ABSTRACTS

2006 Care is Critical Congress, South African Critical Care Society

3 - 7 September 2006, Sand du Plessis Theatre, Bloemfontein

THE EFFECT OF A PASSIVE THORACIC FLEXION-ROTATION MOVEMENT ON TOTAL STATIC COMPLIANCE OF THE RESPIRATORY SYSTEM AND RESPIRATORY RESPONSES IN VENTILATED PATIENTS

Bergh A
Physiotherapy Department, Tygerberg Hospital
Hanekom S, Bester M M
Physiotherapy Department, Stellenbosch University, Western Cape, South Africa

AIM: The aim of this study was to determine the effect of a passive thoracic flexion-rotation movement on the total static compliance of the respiratory system, minute ventilation, tidal volume and respiratory rate.

DESIGN: This study had a one group, pre-test-post-test design.

METHOD: The sample consisted of 18 intubated and ventilated subjects with varying periods of ventilation and various conditions, acting as their own controls. The interventions used included tactile stimulation and passive thoracic flexion-rotation movements performed to both the left and the right. Objective variables namely tidal volume, plateau pressure and respiratory rate were recorded by a research assistant. These measurements were taken immediately following the intervention and repeated again three times in an interval of 20 minutes after the movement was discontinued. Total static compliance of the respiratory system was calculated as tidal volume/plateau pressure – PEEP.

RESULTS: The mean age of the sample was 46 (SD± 19) and patients had been ventilated for 7.5 days (SD ± 6.7). Tactile stimulation had no significant effect on any of the variables measured. The passive thoracic flexion-rotation movements resulted in a significant increase in tidal volume ($p < 0.001$) and a significant decrease in plateau pressure ($p < 0.01$). A Bootstrap analysis of means of the static compliance indicated a significant difference between baseline measurements and measurements immediately following the movement.

CONCLUSION: Passive thoracic flexion-rotation movement significantly affects respiratory responses with improvements in tidal volumes and decreases in plateau pressure. In addition there is a tendency towards an increase in static compliance of the respiratory system.

TRANSFORMATIONAL LEADERSHIP FOR NURSES IN A CRITICAL CARE UNIT

H Botha
Critcal Care, Bloemfontein Mediclinic

Transformation is constantly present in the world. Health care organizations, which include the critical care units, are part of the ever-changing environment. Present critical care units are described as stormy environments where the leadership role of the nursing manager is very important (Ohman, 2000: 53; Porter O'Grady, 2003: 105). Leadership is described as the cornerstone of any success in an organization (Roodt, 2001: 8). Leadership underwent a lot of research from the beginning of the 1900's. In 1985 the transformational leadership approach was developed and it forms part of the neo-charismatic leadership approach. This leadership approach implies a new paradigm regarding leadership and plays an important role in the handling of transformation in a critical care unit. Transformational leaders are future orientated, innovating persons that are focused on people's individual needs. Intellectual stimulation, especially in the critical care unit is also a very important aspect for the critical care transformational leader to focus on. The critical care transformational leader is constantly busy motivating his/ her followers in an inspired way to see the bigger picture beyond the transformation process. The influence of the leader is another important aspect on which the leader focuses. This influence is characterized by integrity and the example of the leader (Ackermann, Schepers, Lessing & Dannhauser, 2000: 58; Bass, 1997: 130; Ohman, 2000: 47). The challenge is to develop nursing managers as transformational leaders in order to make a positive difference in the ever-changing environment.

THE VALUE OF AN ACTIVE PROSPECTIVE OBSERVATIONAL CLINICAL DATABASE FOR THE CRITICALLY ILL

Himine Bothma
Critical Care Clinical Manager, Bloemfontein Medi-Clinic

METHOD: The development of a large prospective observational clinical database for daily use in the critically ill, high care and neonatal patient is discussed. The database forms part of the institution of a Department of Clinical Data that primarily functions in the Critical Care Environment. This initiative belongs to Bloemfontein Medi-Clinic.

INTRODUCTION: Since 1 October 2004 the clinical data of 66 patients/day were captured and processed into an

observational clinical database, called: PROCOD (prospective observational clinical outcome database). The capturing of 130 - 150 clinical parameters is completed after thorough clinical assessment of the patient by an ICU registered nurse. Clinical parameters of nearly 5000 patients have already been captured into the large database.

