

to a failure of the anticipated vertical integration of such subjects throughout the undergraduate curriculum. However, many senior clinicians now feel that the level of anatomical knowledge is insufficient for safe medical practice.<sup>22</sup> Most, if not all of these clinicians will have been educated under the pre-Tomorrow's Doctors system, and may expect that students will have been taught anatomy and physiology to the same level as they were, rather than building on the basics that today's students will have. As new courses become more established and their graduates start to permeate throughout the postgraduate structure, perhaps this will change, but it seems likely that the importance of the basic medical science subjects will have to be re-emphasised.

Communication skills, plus moral and ethical responsibilities are some of the central themes of 'Tomorrow's Doctors'. Perhaps unsurprisingly, this is not an area touched on by Struthers in his writings. However, he did stress the need for openness and honesty in teaching, research, and professional life, and given his desire for increased clinical exposure of students, it seems likely that he may have accepted the need to put doctors more in touch with the people they are treating. He would have almost certainly disapproved if this were at the expense of basic science teaching.

Professor John Struthers was integral in the establishment of the pre-'Tomorrow's Doctors' medical curriculum. From the study of his writings, it seems apparent that he would recognise that many of the educational principles he advocated during the nineteenth century are still central to medical training in the twenty-first century. He would no doubt wish to remind us though that: "*Unless you are well informed in the foundation sciences and principles, you may practise your profession, but you will never understand disease and its treatment*".<sup>7</sup>

## REFERENCES

1. General Medical Council. 'Tomorrow's Doctors': Recommendations on undergraduate medical education. London: General Medical Council, 1993
2. General Medical Council. 'Tomorrow's Doctors': Recommendations on undergraduate medical education. London: General Medical Council, 2003
3. Rubin P, Franchi—Christopher D. New Edition of 'Tomorrow's Doctors'. Med Teach 2002; 24: 368–9
4. Struthers J. The new five-year course of study: remarks on the position of anatomy among the earlier studies, and on the relative value of practical work and of lectures in modern medical education. Edin Med J 1893; 39: 379–384
5. British Medical Journal. Obituary, Sir John Struthers MD FRCS L.D. BMJ 1899; 1: 561–563
6. Struthers J. Professor Struthers on recent medical legislation. The Aberdeen Journal 1887 October 20
7. Struthers J. Hints to students on the prosecution of their studies: being extracts from the introductory address at Surgeons Hall, session 1855–6. Edin Med J 1856; 2: 353–360
8. Struthers J. The medical school of the future: introductory address at medical school, Surgeons Hall, Edinburgh, October 1895. Edin Med J 1896; 42: 289–300
9. Struthers J. Notes on Medical Education: being replies to the inquiries addressed to teachers by the General Medical Council. Aberdeen: D Chalmers and Company, 1869
10. Keith A. Anatomy in Scotland during the lifetime of Sir John Struthers (1823–1899): being the first Sir John Struthers Anatomical Lecture delivered at the Royal College of Surgeons of Edinburgh, 17 November 1911. Edin Med J 1912; 8: 7–33

11. Anderson PJ. Aurora Borealis Academica: Aberdeen University Appreciations 1860–1889. Aberdeen: Aberdeen University Press, 1899
12. Gillespie AL. Obituary: Sir John Struthers MD LLD. Edin Med J 1889; 5: 433–434
13. Williams MJ. Professor Struthers and the Tay whale. Scott Med J 1996; 41: 92–94
14. Weatherall D. Christmas myth exploded. The Times Higher Educational Supplement, Jan 17, 1997: 27
15. Biddiss M. 'Tomorrow's Doctors' and the study of the past. Lancet 1997; 349: 874–76
16. Heylings DJA. Anatomy 1999–2000: the curriculum, who teaches it and how? Med Ed 2002; 36: 702–710
17. Marton F, Säljö R. On qualitative differences in learning. I – outcome and process. Br J Educ Psychol 1976; 46: 4–11
18. Entwistle NJ, Ramsden P. Understanding Student Learning. London: Croom Helm Ltd, 1983
19. Pennington C. Anatomy and the medical curriculum: the influence of Struthers and Huxley. In: Pennington C. The Modernisation of Medical Teaching at Aberdeen in the Nineteenth Century. Aberdeen: Aberdeen University Press, 1994. 16–34
20. Pryde FR, Black SM. Anatomy in Scotland: 20 years of change. Scot Med J. 2005; 50: 96–98
21. Trueland J. 2005. Centre of excellence. University of Aberdeen Magazine. September 2005; 4: 10–12
22. Waterston SW, Stewart IJ. Survey of clinicians' attitudes to the anatomical teaching and knowledge of medical students. Clin Anat 2005; 18: 380–384

