine and morbid obesity.

DEVELOPMENT OF STANDARDS FOR PAEDIATRIC EMERGENCY CARE IN CAPE TOWN

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Objectives. To develop consensus standards for paediatric emergency care, for quality assurance and improvement, and to facilitate a parallel research endeavour looking at pathways to care in paediatric critical care.

Methods. A taskforce group was formed with representation from all involved in paediatric emergency care to develop standards.

Results. A set of standards, applicable to all levels, was developed, with focus on emergency conditions that commonly involve an ultimate critical care element, under the following subsections: reception and resuscitation, gastro-enteritis, respiratory distress, septic shock, coma/convulsions, polytrauma/head injury, burns, and referral and intensive care unit access.

Discussion. The consensus standards reached and the accelerated process represent a meaningful tool for audit and quality assurance. By involving all role-players at an early stage in the consensus process, the standards were given local credibility and attainability.

Conclusion. We present a set of standards which will spur the development of further standards, allow objective quality assurance, and facilitate research into the healthcare system, consequently improving the quality of paediatric emergency care in the Western Cape province.

OXIDATIVE STRESS AND VITAMIN C STATUS IN SEPTIC SHOCK

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Background. Severe sepsis features oxidative stress and diminished vitamin C status. Vitamin C is important in maintaining endothelial function in sepsis. Uncontrolled hyperglycaemia contributes to endothelial vitamin C depletion through competitive utilisation of shared glucose transporters. Plasma glucose: vitamin C ratio therefore seems important for endothelial function in septic shock.

Aim. To investigate vitamin C status and oxidative stress in septic shock patients receiving inotropes.

Methods. In a prospective cross-sectional study, blood from patients with septic shock was analysed for vitamin C levels and thiobarbituric acid-reactive substances (TBARS), markers of oxidation.

Results. Pilot results ($n=7$) indicate low median (IQR) plasma vitamin C levels (4.6 (2.8 - 13.2) $\mu\text{mol/l}$) and high median (IQR) TBARS (7.9×10^{-7} (1.7×10^{-7} - 2.3×10^{-6}) nmol/l) upon development of septic shock. Plasma vitamin C levels did not recover to the normal range within 5 days of cessation of inotropes (9.2 (7.2 - 12.4) $\mu\text{mol/l}$), and TBARS remained high (4.1 (9.9×10^{-8} - 6.4×10^{-7}) nmol/l). Baseline sequential organ failure assessment (SOFA) score correlated with TBARS ($r=0.79$, $p=0.03$) as did the plasma glucose: vitamin C ratio with inotrope requirements ($r=0.63$, $p=0.1$).

Conclusion. A high glucose: vitamin C ratio is associated with an increased inotrope requirement. Oxidative stress with depleted vitamin C persists after septic shock.

DRAMATIC DECREASE OF VENTILATION-ASSOCIATED PNEUMONIA RATES BY PREVENTIVE BUNDLE STRATEGIES

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Background. Ventilator-associated pneumonia (VAP) is a leading cause of morbidity and mortality in intensive care units (ICUs). The use of preventive bundle strategies has been shown to decrease VAP rates.

Objective. To evaluate the feasibility of preventive bundle strategies in decreasing VAP rates and the workload of ICU staff.

Methods. Despite optimal care, VAP rates were high in our centre. Analysis of the literature on bundle strategies highlighted various points of consideration. We selected a strategy including nearly all considerations: hand-hygiene, isolation, subglottic aspirations, proper endotracheal tube size, cuff-pressure control, HME filters, closed-loop suction, re-intubation avoidance, preference of non-invasive mechanical ventilation, orogastric instead of nasogastric-tubing, sedation deceleration/cessation protocols, avoidance of paralytics, weaning protocols, HOB at least 30 degrees, aspiration before movement, enteral instead of parenteral-nutrition, oral hygiene care, sucralfate instead of proton pump inhibitors (PPIs)/H2RB, limited transfusions, deep-vein thrombosis prophylaxis and moderate glycaemic control. With each of the 20 items of consideration assigned 1 point each, a score of at least 15 was advocated for each patient. Staff satisfaction and work burden were assessed by a 5-point scale.