OBJECTIVES: The database was developed mainly for the following reasons:

- To identify strengths and weaknesses in our own critical care environment.
- To design clinical guidelines from information created from the data.
- To support the concept of managed care.
- To increase standards of nursing care by the process of continuous analysis of interventions and events.
- To manage cost of the patient in the private health sector, by creating relationships between factors that do have a positive effect on clinical outcome.
- To measure risks that may have a negative effect on clinical outcome.
- To identify resistance profiles of antimicrobial therapy.
- Finally: to ensure that managed private health care expenditure ensures and delivers the best clinical outcome to the patient.

CONCLUSION: The clinical managers/consultants constantly evaluate and primarily contribute to increased standards of care of all members of the multidisciplinary team by continuously having information available to manage their own clinical environment.

HOW MANY NURSES ARE LEFT IN ICU?

Gillespie R S
Department of Critical Care, UCT/GSH

INTRODUCTION: A global shortage of Registered Nurses (RNs) has been reported internationally, and confirmed in South Africa by the National Audit of Critical Care Services. Critical Care Nurses (CCNs) especially are in great demand and short supply. This has affected the quality of patient care.

AIM: The purpose of this study was to quantify the nursing workforce compared with the requirements of the ICUs of the hospitals of the Western Cape Province as at 1 January 2005, and the potential supply via the educational institutions.

METHODS: A descriptive survey conducted on site in the critical care units of the private and public sector hospitals of the Western Cape, using a structured questionnaire. Data were collected on nursing staff, unit beds, patient admissions, technology, and other staff.

RESULTS: Seven educational institutions and 35 hospitals (12 public/23 private) were identified, with 77 of the 80 critical care units surveyed, a return rate of 96.5%. Findings revealed 39 adult ICUs (12/27), 2 paediatric ICUs (public), 14 neonatal ICUs (4/10), 13 adult HCUs (11/2), one paediatric HCU (public), 3 neonatal HCUs (public) and 5 High Dependency Units for adults (public) with a total of 720 functional unit beds (359/361). A registered nurse-to-patient ratio of 1:1 for ventilated patients is used by 5.26% of public sector units and 100% of private sector units. Nurse-to-patient ratios varied from 1:1 to 2:3 for ventilated patients and 1:1 to 1:16 for non-ventilated patients. The total number of nurses working in the public sector units were 768 of whom 118 (15.4%) were CCNs and 289 RNs (37.6%), while 535 nurses worked in the private sector units of whom 204 (38.1%) were CCNs and 204 (38.1%) RNs. Compared with international norms, Western Cape units have a deficit of 74% RNs in the public sector hospitals, and a deficit of 82% in the private sector, an actual shortage of 3010 RNs for both sectors. The number of students being trained at both the undergraduate (300 during 2004) and the postgraduate (80 CCNs during 2004) level at the educational institutions is inadequate. Clinical training institutions are available, but the numbers of educators and clinical mentors are inadequate to train the number of nurses required to meet the demand.

CONCLUSION: The current supply of nurses does not meet the demand of the critical care units of the hospitals of the Western Cape.

NON-INVASIVE POSITIVE-PRESSURE VENTILATION IN ACUTE ASTHMA EXACERBATION AT AN EMERGENCY DEPARTMENT

[1]S G Hanekom, [2]H van Aswegen, [3]C Eales ,[4]L Engelbrecht, [5]P Becker
[1]*Physiotherapy Department, Kalafong Hospital,* [2,3]*Physiotherapy, Faculty of Health Sciences, University of the Witwatersrand,* [4]*Emergency Unit, Kalafong Hospital, University of Pretoria,* [5]*Biostatistics Unit, Medical Research Council*

INTRODUCTION: Acute asthma exacerbation is a common cause of respiratory failure in the emergency department. Failure to improve can lead to respiratory muscle fatigue with need for ventilatory support. Artificial airway support is associated with several risks and complications. Non-invasive ventilation has been shown to provide adequate ventilatory support in acute respiratory failure of varying causes. The aim of the study was to investigate the effectiveness of non-invasive ventilation together with standard medical therapy (ST) versus standard medical therapy alone in ameliorating pulmonary function and alleviating sensation of breathlessness in patients presenting with an acute asthma attack.

