

ABSTRACTS OF SOCIETIES

Scottish Intensive Care Society

26th and 27th January 2007 at Dunblane

Oral Presentations

Comparison of Outcomes: Tight Glycaemic Control Regimen and Historical Controls

K Ray, R Bannerjee, H McGarvie, G Simmons, M C Bellamy

St James's University Hospital, Leeds LS9 7TF

Introduction: We have assessed the effects of a tight glycaemic control (TGC) protocol in critically ill patients in a mixed tertiary-referral adult intensive care unit and compared glycaemic control and patient outcomes with historical controls.

Methods: We developed and implemented a "glucose clamp" protocol based on published models. We compared the effects of this protocol by retrospective review of intensive care unit charts and data abstraction from an electronic database for 200 consecutive admissions in the months December 2005 – February 2006 with a similar period December 2003 – February 2004 when insulin was given by a "sliding scale" according to perceived clinical need. We compared patient characteristics at admission, diagnosis and illness severity between the time periods. We compared daily insulin requirements, median blood sugars and the number of hypoglycaemic episodes. Finally, we compared mortality data in the two periods. We prepared a logistic regression model based on the earlier period to describe mortality risk (ICU and hospital) and compared predicted with actual mortality in the later period. **Results:** Data are given as 2004, 2006; expressed as mean (95% confidence interval) or median (interquartile range). There were no differences between patients at admission: age 61.5 (50.5-73) v 62(45-72) years; gender 54.5% male v 52%; weight 71.5(68.7-74.2) v 71.8(69.5-74.1) kg; medical/surgical origin 49.5% v 48.2%; elective admission 29% v 25.1%; APACHE score 21.5(16-28.5) v 19(12-27); admission blood glucose 7.9(7.5-8.3) v 8.4(7.9-8.8) mmol.L⁻¹. However, the mean daily insulin delivered in 2004 (ad hoc sliding scale) was 12.1(9.3-15.0) U, but in 2006 had risen to 18.4(14.4-22.5) U, P<0.02. This was associated with a reduction in the number of hypoglycaemic episodes from 57 in 948 patient days to 18 in 1011 patient days (P<0.01). Surprisingly, the mean blood glucose concentrations were the same: 7.35 v 7.6 mmol.L⁻¹ (95% CI of difference – 0.66 – 0.15). ICU mortality fell slightly from 27(20-33)% to 21(15-27)%, P=0.21, whereas hospital mortality fell from 41(34-48)% to 29(22-35)%, P<0.01. The ICU survival model fitted the 2004 dataset well (ROC AUC 81%) and predicted a 2006 ICU mortality of 25(22-28)%. The hospital mortality model fitted the 2004 data well (ROC AUC 81.3%) and predicted a 2006 hospital mortality of 41(37-45)%. **Conclusions:** The study is limited by its design (historical controls). Nevertheless, patient characteristics

were very similar between the 2 time periods. The TGC protocol was associated with higher insulin doses delivered and fewer hypoglycaemic episodes despite achieving similar mean blood sugar values to ad hoc sliding scale prescriptions. There was a lower ICU and hospital mortality in 2006, although the predicted mortality based on patient characteristics gave figures almost identical to the 2004 mortality rates. Some groups have suggested that insulin administration rather than TGC may be responsible for improved outcomes. It is likely that the mortality improvements seen here were genuine, but it is not possible to say whether they were related to implementation of better glycaemic control.

Please refer to www.smj.org.uk for references

Reduction in MRSA Acquisition Associated with the Introduction of an Infection Surveillance and Continuous Quality Improvement Programme.

K Ellis, A Longmate

Intensive Care Unit, NHS Forth Valley, Stirling Royal Infirmary, FK8 2AU.

Introduction: MRSA (Methicillin Resistant Staphylococcus Aureus) acquisition rates in ICU's are reported to be about 5%.

