

## ABSTRACTS

# South African Critical Care and Thoracic Societies Congress

Cape Town, 5-8 August 2008



## Oral Presentations

### ARTERIAL BLOOD GAS: AN EXPERIMENT TO STUDY THE EFFECTS OF TEMPERATURE AND TIME DELAYS ON THE OUTCOME OF A BLOOD GAS RESULT

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**INTRODUCTION:** Arterial blood gas (Abg) analysis is a test done daily on numerous occasions in critical care areas and plays an important role in clinical decision making with regard to a patient's ventilatory and acid-base status. Pre-analytical factors during preparation of the Abg sample can affect the result of an Abg, particularly with regard to the partial pressure of oxygen and the partial pressure of carbon dioxide.

**AIM:** To investigate the relationship between the temperature at which an Abg sample is stored and the result following analysis, and to investigate the relationship between the time delay after which an Abg sample is drawn and the result following analysis.

**SUBJECTS AND METHODS:** Three samples of arterial blood were drawn from each of fifteen subjects ( $N=15$ ) in an intensive care unit. The first sample was stored on slush ice for 30 minutes prior to analysis. The second sample was stored at room temperature for thirty minutes prior to analysis. The third sample was stored at room temperature and analysed within ten minutes. Institutional ethical approval was granted and patients gave written consent.

**RESULTS:** In each of the results, the partial pressure of oxygen and the partial pressure of carbon dioxide were identified. The result of the standard deviation with regard to the partial pressure of oxygen showed the mean value in the case of samples held on ice for 30 minutes was larger than the other two means. Further tests show that there was no significant difference between the readings at room temperature whether tested within 10 minutes or at 30 minutes. However, the mean value was significantly higher after being kept on ice for 30 minutes, therefore for the partial pressure of oxygen the main pre-analytical factor was temperature and not time. The result of the standard deviation with regard the partial pressure of carbon dioxide showed the mean to be lower in the samples stored at room temperature for thirty minutes than the other two means. Further tests showed that the difference between the means was significant. The pairwise comparisons showed that the mean at room temperature within 10 minutes differs significantly from the means after 30 minutes with or without ice. In this case, the main factor was time and not temperature.

**CONCLUSION:** There is a relationship between storage of an Abg and the result. There is also a relationship between when an Abg is analysed and the result. Therefore, an Abg should ideally be analysed within the first ten minutes following withdrawal. However, a delay of 30 minutes is acceptable, if stored at room temperature.

### THE OUTCOME OF HIV-EXPOSED CHILDREN ADMITTED TO A PAEDIATRIC INTENSIVE CARE UNIT (PICU) IN A RESOURCE-LIMITED SETTING

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**BACKGROUND:** There is limited information regarding the outcome of HIV-exposed children admitted to PICUs in resource-limited settings.

**METHODS:** A 1-year review from January 2007 to December 2007 was conducted at Red Cross Children's Hospital.

**RESULTS:** 63 of the 1119 patients admitted to PICU in 2007 were HIV-exposed: 32 were HIV-infected, 28 were uninfected, and the status of 3 not determined. Case records of 31 infected [HIV+] and 27 uninfected [HIV-] children were analysed.

**PERINATAL HISTORY:** Most HIV+ children had not received prevention of mother to child transmission (PMTCT) interventions [No PMTCT (64.5%), NVP/AZT (19.4%), HAART (3.2%), and Unknown (3.2%)] compared to the HIV- group [No PMTCT (7.7%), NVP/AZT (66.7%), HAART (3.9%), Unknown (23.1%)]. Median age (IQR) on admission of HIV+ and HIV- children was 2.7 (1.9, 3.6) and 2.4 (1.0, 5.2) respectively,  $p=0.8$ . Most HIV+ children had advanced WHO stage 3 (7.4%) or stage 4 (85.2%) disease. In the HIV+ group the most common diagnoses were pneumonia (61.3%) and sepsis (9.7%) and the main indication for PICU admission was respiratory failure (77.4%). In the HIV- group most frequent diagnoses were pneumonia (51.9%), gastroenteritis (14.8%) and CCHD (11.1%). The main indications for PICU admission were respiratory failure (55.6%) and post-operative monitoring (25.9%).

In the HIV+ group, 90.3% required assisted ventilation; 87.1% required IPPV and/or HFOV. In the HIV- group, 85.2% required assisted ventilation; 63% required IPPV and/or HFOV. The median (IQR) stay in PICU for the HIV+ and HIV- groups was 7.0 (4, 10) and 3.0 (1, 5) days respectively,  $p=0.0009$ . More HIV+ children required >5 days ICU care: 64.5% v. 14.8%, OR (95%CI): 14.1 (3.3, 66.6),  $p=0.00002$ . Inotropes were required in 25.8% of the HIV+ group and 29.6% of the HIV- group. The median duration of inotropic support was 2 days in

both groups. Empiric gancyclovir was started on 18 (58.1%) children in the HIV+ group, 13/18 (72.2%) had evidence for CMV infection; and 5 (18.5%) in the HIV- group, none had evidence of CMV infection. In patients without CMV infection, gancyclovir was discontinued. On admission, 3 HIV-infected children were on HAART. During the admission a further 17 children were started on HAART, 10 in PICU. During the PICU admission 32.3% (10/31) in the HIV+ group and 14.8% (4/27) in the HIV- group died,  $p=0.1$ . In the HIV+ group who died, gancyclovir was started in 70% (7/10), a median (IQR) of 7 (7, 11) days after hospital admission. By comparison, in HIV+ children who survived, gancyclovir was started in 52.4% (11/21), a median (IQR) of 2 (1, 3) days after hospital admission,  $p=0.003$ .