METHODS: A randomized parallel open study was undertaken. Patients presenting at the emergency unit, Kalafong Hospital, with an acute asthma attack whose PEFR was below 60% predicted were randomized to ST (n=10) or ST plus continuous positive airway pressure (CPAP) (n=8) or ST plus bilevel positive airway pressure (BIPAP) (n=10) after initial one to three inhalations. Clinical and physiological variables were collected at time zero, 30 minutes, then hourly until PEFR was above 65 - 70% predicted or patient was transferred from the emergency unit.

RESULTS: Twenty-eight patients with acute asthma were enrolled. There was similar distribution between groups for age, heart rate, blood pressure, respiratory rate, PEFR and PEFR %pred at start of treatment. In the first half hour of treatment, sensation of breathlessness improved significantly in the CPAP and BIPAP group (p=0.0227). At one hour of treatment there was a significant difference in PEFR and PEFR %pred (p=0.0355, p=0.0388) in the CPAP and BIPAP groups compared with ST alone. No significance was found at end of treatment for PEFR and PEFR %pred between the groups. Significant improvement of respiratory rate and sensation of breathlessness was found at end of treatment in the CPAP and

BIPAP groups (p=0.0331 and p=0.0231 respectively) compared with ST. Twenty percent of the ST, 37.5% of the CPAP and 40% of the BIPAP group reached a PEFR %pred > 65% in the emergency department.

CONCLUSION: Non-invasive ventilation has an immediate effect in alleviating the patient's sensation of breathlessness followed by an increase in lung function in the first hour of treatment. Its supportive effect on the respiratory muscles is seen in the reduction of respiratory rate and sensation of breathlessness at the end of treatment when compared with ST alone.

When added to ST, non-invasive ventilation had an initial splinting effect on the bronchoconstricted airways, improving lung function, and also unloaded loaded respiratory muscles and provided fatigued inspiratory muscles with support during the whole treatment.

The greatest effect of non-invasive ventilation on lung function was during the first hour of treatment.

PERIPHERAL CORTICOTROPIN-RELEASING FACTOR MAY HAVE A ROLE IN POST-TRAUMA INTESTINAL BARRIER DYSFUNCTION

L T Hill, W L Michell*, M S Hendricks, L Weight, S Kidson

Departments of Critical Care and Human Biology, University of Cape Town*

INTRODUCTION: The precise reasons for the typical bowel dysfunction following traumatic injury are as yet unclear. Besides the traditional role of corticotropin-releasing factor (CRF) in stress hormone activation, CRF in peripheral blood/tissue may induce intestinal barrier dysfunction via receptor-mediated mechanisms independently of the hypothalamic-pituitary-adrenal axis. This mechanism seems to involve interactions of CRF with enteric nerves and mast cells[1], which results in increased gut intercellular tight junction permeability to macromolecules[2], as well as increased epithelial cell apoptosis. These events lead to loss of mucosal integrity.

AIM: To investigate whether peripheral CRF is associated with post-operative gut dysfunction in shock.

SUBJECTS AND METHODS: CRF analysis was performed on full-thickness bowel specimens obtained from shocked trauma patients requiring emergency abdominal surgery for penetrating injury, and patients undergoing small bowel resection during elective hepatobiliary procedures. Venous blood was taken before anaesthesia, intra-operatively and on post-operative day 1. CRF extracted from tissue and blood was quantified using radio-immunoassay. On D1 postoperatively intestinal permeability was tested by urinary lactulose: mannitol (L:M) measurement. Institutional ethical approval was granted and patients gave written informed consent.

RESULTS: Trauma patients (n=6, M/F=6/0, age 27 ± 10.2 years, ISS 23 ± 6.8) were younger than elective patients (n=6, M/F=4/2, age 52.8 ± 7.7 p<0.0006). Trauma cases had significantly lower mean ± SD tissue [CRF] (0.034 ± 0.015 x 10^{-3} % total protein vs 0.117 ± 0.075 x 10^{-3} %TP, p=0.023) than elective patients. The median (IQR) intra-operative blood CRF level was higher in trauma (86.7 (5.5) pg/ml vs 59.8 (9.6) pg/ml, p=0.03) than elective patients. In trauma this correlated negatively with post-operative L:M (r =-0.9, p=0.037), although intestinal permeability was greatly and equally increased in both groups (combined mean ± SD L:M 0.58 ± 0.55).

CONCLUSIONS: CRF is detectable in bowel tissue following trauma and is significantly lower in trauma vs elective surgery patients, while CRF in peripheral blood may be a factor associated with gut barrier changes following shock and emergency laparotomy.