¹ Process measurement has been shown to reduce ICU acquired infections.² **Methods:** An ICU infection surveillance and quality improvement programme was commenced in September 2005. Data collection, educational feedback and training for staff was performed by a dedicated nurse. MRSA screening was performed in all admitted patients. Initial MRSA negative screening followed by MRSA colonisation or infection on subsequent screening in patients remaining 2 calendar days or more was classified as an episode of ICU acquired MRSA. Patients leaving the unit within 2 calendar days were excluded. All staff members were actively encouraged to improve upon existing positive infection control attitudes and behaviours through a programme of systematic formal and informal educational activities. Contemporaneous graphs illustrating the number of patients admitted since the last MRSA acquisition were openly displayed in the form of a statistical process control (SPC) "g-chart" (geometric distribution chart) (fig 1 see www.smj.org.uk for figure). Educational activities were linked to discussion of the results and positive feedback given when appropriate. **Results:** MRSA acquisition rate over the 14 month study period was 4.7% (n=23) compared to a rate of 10% in 2004.³ The SPC chart demonstrates an increase in numbers of patients admitted between MRSA acquisitions as the plot progresses. Criteria for special cause variation are met as the final plot has crossed the upper control line (3 standard deviations). Health care provision in Forth Valley within intensive care and beyond has undergone great change in the past year and confounding variables that might affect MRSA acquisition are numerous.

Conclusion: We conclude that there is a reduction in MRSA acquisition rate associated with the introduction of a surveillance and quality improvement intervention.

Please refer to www.smj.org.uk for references

Practical Barriers to the Implementation of Early Goal Directed Therapy in the UK: Trainee Skills and Awareness

M MacKinnon¹, SJ McNally², M Hawkins³

¹Department of Anaesthesia, Western Infirmary, Dumbarton Road, Glasgow.

²University Department of Surgery, Royal Infirmary of Edinburgh, Edinburgh.

³Department of Anaesthesia, Stirling Royal Infirmary, Livlands Gate, Stirling.

Introduction: The Surviving Sepsis Campaign (SSC), launched in 2004, hopes to achieve a 25% reduction in sepsis mortality within five years. Its guidelines, divided into 'bundles' of care, include early goal-directed therapy¹ (EGDT) to be delivered within the first six hours of treatment. In the UK, patients with severe sepsis are often initially managed by a Specialist Registrar (SpR) physician or surgeon before referral to the intensive care team. The time taken to referral will vary, and the initial 6 hour bundle of care may need to be provided by the parent team for the patient to benefit. Thus, it is essential these doctors are aware of the SSC and EGDT. This study is the first to investigate this awareness in SpRs in acute specialties in the UK. **Methods:** A questionnaire was designed for online access. Questions included: practical skills pertaining to the delivery of EGDT; and awareness of SCC and EGDT. Email invitations were sent to SpRs in Anaesthesia, General Surgery and General Medicine across Scotland. The survey was open for completion for 3 months. A power calculation indicated 30 replies per specialty were required (power 0.9; p<0.05). **Results:** 185 responses were obtained: 56 Anaesthetists; 50 Surgeons; 79 physicians. The majority of anaesthetic trainees were aware of SSC and EGDT, compared with ~ 50% of medical trainees (table 1 see www.smj.org.uk). Of all the respondents, only 34% had the full complement of skills and knowledge to implement EGDT, including line insertion and initiation of vasopressors. **Conclusions:** This study demonstrates that, in the UK, the SSC is not penetrating fully beyond anaesthesia and intensive care. Awareness of the SSC in other acute specialities needs to be addressed if the 25% mortality reduction is to be achieved. If doctors managing septic patients are unaware of the necessity for rapid normalisation of deranged physiology, the window for optimum therapy will be missed. Most non-anaesthetic SpRs also lack some key skills to fully provide EGDT. It is therefore imperative to ensure timely referral to appropriately skilled staff.

Please refer to www.smj.org.uk for references

A Survey of Prescribing Errors in Intensive Care

K Went, P Antoniewicz, DA Corner, P Gregor, A Mathewson, S McLeod, I.W Ricketts, AJ Shearer

Intensive Care Unit, Ninewells Hospital, Dundee, DD1 9SY

This paper reports on an audit of the current prescribing system employed in the Intensive Care Unit (ICU) at Ninewells Hospital Dundee. The audit was carried out to identify deviations from local prescribing procedures, with an aim of addressing these through the introduction of an electronic system. Identifying the prescribing process errors that occur in ICU allows an understanding to be formed of how they can be prevented.¹ Doing this also provided a baseline for future comparison with an alternative electronic system to quantify the level of non-compliance with local standards. The prescription process can be split into two categories; the clinical and technical aspects of prescribing. This audit focussed on the technical aspects. The audit was carried out over a 15 week period, 21 November 2005 until 7 March 2006. In this time 90 prescription charts were viewed and audited for 68 different patients. The audit consisted of checking the chart against 15 standards and documenting whether they were met or not. The standards were derived from the local hospital Safe and Secure Handling of Medicines Policy.² All of the charts viewed contained at least one non-compliance. Of the 1,921 individual medical prescriptions viewed 30% contained at least one deviation, with some prescriptions containing several.