Median total hospital stay (IQR) for the HIV+ and HIV- groups was 18 (14, 26) and 14 (8, 19) days respectively,  $p=0.06$ . More HIV+ children were hospitalized for >14 days: 71.0% v. 44.4%,  $p=0.04$ . No further deaths occurred and, at hospital discharge, 67.7% of the HIV+ group and 85.2% of the HIV- group were alive.

**CONCLUSIONS:** HIV-exposed children are a vulnerable group. Predictably, hospital outcome following PICU admission was worse in HIV-infected children than in the HIV-uninfected group. PMTCT seems to reduce the HIV transmission rate.

**VANCOMYCIN, TEICoplanin AND LINEZOLID SUSCEPTIBILITY OF BACTERAEIC STRAINS OF METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) ISOLATED IN THE PRIVATE SECTOR IN GAUTENG PROVINCE, SOUTH AFRICA**  
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**INTRODUCTION:** MRSA isolates with vancomycin minimum inhibitory concentrations (MICs) of 1 - 2 mg/l, despite being classified as susceptible, are associated with worse outcome, and this is not improved by increasing the dose. Furthermore, hetero-resistant strains, a phenomenon in which some more resistant organisms may be present within a population that appears to be sensitive, may have an impact on the outcome of serious infections. These hetero-resistant strains are not detected by conventional susceptibility testing methods, including automated systems such Vitek.

**AIM:** The aim of this study was to determine the glycopeptide and linezolid susceptibility patterns of MRSA isolates from patients in the private sector in Gauteng Province, South Africa, and to screen for hetero-resistance to glycopeptides among these strains.

**METHODS:** Fifty consecutive MRSA strains isolated from blood cultures in hospitalised patients were tested according to CLSI standards. The strains were screened for hMRSA by using the Etest Macromethod (AB Biodisk).

**RESULTS:** Results of susceptibility patterns are depicted in the table. The MIC90 of vancomycin was 2 mg/l which is at the breakpoint for susceptibility. The MIC90 of teicoplanin and linezolid was 3 and 2 mg/l, respectively, both well below the breakpoint, suggesting that these agents are more active against bacteraemic strains of MRSA. More importantly, 50% (25/50) of the strains demonstrated hetero-resistance to vancomycin.

Table.	Susceptibility patterns of MRSA isolated from bacteraemic patients in Gauteng, South Africa (N=50)		
mg/L	Vancomycin	Teicoplanin	Linezolid
MIC50	1	2	1.5
MIC90	2	3	2
Range	0.5 - 2	0.75-4	1-2
Breakpoint	S≤2	S≤8, R≥32	S≤4

**CONCLUSION:** It is becoming increasingly important to provide clinicians with MICs of *S. aureus* for the glycopeptides especially for vancomycin, as these organisms have been undergoing 'MIC creep', a phenomenon which has been documented both in this study and internationally. We have shown that the MIC90 for vancomycin of the strains that were studied is 2 mg/l, making this drug an unsuitable choice for the treatment of serious MRSA infections, especially pneumonia.

Our recommendation is that all MRSA isolates from clinically relevant specimens be reported with MICs for vancomycin and teicoplanin and that treatment failure with glycopeptides warrants further testing of the MRSA isolates to detect possible hetero-resistance.

**LEVEL OF NURSES' COMPETENCE IN MECHANICAL VENTILATION WITHIN INTENSIVE CARE UNITS OF THREE TERTIARY HEALTH CARE INSTITUTIONS IN GAUTENG PROVINCE**

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**BACKGROUND:** Studies generally agree that the survival of mechanically ventilated patients in ICU is reliant on the competence of nurses undertaking the highly specialised role (Ashurst, 1997; Brunner, 2004; Scribante et al., 1996). However, an audit undertaken by the Critical Care Society of Southern Africa (CCSSA) in 2004 revealed that 75 % of nurses working in ICU are inexperienced and do not hold an ICU qualification. A high index of suspicion exists around non-qualified inexperienced nurses as local studies demonstrate them to be incompetent (Khoza & Ehlers, 1998; Moeti 2004; Morolong & Chabeli 2005), while poor competency among ICU nurses is more common than expected (Scribante & Bhagwanjee, 2003).

The aim of the study is to describe and compare the level of competence, with regard to mechanical ventilation, of registered nurses working in ICU, who have varying years of experience and training backgrounds, using specifically designed clinical vignettes, in 3 tertiary healthcare institutions in Gauteng.

Anon-experimental, descriptive, comparative, two phase design will be utilized in this study. **Phase one** comprises the validation of 3 clinical vignettes developed by the researcher to elicit the level of competence of nurses working in the ICUs with regard to mechanical ventilation. Purposive sampling of experts from nursing, medical and technical disciplines will be utilised with focus groups and a modified Delphi Technique with 6 - 8 experts per group. **Phase 2** comprises the testing of the 3 clinical vignettes in the ICUs of 3 tertiary healthcare institutions in Gauteng, to elicit the level of competence of nurses working in the ICUs with regard to mechanical ventilation. Stratified proportionate systematic

random sampling will be utilised to obtain a proportionate sample of ICU qualified and ICU experienced nurses resulting in a sample which reflects 25% ICU-qualified nurses and 75% non-ICU-qualified inexperienced nurses, the total number of nurses sampled being 120 ( $N=120$ ). All nurses participating in the study will complete the same 3 clinical vignettes and demographic data will also be collected pertaining to the sample.