References

1. Santos J, Yang P-C, Söderholm JD, *et al.* Role of mast cells in chronic stress induced colonic epithelial barrier dysfunction in the rat. *Gut* 2001; **48:** 630-636
2. Saunders PR, Santos J, Hanssen NPM *et al.* Physical and psychological stress in rats enhances colonic epithelial permeability via peripheral CRH. *Dig Dis Sci* 2002; **47:** 208-15

ACTION RESEARCH IN THE INTENSIVE CARE UNIT

N Jordaan, Y Botma, M Phillips

School of Nursing, University of the Free State

Action research was use in the development of a safe procedure in turning a patient to the prone position and back to the anatomical position. Action research is a cyclic procedure improving the procedure with each cycle.

The critical care nurse is daily faced with the development of new devices and equipment with often-limited guidelines and procedures. The responsibility therefore rests on the critical care nurse to develop and ensure safe procedures in the intensive care unit. The application of action research in the development of the abovementioned procedure and future applications of this type of research will be discussed.

Patients in intensive care units can be turned to the prone position to improve oxygenation. Due to all the risks involved in the prone procedure, proning is often considered as only a last resort of support. Equipment to assist in proning a patient do exist (the PRONimbus®), but a safe procedure to turn a patient on this equipment has not been developed.

The purpose of this study was to develop a safe procedure to turn a patient 180°. The prone procedure was performed from a Nimbus® to a PRONimbus® and back.

Action research was considered the most suitable research design, as it is a participative and cyclic process changing between action and critical reflection. With the co-operation of staff in the intensive care unit, this study aimed at improving the effectiveness of the prone procedure.

The development of the prone procedure consisted out of two developmental cycles and one validity cycle. A simulated patient was used during the developmental cycles. The validity cycle was performed on a critically ill patient. The four observers evaluated the prone procedure as well as the safety of all the participants by means of a control list and a monitoring list. On completion of every cycle, all the participants reflected on their experience of the particular cycle. These reflections were used to improve the prone procedure.

A final literature based and safe prone procedure was developed and will be presented to the practice. The use of this prone procedure will meet the criteria of quality nursing care.

The success of this study can be applied to develop more complex procedures with which the critical care nurse is faced so often.

SURVIVAL AND HEALTH-RELATED QUALITY OF LIFE 12 MONTHS FOLLOWING DISCHARGE FROM AN ADULT SURGICAL INTENSIVE CARE UNIT

Karachi F
Physiotherapy Department, Tygerberg Hospital, Western Cape, South Africa

Hanekom S, Faure M
Physiotherapy Department, Stellenbosch University, Western Cape, South Africa

INTRODUCTION: This study forms part of a baseline study conducted on patients admitted to the adult surgical ICU at Tygerberg Academic Hospital in South Africa between July and October 2003. The main aim of this follow-up study was to determine the survival rate 12 months following admission and the health-related quality of life (HRQoL) of this cohort at 12 months following discharge. A further aim was to determine the relationship between the selected demographic and ICU variables and the survival rate and HRQoL scores.

METHODS: This prospective observational cohort study was conducted via telephonic interviews. Survival status was confirmed telephonically, from medical records or the hospitals electronic database. The UK Short Form-36 version 2 (SF-36v2) and a self-developed questionnaire were used to measure the HRQoL scores and to obtain the selected variables for comparison. The HRQoL scores were calculated using the UK SF36v2 scoring system.

RESULTS: The total population of 180 subjects were included in the survival analysis. The cumulative survival rate was 62%. APACHE II was the only variable significantly associated to long-term survival ($p<0.01$). Forty-six subjects completed the HRQoL questionnaire. The mean SF-36 HRQoL domain scores ranged between 43% and 53%. Age and APACHE II were significantly associated with the social functioning ($p=0.01$) and physical functioning ($p=0.02$) domains respectively. None of the other variables were significantly associated with any of the HRQoL domains.

CONCLUSION: The long-term survival of this ICU population suggests that the standard of care provided by this third world ICU setting is similar to that of first world ICU settings. Even though the HRQoL outcomes are slightly lower than international ICU populations, the domains affected are comparable to them. APACHE II may also be a useful contributor in predicting long-term physical functioning outcomes. Low scores in the physical functioning, role-play and role emotion domains indicate a need for further physical and emotional rehabilitation.