Results. Mechanical ventilation rates were the same for the 4 months of the study (68 - 72%), but strictly-obeyed bundle considerations significantly decreased VAP rates from 48.8 to 2.1 ($p < 0.001$). There was no significant decrease in staff satisfaction in terms of extra workload (3.7 v. 3.3).

Conclusion. Stringently obeyed preventive VAP bundle strategies show success in lowering VAP rates to near zero, but do not increase the workload burden of staff.

THE OPINION OF PATIENTS AT A LOCAL SOUTH AFRICAN TEACHING HOSPITAL ON PHYSICIAN-INDUSTRY RELATIONS

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Objectives. The physician-patient relationship is built on trust, with an understanding that the physician will act ethically and in the patient's best interest. This is violated when physicians make patient management decisions motivated by desire for personal gain. Gift giving is commonly used by the pharmaceutical industry to influence physician prescribing and procurement.

Aim. To determine how patients at a regional state hospital perceive the practice of physicians accepting gifts from the pharmaceutical industry.

Methods. A questionnaire was administered to 200 post-operative adult patients at Greys Hospital, Pietermaritzburg, South Africa.

Results. Most patients (62%) felt that it was unacceptable for physicians to accept gifts from a pharmaceutical company; 80% believed doctors were influenced by this practice; and 81% preferred to be cared for by a doctor who had no relationship with/did not accept gifts from pharmaceutical companies.

Conclusion. The majority of patients did not agree with the practice of gift giving, particularly that which leads to personal

gain for physicians. Patients believed that this influenced physicians' decision-making, and would prefer to be cared for by physicians without ties to the pharmaceutical industry.

CONFIDENTIAL INQUIRY OF MATERNAL MORTALITY AND MORBIDITY FROM UNSAFE ABORTIONS IN STEVE BIKO ACADEMIC HOSPITAL

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Aims. (i) To perform a confidential enquiry into severe acute maternal mortality and morbidity due to unsafe abortions; (ii) to determine adherence to a strict protocol approach in managing patients with unsafe abortion; and (iii) to determine the number of organ systems affected in both maternal near-miss and maternal death patients.

Methods. Data were collected from the medical records of patients who fulfilled the criteria of severe acute maternal morbidity (maternal near-miss) and maternal death from unsafe abortions at Steve Biko Academic Hospital from 2008 to 2010.

Results. There were 38 cases of maternal near-misses from unsafe abortions and 12 cases of maternal deaths in mothers less than 20 weeks pregnant. From the 12 maternal deaths, 3 were excluded because of death from unrelated causes. The mortality index was 24%. The average shock index (SI) of the maternal near-miss patients was above 1 pre-operatively in 61% of cases; this improved in 58%, deteriorated in 29% and remained the same in 5%. The average SI of the maternal death patients was above 1 in 100% of cases pre-operatively or prior to death; this improved in 44% and deteriorated in 56%. A speculum examination was performed in 11% of maternal death patients and 32% of maternal near-miss patients. Five (13%) maternal near-miss patients and 2 (22%) maternal death patients had a complete systematic evaluation. An average of 5 and 2 organ systems per patient were affected in maternal death and maternal near-miss patients, respectively.

Conclusion. Patients who died from unsafe abortions were severely ill on presentation, with an average of 5 organ systems/patient (more than double that of the maternal near-miss patients). The management of patients following unsafe abortions, especially those with septic shock, remains suboptimal; only 5 maternal near-miss patients (13%) and 2 maternal death patients (22%) had a complete systemic evaluation according to the strict protocol approach.