Focus group consensus utilising a checklist and descriptive statistics will be used to determine consensus between the nursing, medical and technical groups regarding the development of the 3 clinical vignettes. In **phase two**, the scores from the 3 clinical vignettes will be analysed in an appropriate analysis of variance (ANOVA) with main effects qualified and experienced nurses, along with main effects and interactions between qualified and experienced groups, and years of experience. Testing will be done at the 0.05 level of significance. Level of competence is set at 75% for each clinical vignette. Statistical assistance will be obtained from a statistician from the Medical Research Council.

### THE DEVELOPMENT OF A MODEL TO MANAGE CLINICAL OUTCOMES IN THE SPECIALISED CARE UNIT

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**INTRODUCTION:** The increasing demand for clinical outcome assessment and for documentation to assess and define quality care in the specialised care environment has resulted in the development of numerous clinical databases worldwide. It is common knowledge that data captured into databases are only valuable when they are analysed regularly and the resulting recommendations implemented in the daily/monthly management of the specialised care unit. The South African specialised care environment and its management are still battling to find the most reliable and applicable model to use in the South- African milieu. This model represents our attempt at a clinical management model for a specialised care environment (reference to the staff and organisational model that has been operational in the Medi-Clinic private hospital group is excluded from this model).

The model exploits data from our comprehensive observational clinical outcome database (PROCOD) which to date holds data for 12 000 patients and covers a period of 45 months from October 2004 to June 2008. Real-time collection of 130 - 150 data fields daily enables an almost ideal ICU information system. Three well-known scores (APACHE 11, SAPS 11 and MODS) are incorporated in the holistic database.

**PRESENTATION AND DISCUSSION:** The department of clinical data generates the following monthly reports from the database that are distributed to the applicable unit managers to continuously improve management of their units. Data from previous years are used as benchmarks for the current period.

- Admissions by gender (adult and neonatal)
- Average LOS by gender (adult and neonatal)
- Mortality by gender (adult and neonatal)
- Gestation distribution (neonates only)
- Birth weight distribution (neonates only)
- Delivery type distribution (neonates only)
- BMI (adults only)
- Primary doctors involved (adults only)
- Comorbidities (adults and paed. only) – top 15
- Top 15 diagnoses

- Ventilation as % of admissions, average period of ventilation.
- Ventilation modes used
- Devices: average indwelling times/device
- Average  $\mu\text{g}/\text{kg}/\text{min}$ . administration of vaso-active drugs
- Nutritional aspects
- Organ failures (adults only)
- Fluid balance on day 5
- Antibiotic use with S/R profiles
- APACHE 11 use (adults only)
- Infection profile

### FREQUENCY OF CONGENITAL MALFORMATIONS IN THE NEONATAL UNIT, NELSON MANDELA ACADEMY HOSPITAL (NMAH) 2000 - 2007

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**BACKGROUND:** Birth defects are a leading causes of infant mortality in many parts of the world, mainly in developed countries, and are among the first 5 causes of death in underdeveloped countries (WHO). In a previous study in NMAH, it was found that the death rate of congenital abnormalities was 4.9% among all live births during the period 2000 - 2007.

**METHOD AND OBJECTIVES:** To know the frequency and mortality in newborns with external major congenital abnormalities from 2000-2007. To identify the most frequent abnormalities detected. A retrospective study that included all newborns with major congenital abnormalities in NMAH for 2000 - 2007. They were admitted into neonatal unit. Clinical records were revised and clinical epidemiological information was collected. The malformations were classified according to the system affected and type of defect. The frequency of death in the study group was calculated and compared with the total mortality of the unit.

**RESULTS:** The majority of the congenital abnormalities were represented by CNS abnormalities (35.8%), heart defects (14.3%), gastrointestinal defects (9%), multiple defects (28.2%), trisomies (13.4%).

**CONCLUSION:** During 2000 – 2007, 0.66% of newborns had a least one major congenital abnormality. The study group's total mortality had a sustained rate of 4 - 5%. The most frequent abnormalities were CNS defects, heart defects and multiple defects.

**RECOMMENDATIONS:** To create a birth defects registry (foetus and newborns) in our hospital to create the possibility of developing prevention programmes (antenatal screening).

### PILOT STUDY: ESTABLISHING A DATABASE FOR A CARDIOTHORACIC ICU

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**BACKGROUND:** The creation of a clinical database pertaining to patients' demographic profile, medical history, clinical course and outcome is important for ongoing audit purposes.

**OBJECTIVES:** To ascertain the ease with which data is captured; to verify the accuracy of the data captured; to ascertain the ease with which data is transferred to an electronic database; to verify accuracy of data captured electronically.

**DESIGN:** A prospective study conducted over a month in the cardiothoracic ICU at Johannesburg Hospital. Registrars rotating through the ICU were asked to obtain consent and capture data pertaining to age, gender, medical history, surgical procedure, procedure-related issues, duration of ICU stay and ICU outcome. The data sheets were electronically captured by one person. The data captured by the registrars and the electronic data were verified by another person.

**RESULTS:** During the study period, 30 patients (22 adult and 8 paediatric) were admitted for cardiac surgery. One patient refused to consent, and consent was not obtained from 8 patients. Registrars were able to capture data with ease within their working hours. There was 96% accuracy of manual data capture by registrars, and there were approximately 4% missing variables. Lack of an onsite computer precluded immediate electronic data capture. It took approximately 5 - 6 minutes to electronically capture the data. The accuracy of electronic capture was >99%.

**COMMENT:** The development and maintenance of an accurate database is feasible. The issue of consent and an onsite computer needs attention.