Please refer to www.smj.org.uk for references

An Audit to Investigate the Nutritional and Physical Outcomes of Patients on the Ward and at Hospital Discharge Following a Prolonged Intensive Care Stay.

JL Merriweather, LG Salisbury

Edinburgh Royal Infirmary, 51 Little France Crescent, Old Dalkeith Road, EH16 4SA.

Background: Following a prolonged intensive care stay patients frequently suffer both physical and psychological impairments.¹ Evaluation of interventions for this patient group is limited and little research has focused on enhancing physical recovery, in particular during the ward phase immediately after a prolonged intensive care stay. At Edinburgh Royal Infirmary, a multi-disciplinary group was formed to develop a follow-up service to patients after discharge from the Intensive Care Unit (ICU). An audit was undertaken to identify the nutritional and physical issues encountered during the ward phase. Our aim was to establish the physical and nutritional problems during their ward stay and to explore patient discharge destination and outcomes. **Methods:** A three month audit was carried out from June to August 2006. Patients were included if they had an ICU

stay >4 days and were subsequently transferred to a ward at Edinburgh Royal Infirmary. Exclusions were a diagnosis of suicide attempt/overdose, discharge for palliative care, or discharge to an established follow-up rehabilitation service e.g. liver transplant or stroke. Outcome measures were collected weekly and included the Rivermead Mobility Index, Timed Up and Go, 10m walk, handgrip dynamometry and anthropometrics. In addition, all physical and nutritional interventions received on the ward and problems encountered were recorded. **Results:** Fifty-seven patients were discharged after >4 days in ICU during the audit period. Twenty-four met the audit inclusion criteria. Exclusions/missed patients (N = 33) were discharge home before follow-up (11); transfer to another hospital (9); suicide attempt (3); palliative care (2); death on ward (2); liver transplants (2); transferred back to ICU (1) and lost to follow-up (1). 12 male and 12 female patients were followed up. Median age was 62.5 years (54-69.25); median APACHE 19.5 (15.25-23.75); median length of ICU stay 17.75 days (6.98-36.33); and median ventilation days of 9 (3.25-23.75). The median length of ward stay was 25.5 days (12.75-42.25). 62.5% of the patients were discharged directly home, 4.2% went to another hospital, 20.8% went to rehabilitation and 12.5 % died while on the ward. Problems identified at ward level included discharge to a variety of specialist wards, isolation in side rooms, dislodgement of naso-gastric tubes, variable dietetic input and a lack of physiotherapy for mobility issues. At discharge, the median values of the outcome measures were Rivermead Mobility Index 7, timed up and go 13.53 seconds and 10m walk test 12.35 seconds. Mean handgrip dynamometry was only 51% of the normal value. Anthropometric measurements were not possible in 29% of the patients. Of the remaining patients 19% had a mid arm muscle circumference under the 5th centile; 5% of patients had a triceps skinfold thickness measurement under the 5th centile. Together these data indicated severe physical disability and impairment, together with poor nutritional state, in most cases. **Conclusions:** Patients requiring prolonged ICU stay are discharged with significant nutritional depletion and impaired physical function. Most are discharged directly home without formal rehabilitation. Enhanced rehabilitation could improve outcomes.

Please refer to www.smj.org.uk for references

Endogenous Urate Production Augments Plasma Antioxidant Capacity in Healthy Lowland Subjects Exposed to High Altitude.

JK Baillie¹, MGD Bates¹, AAR Thompson¹, WS Waring², RW Partridge¹, MF Schnopp¹, A Simpson¹, F Gulliver-Sloan², SRJ Maxwell², DJ Webb².