DEVELOPMENT OF A HOSPITAL DISASTER PLAN AND TRAINING EXERCISES FOR CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL AND RESOURCE-LIMITED COUNTRIES

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Background. Chris Hani Baragwanath Academic Hospital (CHBAH), the largest in the Southern Hemisphere (2 900 beds), was designated

as the main disaster hospital for the 2010 FIFA Soccer World Cup in South Africa. Nominal disaster plans existed, without disaster training or exercises and with severe financial and human resource limitations.

Methods. The Trauma Directorate developed a new plan for the world cup, and future mass casualty incidents at CHBAH and other resource-limited hospitals. The plans were centred on 5 critical issues: (i) preparation of hospital structure and staff; (ii) plan dissemination; (iii) disaster training; (iv) development of 3-tier 'disaster bags'; and (v) development of a real-time disaster simulation programme to test staff and resource preparedness and availability.

Results. A public-private partnership ensured the acquisition of 350 'disaster bags', and over 400 staff members were trained in in-hospital triage and trauma management via a free disaster course. All hospital staff members were allocated specific disaster functions. Simulated in-patient scenarios (350 in total) were developed to test resources for 72 hours.

Conclusions. This is the first time that CHBAH has had an integrated disaster plan, with separate equipment allocation, through private funding and involving all disciplines. This plan, together with exercise and training modules, aims to provide a reproducible model for resource-limited countries and institutions.

THE USE OF WEANING AND EXTUBATION PROTOCOLS TO FACILITATE WEANING AND EXTUBATION FROM MECHANICAL VENTILATION

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Background. Prolonged mechanical ventilation (MV) is associated with multiple complications and significant increases in infection and mortality.

Aims. (i) To determine whether use of a therapist- and nurse-driven weaning protocol to wean and extubate patients from MV results in decreased time of MV and ICU stay; and (ii) to assess the time to spontaneous breathing trial (SBT) failure.

Methods. A prospective 28-patient cohort, weaned according to protocol, was matched retrospectively for age, gender, type and severity of injury (ISS) with a same-sized cohort weaned according to physician preference.

Results. No statistically significant difference was observed in the number of days spent on MV ($p=0.3$; 14.4 days v. 16.3 days) or in the ICU ($p=0.9$; 20.8 days v. 21 days). The re-intubation rate was similar for both groups (3/28 v. 4/28). Patients who failed SBT had greater ISS (16.1 v. 14.5) and spent longer on MV (20.5 v. 14.4 days) than the average phase I patient. The reduction in time spent on MV was not statistically significant, but was clinically significant in view of complications associated with prolonged ventilation. Sicker patients were more likely to fail SBT later in the trial.

Conclusions. The role of physiotherapists and nurses in weaning patients from MV could be expanded in South Africa.

THE USE OF SURFACTANT AS A THERAPEUTIC INTERVENTION IN HYDROCARBON PNEUMONITIS

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Case report. A 16-month-old boy with hydrocarbon pneumonitis presented with acute respiratory distress syndrome (ARDS), haemodynamic instability and encephalopathy. He had poor oxygenation with both conventional ventilation and recruitment manoeuvres, as well as high frequency oscillation. His oxygenation index was 92 at 2 hours post admission to the intensive care unit. Early intra-tracheal surfactant administration (25 mg/kg beractant), accompanied by prone positioning, resulted in an improvement in oxygenation index, haemodynamic parameters and chest x-ray appearance. His oxygenation index improved to 32 by 1 hour post surfactant, 24 by 24 hours and 4 by 48 hours. A second dose of surfactant was not administered. Complications arose with pulmonary haemorrhage on day 3 and seizures on day 4, but the patient was successfully extubated on day 7 with no residual lung disease. Compared with only 2 published case reports of surfactant administration with hydrocarbon pneumonitis, differences in our case were: (i) higher initial oxygenation index; (ii) earlier administration of surfactant (<5 h); (iii) surfactant administration was combined with high frequency ventilation and prone positioning; and (iv) a smaller dose of surfactant was administered (25 mg/kg).