### **SEVERITY OF ILLNESS SCORES IN PATIENTS WITH SEVERE BACTERAEMIC PNEUMOCOCCAL PNEUMONIA: IDENTIFICATION OF THOSE CASES MOST LIKELY TO BENEFIT FROM ICU CARE**

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**INTRODUCTION:** *Streptococcus pneumoniae* is the commonest cause of community-acquired pneumonia even among patients requiring ICU admission. Severity of illness scores are often used to assist in determining the severity of illness of patients with pneumonia, which is one of the important factors taken into account when determining the optimal site of care of these patients (e.g. the need for ICU admission).

**AIM:** We wished to compare the efficacy of the various pneumonia severity scoring systems (Pneumonia Severity Index (PSI), CURB-65, CRB-65, modified ATS criteria (mATS) and Pitt Bacteremia score (PBS)) in patients with bacteraemic pneumococcal pneumonia, to determine their accuracy in identifying severe infection and in recognising cases that required ICU admission. We evaluated their sensitivity, specificity, positive and negative predictive values and accuracy in predicting 14-day mortality in 766 consecutive cases with radiologically confirmed pneumonia collected prospectively by the International Pneumococcal Study Group. Severe infections was defined as a PBS >4, PSI of risk class IV or V, CURB-65 of >3, and modified ATS criteria of 1 major or 2 minor.

**RESULTS:** The PSI was the most sensitive score (80.2%), while the PBS and mATS were most specific in predicting mortality (91.3% and 84.9% respectively). The negative predictive value was similar for all scores (all >90%). The positive predictive value (PPV) was highest for the PBS (55.5%) and lowest for the PSI (23.2%) which, if strictly applied, would have classified almost half the study population (49.5%) as

severely ill, needing admission to ICU. The corresponding number of patients classified as severely ill by the PBS was 16.3%, by the mATS was 27.5%, and by the CURB-65 score 24.6%. The predictive accuracy and discriminatory power as measured by the ROC was highest for the PBS. The PBS and mATS were superior to the CURB-65 and CRB-65 scores regarding specificity and positive predictive value.

**CONCLUSIONS:** The low positive predictive value of the PSI renders it not useful for decisionmaking in severely ill cases of bacteraemic pneumococcal pneumonia. The PBS and mATS identified those patients most likely to benefit from ICU care and were superior to the CURB-65 and CRB-65.

### **MORTALITY FROM BACTERAEMIC SEPSIS: DR GEORGE MUKHARI HOSPITAL ICU EXPERIENCE**

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**BACKGROUND:** Mortality from sepsis has not improved despite improved understanding of its pathophysiology, development of new therapies and availability of sophisticated monitoring equipment.

**PURPOSE:** To determine the mortality from bacteraemic sepsis in our ICU.

**DESIGN:** A prospective observational study over 8 months (Jan. – Aug. 2007) of consecutive patients in ICU with community or hospital/ICU-acquired bacteraemic sepsis.

**MATERIALS AND METHODS:** The following information was obtained from all study subjects: demographic details, APACHE II score, site of sepsis, pathogens isolated and outcome. Data were analysed using descriptive statistics. Comparisons were made using the Chi-square test. Permission to conduct the study was granted by the Research Ethics and Publications Committee of the University of Limpopo.

**RESULTS:** Forty patients were studied. Mean age was 36±13.6 years. Mean APACHE II score for the group was 13.73±7.24. The mean length of stay in ICU was 11.2±7.7 days. Fourteen (35%) patients were in septic shock. Eight patients (20%) died. Gram-negative pathogens were the predominant infecting organisms (82.5% of the cases). Adrenaline was the vasoactive agent most commonly used for haemodynamic support. The difference in the death rate between patients with septic shock and those without shock was not statistically significant ( $p=0.065$ ).

**CONCLUSION:** Bacteraemic sepsis continues to be associated with a high mortality. Mortality in this study was not associated with illness severity.

### **HIV IN THE PAEDIATRIC ICU (PICU) IN A RESOURCE-CONSTRAINED ENVIRONMENT**

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**BACKGROUND:** HIV/AIDS creates ethical problems for the paediatric intensive care clinician in a resource-constrained environment. The high prevalence and burden of severe disease exacerbates scarce ICU beds. The diagnosis is frequently established only after admission; prognosis of the child may be uncertain. ART may not be available. Ethically acceptable policies must be established for admission and management of HIV-positive children requiring intensive care.

**AIM:** To assess the ethical aspects surrounding admission and

management of HIV-positive children in public sector PICUs in South Africa.

**METHOD:** A questionnaire regarding admission policies and management of HIV-positive children was sent to 8 tertiary hospital PICUs. Clinical scenarios were also posed.

**RESULTS:** Responses were received from 6 PICUs. At the time of the study, only 1 PICU refused admission to HIV-positive children (justification: poor long-term prognosis; 20% survival at 6 - 8 months' follow-up). PICUs would not admit children with clinical stage 4 disease, severe wasting, nervous system involvement and delayed diagnosis or re-admission for ventilation of PCP. ART played an important role. Two PICUs would not utilise their last ICU bed for an HIV-positive child. Practices between PICUs varied for a 6-month-old HIV-infected underweight baby not on ART, with diarrhoea and septicaemia. Withdrawal of life-support would be considered in cases of prolonged ventilation.

**CONCLUSION:** HIV-positive children are often discriminated against in PICU admission in SA. Life-limiting decisions in resource-constrained environments are often rationing decisions. Each child's best interests must be weighed up against the best interests of other children.

#### USE OF A HAEMOGLOBIN-BASED OXYGEN CARRIER (HBOC-201) IN 54 PATIENTS WITH LIFE-THREATENING ANAEMIA

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**AIM:** To determine variables associated with survival, a multi-centre international unblinded series of severely anaemic Compassionate Use (CU) patients receiving a haemoglobin-based oxygen carrier (HBOC-201) was reviewed.