## ABSTRACT OF SOCIETIES

### Scottish Intensive Care Society

#### Oral Presentations

References for all articles can be found online at [www.smj.org.uk](http://www.smj.org.uk)

#### Teamwork in the Scottish ICU

T Reader, R Flin, B Cutbertson

School of Psychology, William Guild Building, University of Aberdeen, AB24 2UB

Studies of patient safety have indicated the importance of having effective teamwork within the intensive care unit (ICU). In particular, lapses in team communication between ICU nurses and doctors have been found to be an important factor in the occurrence of preventable medical errors.<sup>1,2</sup> Pronovost et al.<sup>3</sup> have also cited the importance of open communication between nurses and doctors, in order to create an environment where it is safe for all individuals to participate and speak up when necessary. This is consistent with many high-risk industries, where teamwork, and the processes of teamwork (e.g. communication), are recognised as being crucial.<sup>4</sup> Due to the role of communication in medical errors, it would appear important to measure the perceptions of nurses and doctors with regards to factors influencing the quality of communication in the ICU. To date, relatively little research has been done in the UK ICU environment.

The current study reports on the perceptions of ICU nurses and doctors with respect to communication in the ICU. Employing a questionnaire tool used previously within the US, the study examines perceptions of teamwork in a number of Scottish ICUs. The questionnaire has been used across the US, with associations between interdisciplinary communication, patient length of stays, and risk-adjusted mortality rates being found.<sup>5,6</sup> The questionnaire contains items that measure the quality of communication in the ICU between disciplines (i.e. nurses and doctors), and within disciplines (i.e. senior and junior doctors). Also measured by the questionnaire are perceptions of leadership, satisfaction with communication, understanding patient care goals, and perceived unit effectiveness. The preliminary results show that, overall, staff in ICUs have generally high perceptions of teamwork, similar to the US norm data. However, significant differences in perceptions of interdisciplinary communication openness were found between nurses and doctors. Also, there were significant associations between the leadership and communication scales, and between quality of unit communication and reported understanding of patient care goals.

*The funding for this project comes from a PhD studentship awarded by the College of Life Sciences and Medicines, University of Aberdeen.*

#### Recovery from the Anaemia of Critical Illness is Associated with Resolution of the Inflammatory State Despite a Depressed Erythropoietin Response

A Bateman, TS Walsh

Department of Critical Care, The Royal Infirmary of Edinburgh, Little France Crescent, Edinburgh EH16 4SA

**Background:** Anaemia is present in 80-90% of all patients at intensive care unit (ICU) discharge and persist for long periods in many patients.<sup>1</sup> In chronic