¹Apex (altitude physiology expeditions), c/o College of Medicine & Veterinary Medicine, University of Edinburgh, The Queen's Medical Research Institute, 47 Little France Crescent, Edinburgh EH16 4TJ, UK

²Clinical Pharmacology Unit, Centre for Cardiovascular Science, University of Edinburgh, The Queen's Medical Research Institute, 47 Little France Crescent, Edinburgh EH16 4TJ, UK

Introduction: Both tissue hypoxia *in vitro*, and whole-body hypoxia *in vivo*, have been found to promote the release of reactive oxygen species (ROS) that are potentially damaging to the cardiovascular system. ROS release in hypoxia can alter vascular endothelial permeability, which may be a key component of the pathogenesis of high-altitude pulmonary oedema and high-altitude cerebral oedema.¹ Antioxidant systems protect against oxidative damage by ROS and may exhibit some degree of responsiveness to oxidative stimuli.² Production of urate, a potent soluble antioxidant, is increased in hypoxic conditions.³ We therefore aimed to determine whether urate is an important antioxidant defence in healthy subjects exposed to hypoxia. **Methods:** We conducted a cohort study of 25 healthy lowland volunteers during acute exposure to high altitude (4 days at 3600m, followed by 10 days at 5200m) on the Apex high altitude research expedition to Bolivia. We measured markers of oxidative stress (8-isoprostane F₂), serum urate concentration, and total plasma antioxidant activity by two techniques: ABTS spectrophotometry (TAS) and enhanced chemiluminescence (ECL). **Results:** On ascent, F₂-isoprostane levels were significantly elevated compared with those at sea level ($p < 0.01$). After 1 week at high altitude, plasma antioxidant capacity by both TAS and ECL, and serum urate concentration, were significantly elevated (each $p < 0.01$ vs sea level), and F₂-isoprostane levels were reduced to sea-level values. There was a highly significant correlation between plasma urate and antioxidant capacity at this stage (ECL $r^2 = 0.59$, $p = 0.0001$; TAS $r^2 = 0.30$, $p = 0.0062$). **Conclusions:** Our results support the hypothesis that urate may act as a responsive endogenous antioxidant in high-altitude hypoxia.

Funding: This research was funded by a project grant from the British Heart Foundation (Grant No. PG/2001067), a small project grant from Chest, Heart and Stroke Scotland (Grant No. 230103), and by the Scottish Charity Apex (Altitude Physiology Expeditions): www.altitudephysiology.org.

Please refer to www.smj.org.uk for references

Generic "Quality of Life" Measures Following Critical Illness; the Emperor's New Clothes?

P Ramsay¹, T Walsh¹, G Huby² and A Thompson²

¹Intensive Care Unit, Royal Infirmary of Edinburgh, Edinburgh, EH16 4SA

²School of Health in Social Science, University of Edinburgh, Teviot Place, Edinburgh EH8 9AG

The measurement of health-related quality of life (HRQoL) among survivors of critical illness has become a prominent feature of our outcomes research. Local research experience suggests that existing measures may fail to capture the broad

spectrum of morbidity that survivors experience. The purpose of this research is to explore, through predominantly qualitative methods, critical-illness mediated morbidity among survivors of prolonged critical illness; a group in whom this type of morbidity appears to be most prevalent. An important secondary aim is to explore the contribution of the processes of rehabilitation and recovery to perceptions of HRQoL. Survivors who experienced prolonged critical illness (defined as ≥ 14 day's mechanical ventilation) were identified from the Scottish Intensive Care Society Audit Group's (SICSAG) database, Wardwatcher® at the 3 participating ICUs across Lothian. Participants were contacted at up to 6 months following ICU discharge, and were invited to complete professionally recommended quality of life questionnaires (the Short Form 36 and EuroQol-5D) and to participate in semi-structured interview. Interviews explored experiences of ongoing morbidity and were analysed with regard to their correlation with the domains and scores of the HRQoL questionnaires. Purposive sampling provided clinically important insights into experiences and perceptions of health and pre-existing morbidity and importantly, the processes of rehabilitation and recovery, i.e. through comparison of (i) patients with/without appreciable pre-existing disease and (ii) patients receiving ward-based rehabilitation alone with those who receive "augmented" ward-based rehabilitation (e.g. stroke wards) or formalised rehabilitation in dedicated facilities. 10 of the required 40 interviewees have been recruited to date. Preliminary analysis confirms that survivors experience a range of morbidity not well captured by professionally recommended measures. Pre-existing disease appears to be an important factor in both coping with new morbidity superimposed by critical illness, and in marshalling support. The process of rehabilitation appears to have important effects on perceptions of recovery, self-management strategies, and perceived HRQoL.