**METHODS:** Patients with life-threatening anaemia received HBOC-201 when a blood transfusion was not an option and all other available treatments had been implemented. Interventions included available standard treatments plus HBOC-201. Mortality; correlations between patient characteristics or treatment and survival to discharge were determined from patient records.

**RESULTS:** Fifty-five HBOC-201 treatments were administered to 54 patients (median age 50 years) with 23 (42%) of patients surviving to discharge. Intraoperative bleeding (45%), anaemia associated with malignancy (18%), and acute haemolytic anaemia (13%) were the prevailing reasons for anaemia. Survivors had a shorter time from onset of anaemia ( $\leq 80$  g/l) to HBOC-201 infusion (3.2 v. 4.4 days,  $p=0.027$ ) and a trend toward higher median [Hb] prior to HBOC infusion (45 v. 38g/l,  $p=0.120$ ) than non-survivors. Non-survivors received slightly more HBOC-201 (8 v. 7 units) over a shorter treatment duration (3 v. 5 days). Cancer and renal disease were more frequent in non-survivors. The number of patients with durable serious adverse events (SAE; stroke, myocardial infarction, and acute renal failure with or without dialysis) was lower in survivors (1 patient) than in non-survivors (10 patients).

**CONCLUSIONS:** HBOC-201 treatment was associated with 42% survival in a severely anaemic patient population deemed to be at high risk of death for whom blood was not an option. The patients were more likely to survive if the duration and extent of enduring a critically low Hb was minimised prior to HBOC-201 treatment.

#### STATUS ASTHMATICUS; ITS OUTCOME IN AN ICU A Mesa,<sup>1</sup> M Xaba-Mokeona<sup>2</sup>

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**INTRODUCTION:** The incidence of asthma and deaths due to this condition continues to increase worldwide, despite advances in its management. Although most asthmatic patients never experience life-threatening asthma, the care of individuals with severe asthma presents a challenge to the IC clinician. Status asthmaticus is a persistent severe asthmatic symptom and airways obstruction despite standard therapy for acute asthma.

**METHOD:** This descriptive-prospective study included creating a clinical database for patients suffering from status asthmaticus admitted to the ICU of Cecilia Makiwane Hospital, between January 2003 and December 2007. Information extracted from this clinical database included: age, sex, previous emergency room (ER) visits, previous use of corticosteroids, use of invasive mechanical ventilation, and complications such as pneumonia, spontaneous pneumothorax, cardiac arrhythmias, acute respiratory distress syndrome (ARDS) and death. The sample consisted of 79 subjects who fulfilled the inclusion criteria.

**RESULTS:** Seventy-nine patients were identified as being suitable for analysis. There were 47 female and 32 male patients. The mean age of the patients was 34 years ( $SD\pm 14.45$ ). The ER was visited by 43 patients (54%) at least once in the preceding 12 months. Most of the subjects were not on corticosteroid therapy at the time of hospitalisation, 12 patients were on oral steroids (15%) and 8 on inhaled regimen (10%). The median of ICU length of stay was 6 days ( $SD\pm 4$ ). A total of 11 patients (14%) required invasive mechanical ventilation (IMV), 4 of them died (36%), and pneumonia was the main cause of death (50%). Complications encountered included pneumonia – 17 patients, spontaneous pneumothorax – 8 patients, cardiac arrhythmias – 4 patients, and ARDS – 3 patients. The mortality rate was 15% (12 subjects); pneumonia was the main cause of death.

**CONCLUSIONS:** The poor outcome of patients was associated with more previous ER visits and lack of use of corticosteroids by the patients before ICU admission.

#### DEALING WITH THE CRITICALLY ILL PATIENT'S FAMILY

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**INTRODUCTION:** Increasingly more people sustain critical injuries and diseases that result in surgical as well as medical emergencies. Critically ill patients are seen and resuscitated in the trauma and emergency departments before they can be transferred to other units for definitive care. Most patients are invariably unconscious with complete self-care deficit and may even be connected to respiratory support machines. In such an environment, there is a lot of stress for the families, compounded by *inter alia* fear of the unknown and the technology used in the management of these patients. Registered nurses have an increased responsibility in that they take care of critically ill patients and are also required to deal with the families in crisis.

**OBJECTIVE:** To describe the experiences of registered nurses when dealing with the families of critically ill patients.

**METHOD:** A quantitative and descriptive survey was used.

**SETTING:** A multi-disciplinary ICU and casualty department of a teaching hospital.

**RESULTS:** Although registered nurses continue to be advocates for patients, it is evident that they experience several problems when dealing with the families of critically ill patients, e.g. the dilemma of excluding the patient's family during resuscitation, frequent visiting times and phone calls, lack of knowledge and understanding about the patient's condition, denial of the patient's condition or death, unco-operative behaviour and lack of appreciation.

**CONCLUSIONS:** The family of a critically ill patient needs to maintain an active connection with the patient. However, the experiences described call for multiple strategies in helping registered nurses to support families of patients, while focusing on maximising patient care.

### 'LEARNING WAS FUN FOR THE FIRST TIME IN MY LIFE!'

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**INTRODUCTION:** RCWMCH and Lucile Packard Children's Hospital entered into a working relationship supported by the Heartlink initiative aimed at improving nursing care to children with cardiac defects and retaining staff with scarce skills and paediatric intensive care unit (PICU) staff. The team from LPCH introduced the concept of a skills fair as a teaching method which they had successfully used to improve practice standards. This concept was introduced to the PICU team at RCWMCH in an attempt to promote a culture of lifelong learning, promote team work, and boost morale amongst staff in the PICU.