conditions such as renal failure, anaemia is associated with impaired quality of life and significant morbidity, which can be improved by treatment.<sup>2</sup> We investigated the factors contributing to the persistence of anaemia after critical illness. We present data relating anaemia recovery to erythropoietin response and persistent inflammation. **Methods:** Patients who received >24 hours of invasive ventilation and/or >2 organ support were screened for the presence of anaemia at discharge from the medico-surgical ICU of the Royal Infirmary of Edinburgh. Exclusions included ongoing requirement for renal replacement therapy, immunosuppression or known chronic haematological condition. 19 of 30 enrolled patients completed followed up at 1, 3, 6, 9, 13 and 26 weeks post ICU discharge either in hospital or their homes. Blood samples were taken at each visit to measure haemoglobin concentration (Hb), reticulocyte count (*retics*), C-reactive protein (CRP) and serum erythropoietin (EPO) concentration. For analysis, patients were assigned to 2 groups depending upon whether or not Hb levels had normalised by 13 weeks following ICU discharge (7 'responders' and 12 'non-responders'). We compared measured parameters at 3 weeks post-ICU discharge to explore associations with poor recovery in Hb. **Results:** CRP was higher and reticulocyte count lower among non-responders, but there was no difference in erythropoietin concentrations, which were inappropriately low in both groups (Figure 1 and Table I can be found at [www.smj.org.uk](http://www.smj.org.uk)). **Conclusion:** Among anaemic patients discharged from ICU erythropoietin response is inappropriately low. Slow/non-recovery of anaemia is associated with persistent inflammation in the post-ICU period and a hypo-responsive bone marrow.

### Neurones Express Macrophage Inflammatory Protein-2 Following Traumatic Brain Injury in the Rat

JKJ Rhodes, PJD Andrews, J Sharkey

Astellas CNS Research in Edinburgh, the University of Edinburgh, the Chancellor's Building, 49 Little France Crescent, Edinburgh, EH16 4SB

The expression of inflammatory mediators and the recruitment of leucocytes into the acutely injured brain are implicated in the pathogenesis of secondary brain injury.<sup>1</sup> However the inflammatory response to brain injury, its control and modulation remain incompletely described. The neutrophil chemotactic cytokine macrophage inflammatory protein-2 (MIP-2) is expressed *in vitro* by glial and cerebral vascular endothelial cells. The *in vivo* expression of MIP-2 in response to traumatic brain injury has been described previously. The production of this chemokine by glia has been implied but not demonstrated.<sup>2</sup>

We have investigated the cellular localisation of MIP-2 in the lateral fluid percussion model of focal brain injury. In accordance with the Animals (Scientific Procedures) Act 1986 and after review by the animal procedures committee, anaesthetised male Sprague Dawley rats received a moderate (1.7-2.0 atm) lateral fluid percussion injury. At 0, 4, 8, 12 & 24h after injury brains were harvested and dissected into anatomical regions. MIP-2 levels in the cortex were analysed by ELISA.

After injury MIP-2 was significantly increased in the injured cortex, peaking at 4 h after injury and declining rapidly to baseline by 12 h. Immunohistochemical staining of coronal sections from 4 h after recovery with an anti-MIP-2 antibody and the neuronal marker anti-NeuN localised MIP-2 expression to the cytoplasm of shrunken necrotic neurones.

*In vitro* chemokines are expressed by glial in response to pro-inflammatory cytokines. We have localised MIP-2 expression following focal brain injury to necrotic neurones. Our *in vivo* results suggest that chemokine release may also be a fundamental primary response to tissue damage in the brain, initiating neutrophil chemotaxis.

### Implementation of Structured Daily Goals within an Intensive Care Unit

S McLeod, C Lee, D Campbell, S Crofts

Department of Anaesthesia and Intensive Care, Ninewells Hospital, Dundee DD1 9SY

The United Kingdom Safer Patient Initiative, a collaborative between the Institute for Healthcare Improvement & the Health Foundation, aims to improve patient care by ensuring the consistent delivery of best practice. It has been shown that changes in process can lead to changes in outcome. Measurement of the process rather than outcome results in rapid and meaningful data with feedback. One initiative is utilisation of daily goals to improve interdisciplinary communication and provide clear targets that are patient centered. When this model was implemented in one intensive care unit (ICU) there was a fall in length of stay from 2.2 days to 1.1 days.<sup>1</sup> We developed and implemented a 5 element daily goal chart for our unit.

Compliance in use of goals was confirmed in a previous audit at 95.4% in our unit (unpublished data). We have now looked in more detail at the content and success of each goal which were categorised. It was expected for all goals, with the exception of parameters, that a time should be set to meet the goal. The attainment or not of each goal was recorded. Data collection was carried out by a member of staff not connected to the setting of the daily goals.