ACIDIFIED FORMULAE IN THE ICU

J Kruger[1], D Labadarios[2], C Fourie[3]
[1]Human Nutrition, [2]Head of Human Nutrition, [3]Head of Surgical ICU, Tygerberg Academic Hospital and Stellenbosch University, Cape Town, South Africa

INTRODUCTION: This trial determined whether acidified enteral formulae (pH 3.5 and 4.5) altered gastric and tracheal colonisation as well as microbial contamination of the enteral feeding delivery system, when compared with a non-acidified control formula (pH 6.8).

METHODS: A controlled, single centre, double-blinded, randomised clinical trial of three parallel groups. Sixty-seven mechanically ventilated, medical and surgical critically ill patients were included in the trial. Microbiological analyses of the enteral formulae were determined during reconstitution and administration thereof (feeding bottle and delivery set). Nasogastric and tracheal aspirates microbiology, haematological evaluation and gastro-intestinal tolerance were determined. Means and standard deviations were calculated for baseline parameters and compared using the Kruskal-Wallis test. Longitudinal data was compared using the PROC MIXED model. Level of significance was set at $p<0.05$.

RESULTS: Gastric pH showed no significant difference between the 3 feeding groups at baseline prior to administration of enteral formulae. After initiation of feeds, gastric pH decreased significantly and remained low in the acidified formulae compared to the control formula. Patients who received acidified enteral formulae had significantly less contamination of the enteral feeding delivery systems in respect of *Enterobacteriaceae* and *Enterococcus*. The acidified group (pH 3.5) showed significantly less gastric contamination with *Enterobacteriaceae*. The pH 3.5 acidified group had the lowest gastric growth in colony counts, compared to the control group. No significant difference between the groups was found for tracheal colonisation.

CONCLUSION: Acidified enteral formulae significantly decreased gastric colonisation by preserving gastric acidity. Acidified formulae significantly decreased bacterial contamination of the enteral feeding delivery system, resulting in bacteriologically safer enteral feeds.

A CONTROLLED RANDOMISED STUDY TO EVALUATE THE ONSET AND IDENTIFICATION OF PATHOGENS IN NON-COATED POLYURETHANE AND SILVER NANO-PARTICLE IMPREGNATED POLYURETHANE CENTRAL VENOUS CATHETERS

J M Oosthuizen

METHOD: This is a randomized study performed in the Intensive Care Unit of Kimberley Hospital Complex. The investigative population consisted of 60 patients admitted to the Intensive Care Unit for a minimum period of seven days. All of the participants included required the insertion of a central venous catheter. Patients were randomized into two groups. In group 1 a non-coated central venous catheter was inserted. In group 2 a silver nano-particle impregnated central venous catheter was inserted. The study procedures commenced after an informed consent document was completed.

INTRODUCTION: Insertion of central venous catheters in the Intensive Care Unit is an integral part in the management of a patient. Central venous catheter insertion has associated indications and contraindications as well as the potential of developing complications. This adds to the increasing costs of management, prolongation of the stay in Intensive Care Unit and an increase in the morbidity and mortality of patients.

OBJECTIVE: A decrease in the incidence of growth of pathogens during day one to seven with the indwelling silver nano-particle impregnated central venous catheter in comparison to the non-coated central venous catheter will be demonstrated.

CONCLUSION: A statistical significant difference was found in the number of positive cultures obtained from the non-coated central venous catheter and silver nano-particle impregnated central venous catheter. Over a 7-day period this implies that the non-coated central venous catheter had less catheter related bloodstream infections, making it a more cost effective product to use.

ICU OUTCOME IN A SERIES OF 245 CARDIOTHORACIC PATIENTS

Fathima Paruk[*], Satish Bhagwanjee[*], Kathy Vanderdonck[#], Fanie Cronje[#], Piet J Becker[**]
Departments of Anaesthesiology, Cardiothoracic Surgery[#] and Therapeutic Sciences**, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg*

INTRODUCTION: Mortality prediction in patients undergoing cardiothoracic surgery has largely been studied by focusing on preoperative factors. Yet there is no consensus with respect to what constitutes the ideal outcome predictive tool.

OBJECTIVES: To: (*i*) describe the ICU cardiothoracic patient profile, (*ii*) evaluate the Euroscore (standard and logistic) in coronary artery bypass graft (CABG) surgery, (*iii*) ascertain factors associated with mortality.

METHOD: A retrospective study conducted over a 1-year period in the Cardiothoracic ICU at Johannesburg Hospital, South Africa.