**METHODS:** An international, interdisciplinary focus group surveyed 82% of professional nursing staff on their educational needs. Educational offerings were developed to address nurses' needs, promote their confidence in practice, and optimise patient care delivery. The focus group analysed data from the PICU educational survey. Nine skills were identified for improving PICU patient outcomes, and included line care, electrocardiogram tracings, managing central lines, defibrillation, hand washing, resuscitation, suctioning, bedside set-up, and medication safety. The focus group brainstormed creative methods to implement hands-on, practice-based education. A carnival theme was selected and interactive games and simulation training were developed for each of the 9 topics. Important skills fair components included: learner-centred approach; a fun, non-threatening environment; multi-modal, performance-based training; utilisation of positive critique, and fostering the development of critical thinking skills. Patricia Benner's Novice-to-Expert model was employed at all stations, and teachings modified to suit the learner. When appropriate, practice protocols were reviewed to standardise patient care delivery. Equipment was demystified. Offering positive critique challenged staff in a beneficial manner. Professional nurses' (PNs) confidence in care was assessed pre- and post-implementation of the skills fair.

**RESULTS:** Forty-five PICU PNs were working in the PICU at the time of the skills fair. Twenty-nine of them completed pre- and post-implementation questionnaires (64.5% of total number of PNs in PICU). Data demonstrated a modest increase in confidence, and a considerable increase in knowledge after the event. All PNs enjoyed the fair, learned from it, and would recommend it to their peers. 82% preferred this method of

teaching, 94.5% would attend again without pressure from their supervisor, and 98.6% asked for another skills fair. In addition to our data, there was overwhelming positive verbal feedback and on evaluation forms supporting our data.

**CONCLUSIONS:** Through the use of innovative teaching strategies, learning can be fun, successfully increase PNs confidence in their practice, and help to standardise patient care delivery.

### A PATIENT'S EXPERIENCE OF A PRE-OPERATIVE EDUCATION PROGRAMME FOR CORONARY BYPASS SURGERY

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#### INTRODUCTION AND PROBLEM STATEMENT:

Breaking the news to a patient who has to undergo coronary artery bypass graft surgery (CABG) can be quite stressful. Bezuidenhout (1994:104) identifies several stumbling blocks for health during the pre-operative period of CABG. The patient is likely to experience emotions such as frustration, anxiety and aggression and may tend to blame others for the condition. To assist patients in coping with these emotions, a pre-operative education programme is important, as knowledge of a situation improves coping skills (Czar & Engler, 1997:215). Patient teaching is an essential aspect to empower patients with knowledge about CABG surgery. In a cardiac unit in a hospital in South Africa, there was no pre-operative education programme for patients undergoing CABG surgery. The researcher implemented a programme with the purpose of exploring how patients might experience this programme.

**RESEARCH AIM:** The aim is to describe and explore patients' experience of a pre-operative teaching programme on CABG surgery.

**DESIGN AND METHOD:** A qualitative, exploratory and descriptive research study which was contextual in nature was followed. The target population was all patients who had to undergo CABG surgery at a private hospital in Pretoria, South Africa. A purposive sample was taken from the target population, with the following criteria: had to undergo the pre-education programme before surgery; no long term complications after CABG surgery that made the stay in ICU >3 days; and no mental disease after CABG surgery. The participating population was 5 patients.

The educational programme consisted of an educational booklet, an educational model and the educationist. Upon the person's consent to surgery, a copy of the educational booklet was given to each participant 2 days before CABG surgery. With the help of a self-made, real-life presentation of an educational model depicting how the patient would look post-operatively, an education session was given to each participant. Immediately before discharge from hospital, an unstructured interview was held with each participant to explore the question, 'How was the programme for you?'

The interviews were analysed using Tesch's method (in Creswell, 1994:155) of open-coding. Trustworthiness of data was ensured using Lincoln and Guba (1985:289-331) strategies for trustworthiness e.g., triangulation etc. to ensure credibility of the research and research findings.

**RESULTS:** See Table.

**CONCLUSION:** The findings indicate that a pre-operative education programme empowers participants. Family involvement is also stimulated.

**RECOMMENDATIONS:** A pre-operative education programme should be implemented in every unit that performs CABG surgery.

Table. Results of research		
Main category	Sub-category	Response of participants
Knowledge	Programme	'If you know what's going to happen, you can prepare yourself better'. 'Better to know... otherwise I could have fought the breathing machine'. 'Man ... that booklet gave me peace and I had time to look at it again and again'.
	Educational booklet	'The doll ... that was the real thing. When I woke up after the operation, I felt that I had everything just like the doll and knew then the operation was a success'.
	Educational model	'I call you my angel, because if it was not for you, I don't know how I would have survived'.
Support systems	Educationist	
	Family as support system Multidisciplinary team	'We as a family worked through the book together so they knew also what to expect, and that helped them a lot to support me'. 'Although I got information from my doctor and some of the nurses ... the programme helped to make certain aspects clear'.
Empowerment	Control of situation	'I also shook with fear but after reading the booklet I thought, no, I will try it'. 'I gave it to my wife to read and told her she doesn't have to be afraid'.
Satisfaction	Emotional calmness	'It's not an easy operation ... but after going through the programme, it felt as if the operation was already done and I could relax'.