THE BURDEN OF DELIBERATE SELF-HARM ADMISSIONS ON THE CRITICAL CARE UNIT OF A TYPICAL SOUTH AFRICAN PERI-URBAN REFERRAL HOSPITAL: A 5-YEAR REVIEW

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Background. The Eastern Cape (EC) has the highest probability of its populace performing deliberate self harm (DSH) and has a shortage of critical care beds.

Objective. To review DSH admissions to the critical care unit (CCU) of a large peri-urban hospital in the EC over a 5-year period.

Methods. DSH admissions at Cecilia Makiwane Hospital (CMH) CCU between 1 January 2006 and 31 December 2010 were retrospectively reviewed. Patients aged <13 years were excluded. The cost of DSH admissions was estimated using the Department of Health 2012 fee schedule.

Results. During the 5-year period, 419 DSH patients were admitted to the CCU (17% of total CCU admissions). Cholinesterase inhibitors (CI) were the most common agents (55%) used in DSH. CI patients had lower mortality ($p=0.0344$) but double the admission time compared with the combined non-CI groups ($p<0.0001$). No significant difference was found between gender and survival ($p=0.5725$) or between the yearly admission means ($p=0.052$). CI cases cost a minimum of R15 966.29 per admission. DSH CCU cases cost in excess of R1 000 000 per annum.

Conclusion. DSH exerts a burden on the EC CCU services. There is need for improved control of unregulated CI availability (and

related public education) and improved psychiatric and psychological services in the rural areas.

INTRODUCING THE CENTRAL-LINE-ASSOCIATED BLOOD STREAM INFECTION (CLABSI) BUNDLE IN CRITICAL CARE UNITS

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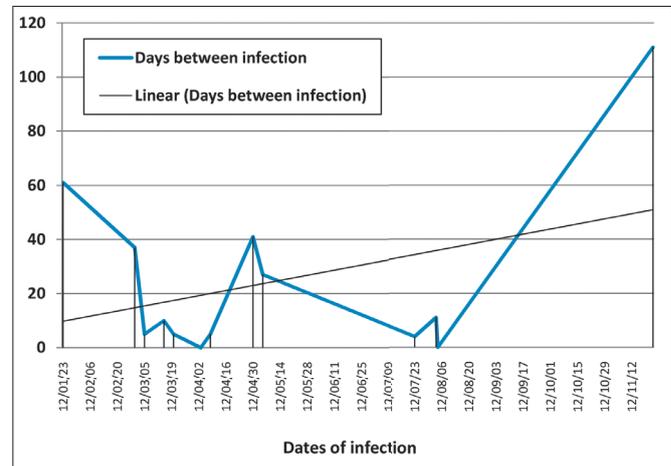
Introduction. Reducing hospital-acquired infection has increasingly become the realm of the infection control nurse. A substantial body of knowledge has accumulated which is not being applied in the clinical setting. A phased approach was employed to introduce the 'Best Care ... Always' campaign – 'the potential to bridge the gap between what we know and what we do' – at Constantiaberg Mediclinic, Cape Town. Focus was placed on the central-line-associated blood stream infection (CLABSI) bundle in critical care units (CCUs).

Aim. To describe the result when people at the coal face collaborate to find specific solutions to reduce CLABSI.

Methods. Focus-group discussions were established: (i) an environment conducive to changing behaviour and generating ideas was created; (ii) a multidisciplinary forum to discuss unit-

specific protocols was established; and (iii) methods and devices were refined. Measurements: (i) device days and confirmed central line infections were measured daily and monthly, respectively; (ii) CLABSI infection rates were represented in monthly graphs; and (iii) CLABSI bundle compliance rates were monitored.

Results.



Conclusion. CLABSI bundle implementation involves awareness among all staff. The goal of measurement and improvement needs to be driven relentlessly.