Data was collected for 133 patient days out of a potential 142 potential patient days (93.6%) over 4 weeks. 540 goals set with 496 (92%) being met. Only 48.9% of appropriate goals were time targeted. 34 goals were not met and in a further 10 the outcome was unknown. When categorised 65.6% were tasks 95.7% with completed: 18.9% were communications with 88.2% completed: 12.6% were parameters with 76.4% completed: 2.2% were miscellaneous with 100% completed: 0.7% were hardware removal with 75% completed.

The setting of daily goals should be multidisciplinary; this was not the case with most goals being medically orientated. The setting of more parameters would perhaps allow the multidisciplinary team to use their unique skills in patient care rather than using a medical model communication is always an area of concern in dealing with the patient, their relatives and others, as it is usually failings in communication that lead to dissatisfaction with hospital care 18.9% of all goals focused on this with 88.2% of these goals being met. We are not yet appropriately completing goals within a time limit.

It is too soon yet to see if this intervention has led to decreased length of stay. The development process is still ongoing but it has become evident that both the methodology and the monitoring of process are powerful tools in the provision of care for an ICU patient.

### Mortality in Patients with Alcoholic Liver Disease Admitted to Intensive Care: Assessment of a New Scoring System

C Goutcher, J Edwards, E Forrest, L Donaldson

Intensive Care Unit, Glasgow Royal Infirmary, 84 Castle Street, Glasgow G4 0SF

Mortality is high in patients with alcoholic liver disease (ALD) who require intensive care (ICU) admission. Several scoring systems have previously been assessed to attempt to predict mortality in this group. Using these scoring systems in clinical practice has been difficult either because of complexity (e.g. APACHE II) or because of lack of objectivity (e.g. Child-Pugh). The Glasgow Alcoholic Hepatitis scoring system (GAHS)<sup>1</sup> is a new, objective scoring system which has been developed and validated for predicting mortality in patients with alcoholic hepatitis. It assigns scores for age, white cell count, urea, prothrombin ratio and bilirubin to give a total score between 5 and 12. This system has not previously been assessed for predicting mortality in patients with ALD admitted to ICU.

We carried out a search of the Ward-Watcher computer database in our ICU. We identified all patients with ALD admitted to ICU from January 2000 to June 2005. Case notes / laboratory databases were checked to confirm the diagnosis of ALD and to get details of the admission. The GAHS was calculated. As in Forrest's study patients were divided into two groups (scores of 5-8 or 9-12). We also calculated a total score for the Cardiovascular (CVS) and Renal sections of the Sepsis-related Organ Failure Assessment (SOFA) score. Likelihood ratios were calculated for each group.

63 patients were identified. Overall ICU mortality was 63% (hospital mortality 74%) consistent with previous studies. ICU mortality in the GAHS 5-8 group was 53% (38/63) compared with 80% in the 9-12 group (25/63). Corresponding likelihood ratios (95% Confidence Intervals) for ICU death were 0.6 (0.4-0.9) and 2.3 (1.0-5.3). The total score for the CVS and Renal sections of the SOFA score combined with GAHS gave ICU mortalities (see table at [www.smj.org.uk](http://www.smj.org.uk))

Patients with alcoholic liver disease who are admitted to ICU have a high mortality. Reversibility of the acute critical illness is often controversial for patients with ALD. GAHS is a simple to use, objective method for predicting those sub-groups who are more likely to survive and would benefit from aggressive ICU support, particularly when combined with the CVS and Renal section of the SOFA score.

### Management of Sepsis and Septic Shock in Critically Ill Patients Transferred by a Dedicated Transport Team in the West of Scotland

AJ Cadamy, I Thomson, A Binning

Intensive Care Unit, Western Infirmary, Dumbarton Road, Glasgow G11 6NT

Over 500 critically ill patients are transferred by a dedicated critical care transport team each year in the West of Scotland. With the advent of

international guidelines for the management of severe sepsis and septic shock there are now criteria by which the management of these conditions can be assessed.<sup>1</sup> We undertook a prospective audit over a three month period to determine what proportion of the patients transferred have these conditions and to determine how management conforms to the guidelines.