**ORIENTATION TO PICU – DEVELOPING A WORKABLE PROGRAMME WITH LIMITED TIME**

**Marleen P Petersen**

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Critically ill patients require care by knowledgeable and highly skilled nurses. The challenges that nurses face daily, such as extreme staff shortages, the loss of highly skilled nurses, high patient turnover and patients requiring complex care, have major implications on the delivery of quality care. Thomason (2006) states: 'Today's nursing educators and clinical nurse specialists are faced with the challenge of how to present the necessary information during new employee orientation in order to facilitate the greatest amount of learning'.

An orientation programme was developed and implemented in a general PICU with a high turnover. The aim was to provide new registered nurses (RNs) with the necessary knowledge

and skills to improve their performance and confidence as soon as possible in order to meet the unit's needs. Some recruits had paediatric nursing experience but most were new graduates. It seemed important to design a multipronged approach and to include current PICU staff in the programme.

Traditional classroom training was the initial method of orientating new RNs in the unit, but staff challenges soon necessitated a shift towards a practical and more integrated approach. Strategies such as requesting the newly qualified RNs to prepare and present specific topics during in-service training sessions supported the unit. The benefit of a collaborative project with US-based Children's HeartLink provided support with resources and additional training possibilities.

This presentation discusses the orientation process of RNs over a 2-year period. It will include challenges, practice shifts as well as evaluation to date.

## A PROFILE OF 2007 POSTGRADUATE ICU NURSING RESEARCH

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**INTRODUCTION:** Given the current challenges to critical care in South Africa, it is important that the profile of critical care nursing research, the extent to which this research is communicated to the critical care community, and the communication channels used, are determined. One of the objectives of the Clinical Trails Group of the Critical Care Society of Southern Africa is to establish and maintain a database of postgraduate critical care nursing research. The aim of the study was to compile a profile of post graduate ICU nursing research that has been completed 2007 in the Nursing Departments of South African Universities. The objectives were to: determine the number of projects completed at masters and doctorate levels respectively; and to compare the 2007 profile with the 2000 - 2006 profile.

**METHODOLOGY:** A quantitative research design was used. Approval to conduct the study was obtained from the University of the Witwatersrand's ethics committee. Programme leaders completed a consent form and an electronic questionnaire. Data were entered into a database and analysed using descriptive analysis techniques.

**RESULTS:** The number and focus of projects completed during 2007 are comparable with the 2000 - 2006 profiles.

Completed projects 2006	
Doctorate	1
Masters	8

**CONCLUSION:** The number of completed postgraduate critical care nursing projects, and the poor dissemination of completed research nationally and internationally, remains a concern.

## MOTIVATION, PERCEPTIONS AND EXPECTATIONS OF THE 2008 CRITICAL CARE NURSING STUDENTS AT THE CHRIS HANI BARAGWANATH NURSING COLLEGE

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**INTRODUCTION:** No information is available describing the perceptions and expectations of critical care nursing students (students) when they embark on and complete the critical care nursing postgraduate course (course). The objective of this study was to determine:

- why students do the course
- what students expect from the course

**METHOD:** A qualitative, exploratory, descriptive and contextual research design was followed. The study sample comprised all students commencing the course at Chris Hani Baragwanath in January 2008. Students were invited to take part on a voluntary basis. Approval to conduct the study was obtained from the Wits Ethics Committee and the Chris Hani

Baragwanath Nursing College. Students were asked voluntarily and anonymously to complete two naïve sketches and provide demographic data. The questions asked in the naïve sketches were:

- Why are you doing the ICU course?
- What do you expect from the ICU course?

**RESULTS:** All the students (60) took part in the study; their mean age was 39 years. In the first question (Why are you doing the ICU course?), 2 main themes emerged:

- the students expressed a lack of knowledge and skills
- they felt that obtaining knowledge and skills will empower them on various levels.

In response to the second question, the students described very high levels of expectations covering both the content of the course and input from the lecturers, but more so in terms of the outcome after completing the course: elevation in status, knowledge, skills and expertise.

**CONCLUSION:** It is important to describe these expectations and perceptions to assist lecturers to identify problem areas and guide students towards realistic expectations and perceptions and to contribute towards a more content critical care nursing workforce.

## PERCUTANEOUS CERVICAL PHARYNGOSTOMY IN A NEUROSURGERY ICU

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Early enteral feeding is important in the treatment of traumatic brain injury (TBI) patients and intensive care (IC) patients. Use of a nasogastric tube is contraindicated in TBI patients with base of skull fractures, and the prolonged use of nasogastric tubes in ICU leads to complications which include those which occur on insertion e.g. bleeding and submucosal dissection and later complications including sinusitis and erosive skin ulcers in poorly fixated nasogastric tubes. A retrospective analysis of pharyngostomies performed in the neurosurgery ICU between 2000 and 2007 was undertaken. A total of 1 707 patients were admitted; 635 (36.1%) pharyngostomies were performed. No major complications occurred.

The procedure, its advantages, as well as possible complications, will be discussed.

## THE EFFECT OF PENETRATING TRUNK TRAUMA ON THE RECOVERY OF ADULT SURVIVORS

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**BACKGROUND:** Gunshot and/or stab wounds to the trunk are trauma-related injuries commonly seen in South African hospitals that often necessitate exploratory surgical intervention to identify and treat injuries to the internal organs. Patients are often managed in ICU. Mechanical ventilation (MV) and immobilisation result in muscle dysfunction.

**AIM:** To establish whether survivors of penetrating trunk trauma adequately recover spontaneously following critical injury.



**METHOD:** A prospective, observational study was conducted. Patients were recruited from four ICUs in Johannesburg. Dynamometry, lung function tests, 6-minute walk distance (6MWD) and oxygen uptake tests were performed over 6 months after discharge with Group 1 (MV <5 days; N=13) and Group 2 (MV ≥5 days; N=29). These results were compared with those of a healthy control group (N=40).