Acknowledgements: Funding for this PhD studentship is provided by the Centre for Integrated Healthcare Research (CIHR). The research project is funded by the Research and Development Department of the Royal Infirmary of Edinburgh.

Please refer to www.smj.org.uk for references

The full version of all Poster Presentations are available at www.smj.org.uk

A Survey of Trace Element Use in Scottish ICUs

A Duncan, J Kinsella, D StJ O'Reilly

Implementing a Glycaemic Control Protocol in a Tertiary Intensive Care Unit

K Ray, R Bannerjee, H McGarvie, G Simmons, MC Bellamy

Severe Cerebral Fat Embolism Syndrome Causing Brain Death, after Long Bone Fractures, Damage Control Orthopaedic Surgery and Acetazolamide Therapy

C Walshe, DJ Cooper, T Kossmann, L Iles

Metabolic Acidosis in Intensive Care; a Survey of Aetiology and Mortality

A Conway Morris

Fever in the Intensive Care unit: an Audit of Current Practice

S Berryman, SA Stott

Do Leuco-Depleted Allogeneic Red Cells Cause Leucocytosis Following Transfusion to Critically Ill Patients?

E Saleh, TS Walsh

National Arterial Line Survey: Postal Survey of Intensive Care Units in Mainland Britain

C Tallon, S Deep, S Deshpande et al

Survey of Oral Care of Patients with Natural Teeth in Intensive Care Unit

A Kamat, C Beecroft, A Shearer, G Phillips, A Shearer

The Calculated Ion Gap: a Novel Predictor of Mortality in the Critically Ill Surgical Patient

EF Leitch, E Dickson, A McBain, et al

C-reactive Protein Predicts Mortality on Admission to a Surgical High Dependency Unit

EF Leitch, EJ Dickson, A McBain, et al

Greater than the Sum of its Parts: C-Reactive Protein and the Calculated Ion Gap Together are Superior in Predicting Mortality in Critically Ill Surgical Patients

EF Leitch, EJ Dickson, A McBain, et al

An Experience of Daily Sedation Breaks and Unplanned Self-Extubation

P O'Brien, D Campbell, S Crofts

A Comparison of Weight and Height Based Approaches for Calculation of Tidal Volumes in ARDS

PM O'Neil, R Bloomfield, E Steel, G MacLennan, DW Noble

Pre-hospital Hypotension which Persists on Arrival to the Emergency Department is a Powerful Predictor of Mortality Following Major Trauma

EJ Dickson, D van Niekirk, SJ Robertson, J Goosen, F Plani, KD Boffard

A Single Episode of Pre-Hospital Hypotension Predicts the Need for Early Operative Intervention Following Major Trauma

EJ Dickson, D van Niekirk, SJ Robertson, J Goosen, F Plani, KD Boffard

Ambulance Transport is Associated with a Higher Mortality than Private Transport following Major Penetrating Trauma in a Semi-Urban Environment

EJ Dickson, D van Niekirk, SJ Robertson, J Goosen, F Plani, KD Boffard

The Successful Introduction of a 'Central Line Care Bundle' within an Intensive Care Unit

S Christie, J Joss, D Campbell, I Mellor, S Crofts

Phone Survey of UK Intensive Care Units Practice for Monitoring Central Venous Catheters

C Barker, KJA Lake, P Jefferson, DR Ball

A Comparison of Outcomes of Elderly Age Group Patients Admitted to the Intensive Care Unit

A Johnston, C Hawksworth

Management of Upper Gastrointestinal Bleeding in the Critical Care Setting

LE Christie, CE Hannah, TS Walsh

Comparison between two Feeding Regimens in the Volume of Feed Delivered and the Control of Blood Glucose in an Intensive Care Unit

J Maybin, B Miles

Care Bundle reduces Central Venous Catheter Related Blood Stream Infections

DG Swann, T Barber, KL Everingham, IF Laurenson, TS Walsh, B Cook

Outcome of Decompensated Alcoholic Liver Disease in Intensive Care

TS Wijesingha, I de Beaux

Central Vascular Access- a Survey of Practice in Glasgow

N Hemmings & C Gilhooly