Patients were deemed to have sepsis if they had suspicion of infection and two or more of the following: Temp.  $>38^{\circ}\text{C}$  or  $<36^{\circ}\text{C}$ ; WCC  $<4$  or  $>12 \times 10^3 \text{ mm}^{-3}$ ; HR  $>90 \text{ min}^{-1}$ ; RR  $>20 \text{ min}^{-1}$ ; SBP  $<90 \text{ mmHg}$  or MAP  $<65 \text{ mmHg}$  or needing a vasopressor. We adapted sepsis resuscitation bundles derived from the guidelines and devised a data collection form with relation to the following: serum lactate measurement; blood cultures prior to antibiotics; antibiotics given within 3hrs for A&E  $<1$ hr for non-A&E referrals; MAP  $<65 \text{ mmHg}$  and management with a minimum  $20 \text{ ml kg}^{-1}$  fluid challenge, vasopressors, and CVP monitoring; achievement of MAP  $\geq 65 \text{ mmHg}$ ; measurement of central venous oxygen saturation (ScvO<sub>2</sub>).<sup>2</sup> Data were collected for every patient transferred during June, July, and August 2005.

90 patients were transferred from a total of 19 different hospitals during the audit period. Data was available for 82 (91%). 45 patients (55% 95% CI 44-66%) met criteria for sepsis. Of these 8 patients had blood cultures prior to antibiotics (18% 95% CI 8-32%), and in 23 (51% 95% CI 35-66%) this information was not available or unclear. Similarly, 24 patients (53% 95% CI 28-68%) had antibiotics within the time window, and in 17 (38% 95% CI 24-54%) this was unclear. 28 (62% 95% CI 47-76%) patients had circulatory failure with 19 of these (68% 95% CI 48-84%) requiring more than a fluid challenge alone. MAP  $\geq 65 \text{ mmHg}$  was achieved in 43 patients (96% 95% CI 85-100%). Two patients with sepsis had serum lactate measured (4% 95% CI 0.5-15%). 1 patient of the 19 who had not responded to a fluid challenge had ScvO<sub>2</sub> measurement (5% 95% CI 0-26%).

A significant number of critically ill patients with sepsis and septic shock are transferred each year in the West of Scotland. Many have circulatory failure and this is managed consistently with fluids, vasopressor and CVP targeting. Documentation and communication of blood culture withdrawal and antibiotic therapy appears to be poor. Serum lactate and ScvO<sub>2</sub> measurement did not appear to be part of the routine management of patients with sepsis referred for transport. The former may be due to the lack of availability of access to the assay. However, as the use of ScvO<sub>2</sub> measurement and targeting merely requires access to a blood gas analyser, the latter finding may suggest that there is a reluctance to apply some aspects of the recommendations in this group of patients.

### Non-Invasive Assessment of Central Aortic Haemodynamics and Endothelial Function in Critical Care

MJ Duffy, DF McAuley, P Glover, BA Mullin

Regional Intensive Care Unit, Royal Victoria Hospital, Grosvenor Road, Belfast, BT12 6BA

Non-invasive pulse wave analysis (PWA) methods can generate the ascending aortic pressure wave from the radial/brachial pressure wave.<sup>1</sup> In cardiovascular disease, measurements derived from central aortic pressure waveform analysis have been reported to be strong independent predictors of cardiovascular mortality. Moreover, PWA combined with endothelium-dependent  $\beta_2$ -adrenergic vasodilation has been shown to be a simple, repeatable, non-invasive means of assessing endothelial function in vivo.<sup>2</sup> The use of PWA in critical care has not previously been reported. We present pilot data from 13 patients admitted to our intensive care unit (ICU) and 10 age-controls.