RESULTS: 245 patients were admitted during the study period following CABG (n=87), valve (n=127) and miscellaneous (n=31) surgery. The mean age was 49 years and the mean duration of ICU stay was 4.5 days. The overall mortality was 12.2%. The Euroscore (standard and logistic) did not predict outcome and was similar for CABG surgery survivors and non-survivors. Preoperative insertion of an intraaortic balloon pump and preoperative cardiac failure were associated with a significant increase in mortality ($p<0.05$). The intraoperative bypass time was significantly longer in nonsurvivors compared to survivors ($p=0.01$). Postoperatively, major haemorrhage (>1litre), nosocomial sepsis, extubation failure and organ failure were significantly higher in nonsurvivors compared to survivors ($p<0.05$). These observations pertain to the entire cohort. The subsets of CABG and valve surgery patients did display certain unique attributes.

COMMENT: A prospective study is indicated to develop and validate an outcome prediction in this patient population.

THE EFFECT OF THREE TYPES OF ENDOTRACHEAL TUBES ON VENTILATOR – ASSOCIATED PNEUMONIA

M Phillips, Y Botma, R Nel
School of Nursing, University of the Free State

INTRODUCTION AND AIM: Ventilator-associated pneumonia is associated with high mortality, morbidity and medical costs. Invading devices like the endotracheal tube contribute to the development of ventilator-associated pneumonia. Subglottic secretions leak past the cuff, contaminating the sterile lower respiratory tract. The aim of the study was to determine the effect of three types of endotracheal tubes on ventilator-associated pneumonia.

METHODOLOGY: A single-centre, blind, prospective controlled clinical trial compared the effect of the Hi-Contour™ (conventional endotracheal tube), HiLo™ (facilitating subglottic suctioning) and HiLo Evac™ (facilitating subglottic suctioning and automatic cuff pressure maintenance) on ventilator-associated pneumonia in neurosurgical patients.

RESULTS: Two patients in the control group and none of the subjects in the experimental groups developed late-onset ventilator-associated pneumonia. Early-onset ventilator-associated pneumonia was identified in two of the study groups.

CONCLUSION: The prevention of ventilator-associated pneumonia in the experimental groups cannot solely be attributed to the performance of subglottic suctioning, according to the relative risk result. Preventive measures included in the research design may have contributed in the prevention of ventilator-associated pneumonia. The key in the prevention of ventilator-associated pneumonia in the intensive care unit may not be the application of only one strategy, but is to stringently utilize all preventative strategies.

THE USE OF THE PLANI PRONING PILLOW TO FACILITATE MORE EFFICIENT AND SAFER PRONING OF PATIENTS

Natascha Plani
Union Hospital, Alberton

Frank Plani
Johannesburg Hospital Trauma Unit, Department of Surgery, University of the Witwatersrand, Union Hospital, Alberton

Prone positioning for patients suffering from acute respiratory distress Syndrome (ARDS) has been well documented since its first description by Bryan in 1974.In the intensive care unit (ICU) of the Union Hospital proning has been much more extensively used recently for early ARDS, severe lung contusion and unventilatable patients.

Proning is a technique associated with certain risks, notably accidental line or endotracheal (ET) tube dislodgements. The most prevalent complications are facial oedema and pressure sores of the face, thorax, iliac crests and knees. Proning is also perceived as a difficult procedure that increases workload of nursing staff significantly.

At present, normal pillows are mostly used to position patients in prone. Major difficulty is often experienced in trying to maintain a free hanging abdomen, especially in obese patients and those with pendular abdomens. This is important for better diaphragmatic excursion. The ET tube is often compressed, especially in patients with short necks.

The Plani Proning Pillows, consisting of three pieces, is an inflatable device designed to facilitate easier and safer proning of patients. The pillows are anatomically shaped to achieve optimal positioning.

In 8 proning cycles involving 4 patients utilising the pelvic and chest pillows, all nursing staff felt that the procedure was easier, safer, and required less manpower. A good position with free hanging abdomen was easily achieved in all these cycles, six of which involved obese patients.

None of the patients developed any pressure sores on the chest or iliac crests and this included patients involved in more than one proning cycle.

A headpiece was added to achieve better head position and to decrease the incidence of pressure sores. The headpiece has not yet been tested.

In conclusion, the Plani Proning Pillows facilitate easier and safer proning of patients, decreasing the reluctance of nursing staff to use this effective and cheap technique to improve patient oxygenation.