**RESULTS AND DISCUSSION:** No lung function abnormalities were detected for subjects in either group. 6MWD was reduced for Group 2 subjects compared to controls (1 month ( $p=0.00$ ), 3 months ( $p=0.00$ )). Morbidity correlated with distance walked by Group 2 subjects (3 months ( $p=0.03$ ), 6 months ( $p=0.02$ )). No differences were found between groups during the VO<sub>2</sub>peak test, although subjects in Group 1 performed better clinically than those in Group 2. At 1 month, there was a reduction in strength for subjects in Group 2 compared to Group 1 and controls ( $p=0.00 - 0.04$ ). Similar results were detected at 3 and 6 months. ICU and hospital LOS correlated with muscle strength at 1 and 3 months for Group 2 subjects. Group 1 subjects had a reduction in strength compared to controls at 1 month only ( $p=0.00$ ). No differences in strength were detected between these groups at 3 or 6 months.

**CONCLUSIONS:** Group 1 subjects recovered adequately spontaneously within 3 months with regard to muscle strength and exercise capacity. Subjects in Group 2 presented with significant limitations in exercise capacity and muscle strength up to 6 months after discharge. Impaired function was related to the duration of critical illness and immobility.

**IMPLICATIONS:** A physiotherapist-led rehabilitation programme, implemented 1 month after discharge, may be indicated for Group 2 subjects to address the physical disabilities (muscle strength and cardiovascular endurance) observed.

## THE QUALITY OF LIFE OF TRAUMA SURVIVORS

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**BACKGROUND:** Short-term mortality is a potential outcome for the critically ill patient, therefore intensive treatment is applied to decrease mortality rate. However, many questions about long-term outcomes of ICU survivors still remain unanswered. Survivors of critical illness of all causes seem to suffer from excessive loss of lean body mass that leads to muscle weakness and fatigue. This seems to result in a prolonged reduction in health-related QOL especially in the physical health domain. As most of this research was conducted on an international level with little emphasis placed on patients who survived penetrating trauma, not all the results may be applicable to the South African critical care survivor population.

**AIM:** To determine if patients who survived penetrating trunk trauma recover adequately spontaneously following critical illness over the first 6 months following discharge from hospital. No formal rehabilitation programmes exist in South Africa for survivors of critical illness following hospital discharge.

**METHODS:** A prospective, observational study was conducted. Subjects with penetrating trunk trauma were

recruited from 4 ICUs in Johannesburg. QOL was assessed with the SF-36 UK-English version questionnaire at 1, 3 and 6 months after discharge. Subjects were divided into Group 1 (mechanical ventilation (MV) <5 days; N=13) and Group 2 (MV ≥5 days; N=29). These results were compared with those of a healthy control group (N=40).

**RESULTS AND DISCUSSION:** Subjects in Groups 1 and 2 presented with similar scores for mental and physical health domains at 1 month. These scores were significantly lower than those of the control group ( $p=0.00 - 0.015$ ). At 3 months, Group 1 subjects presented with mental health domains comparable with the control group but still had limitations in physical domains ( $p=0.011$ ). At 6 months, Group 1 reported a QOL comparable with the control group in all domains. Group 2 subjects had significantly lower physical health scores at 3 months ( $p = 0.000$ ) and six ( $p = 0.000$ ) after discharge compared with the control group. Similar results were found when Group 2 subjects were compared with Group 1 subjects at 3 and 6 months after discharge ( $p=0.01$  and  $p=0.004$  respectively).

**CONCLUSION:** Group 1 subjects recovered adequately spontaneously within 3 months with regard to mental and physical components of QOL. Subjects in Group 2 presented with significant limitations in physical components of QOL up to 6 months after discharge.

**IMPLICATIONS:** A physiotherapist-led rehabilitation programme, implemented 1 month after discharge, may be indicated for Group 2 subjects to address the physical disabilities observed, to improve QOL.

## TUBES HURT – THE EFFECT OF ENDOLARYNGEAL INTUBATION ON LARYNGEAL FUNCTION IN CRITICALLY ILL PATIENTS

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**INTRODUCTION:** Prolonged endolaryngeal intubation carries with it increased patient morbidity, including laryngeal dysfunction. This dysfunction has been studied previously using labour-intensive methods and equipment not readily available in South Africa.

**OBJECTIVES:** The evaluation of critically ill patients' laryngeal function after intubation; and the determination of easy-to-use criteria or investigations which could alert the ICU practitioner to laryngeal injury requiring ENT referral.

**RESEARCH PERFORMED:** Prospective descriptive study of 32 patients over 3 months, evaluating subjective voice and swallowing quality (using a questionnaire) and objective laryngeal functioning through endoscopic examination and standard voice tests (counts per breath; S:Z Ratio).

**FINDINGS:** Average intubation duration was 65 hours (range 12 - 270). Twenty-six (81%) patients had altered voice with a direct correlation between worsening voice quality and duration of intubation. ( $p=0.0276$ ). No correlation was found between changed voice and patient age, number of intubations or tube size. Only 3 patients reported swallowing difficulties. A deterioration in S:Z ratio was shown with lengthening intubation duration ( $p=0.002$ ). Four patients had vocal cord pathology. After 24 hours, 23 patients had improved voice quality, and the cohort demonstrated significant improvements in subjective scoring ( $p=0.00008$ ), counts per breath ( $p=0.00002$ ) and S:Z ratio ( $p=0.035$ ).

**CONCLUSIONS:** The vast majority of patients exhibited transient sequelae of intubation which can be evaluated quickly and effectively using the S:Z ratio. Criteria for ENT referral are proposed.