PWA measurements were performed using the SphygmoCor<sup>TM</sup> Mx system. The following central aortic haemodynamic variables were determined: the aortic augmentation index (AIx – measure of systemic arterial stiffness), the time to wave reflection (Tr – measure of aortic stiffness), and the Buckberg subendocardial viability ratio (SEVR – measure of subendocardial perfusion). Data are mean  $\pm$  SD.

Compared with the control subjects, in the ICU patients there was a significant reduction in Tr ( $155.5 \pm 12.2 \text{ ms}$  vs  $126.2 \pm 13.3 \text{ ms}$ ,  $p < 0.01$ ) and SEVR ( $171.2 \pm 20.1$  vs  $114.5 \pm 27.2$ ,  $p < 0.01$ ), despite both groups having similar peripheral blood pressures. When the ICU patients were subdivided into septic ( $n=5$ ) and non-septic ( $n=8$ ), the septic patients had a greatly reduced AIx ( $-5.4 \pm 17.0\%$  vs  $28.8 \pm 11.9\%$ ,  $p < 0.01$ ) and a severely impaired response to endothelium-dependent  $\beta_2$ -adrenergic vasodilation (Figure 1 see [www.smj.org.uk](http://www.smj.org.uk)).

As well as providing additional haemodynamic information useful in monitoring the critically ill, data derived from PWA may inform prognosis in the critically ill. Further research is warranted to determine the usefulness of these variables

in critical illness. Of particular interest, PWA may be a useful non-invasive means by which to assess arterial endothelial dysfunction in sepsis.

### Anonymous Incident Monitoring in Critical Care

A Hutchinson<sup>1</sup>, C McAllister<sup>2</sup>, G Lavery<sup>1</sup>, P Caddell<sup>1</sup>, J Adams<sup>1</sup>, P Glover<sup>1</sup>

<sup>1</sup>Regional Intensive Care Unit, Royal Hospitals Trust, Grosvenor Road, Belfast, BT12 6BA

<sup>2</sup>Intensive Care Unit, Craigavon Area Hospital, 68 Lurgan Road, Portadown, BT63 5QQ

Intensive care units are complex patient management environments in which critical incidents occur frequently.<sup>1</sup> The design of this project is based on the previous experience of the Australian Incident Monitoring Study in Intensive Care Units, a well established system, which has proven to be successful.<sup>2</sup> By recording and analysing incidents, we aim to identify patterns and system based failures amenable to change, thus improving patient safety.

The project was undertaken in a 17 bedded ICU / 8 bedded HDU critical care facility over 5 months (May-October 2005). A database, specifically designed for the anonymous collection of incident data, relevant to an intensive care environment, was installed in the unit. The database was designed to be user friendly, to maintain patient and staff anonymity and to prevent access to the data by anyone other than the local coordinators at a later date. An incident was defined as "any event that led to, or could have led to, patient harm if it had been allowed to proceed. It may, or may not, have been preventable and it may, or may not, have involved error." Details were requested on various aspects of the incident and contributing factors, as well as outcome. The system complemented the formal hospital incident report system.

Seventy-five incidents were reported over the 5-month project period. The majority of incidents involved airway management issues (39%), followed by procedures and lines (27%), drug errors (17%), unit management (15%) and environmental problems (3%). Medical staff precipitated 29% of incidents and nursing staff 48%. Most incidents were detected by nursing staff (80%). Incidents were detected within 1 hour of their onset in 63% of cases. Reported incidents resulted in either no, or only a minor, physiological change in the patient's condition in the majority of cases (74%). During the pilot project there were 19 incidents reported through the existing hospital critical incident reporting system.

The anonymous incident reporting scheme has been well adopted by staff. As a result of this project, change has been implemented to reduce further adverse events, and a decision to continue using the database has been made. The system gives staff more direct feedback regarding incidents and staff members appear to be more comfortable using an anonymous system, reflected by the increased numbers reported. The Northern Ireland Incident Monitoring Study will prospectively audit adverse events in several intensive care units in the province.

### Outcomes of Patients Treated with Activated Protein C for Severe Sepsis

AHJ McDonald, DG Swann

Critical Care, Royal Infirmary, 51 Little France Crescent, Edinburgh EH16 4SA

Severe sepsis has a mortality of 21.2-47.3%.<sup>1</sup> Activated Protein C (APC), a mediator of the inflammatory and coagulation systems, reduced hospital mortality of severely septic patients from 34.6% to 29.4% in a randomised controlled trial.<sup>2,3</sup> This therapeutic benefit outweighed the risk of bleeding complications in septic patients with multiple organ failure or an APACHE  $\geq 25$ .<sup>3</sup>

This study assessed the outcomes of patients treated with APC in terms of mortality and organ failure through retrospective analysis of medical records. Expected mortality data was calculated 24 hours after admission to Intensive Care using the APACHE II score. Organ failure was assessed one day before, the four days during, and one day after treatment with APC using the Sequential Organ Failure Assessment (SOFA) score, without the neurological aspect – this was impossible to assess retrospectively.

APC was administered to 48 patients, who on the day of administration had 3-5 failing organ systems. The hospital mortality for the group was 33.3%. Predicted hospital mortality using the APACHE II score and diagnosis was 54.2% (48.2-60.2% CI). This gave an SMR of 0.61.

The figure (refer to [www.smj.org.uk](http://www.smj.org.uk)) illustrates daily SOFA scores of 40 patients with complete data. Mean SOFA scores rose in the day before treatment with APC and then fell. The fall in mean SOFA score reached statistical significance, at  $p < 0.05$ , on day 4 onwards. (The paired t-test was used after confirmation of normal distribution. For non-parametric data, Wilcoxon's test was used)

By day 5, four patients had died and one transferred to another hospital. Four cases of non-fatal bleeding were reported.

Our patients with severe sepsis who received APC had a lower than expected hospital mortality using the APACHE II prediction model. Their hospital mortality was between those of the treatment and control arms of the PROWESS study. Bleeding complications were not a major problem. There was a significant improvement in organ failure after infusion of APC.

#### **Cervical Spine Clearance in the Multiply Injured, Unconscious Patient: Current Practice in the West of Scotland**

*M Burwaiss, P Edgar*

Neurointensive Care Unit, Institute of Neurological Sciences, Southern General Hospital, 1345 Govan Road, Glasgow G51 4TF

In the conscious trauma patient, clinical examination of the cervical spine (C-spine) offers the most sensitive, specific and cost effective method of excluding injury. Unfortunately in the unconscious or multiply injured population presenting to Intensive Care such clinical clearance is rarely possible. Most (90 - 95%) of these patients do not have a C-spine injury and keeping them immobilised unnecessarily for long periods is associated with a number of potentially life-threatening complications. Recently several groups have attempted to outline an optimal imaging strategy to identify those patients in whom it is safe to discontinue spinal immobilisation<sup>1</sup>, with most suggesting a combination of plain radiographs and CT of the entire C-spine within 72 hours of admission as a reasonable standard.

Our unit receives unconscious trauma victims from all over the West of Scotland and we are regularly faced with the problem of "clearing" the C-spine radiologically. There is wide variation between different referring units in the type of C-spine imaging performed. To clarify this issue further we conducted a telephone survey of eleven hospitals in the West of Scotland. We contacted the consultants on-call for both radiology and intensive care and asked them about their current practice in imaging the C-spine in unconscious trauma patients.

Seven hospitals would perform three standard plain radiographs in this situation while three would perform only a lateral C-spine view. All centres would readily progress to CT scanning: eight would scan the entire C-spine while three performed limited scans. All CT scanners were able to complete adequately detailed scans within minutes and a formal report from a consultant radiologist would be available within 24 hours of the scan taking place. If imaging was normal two units would "clear" the cervical spine while the patient remained unconscious: four hospitals awaited return of consciousness irrespective of imaging. The remaining five units would "sometimes" clear the neck in this patient group after discussion with orthopaedic surgeons and radiologists, but admitted this was "very operator dependent". Four hospitals had a protocol for this scenario, although each protocol suggested a different management strategy. One clinician felt that protocols were best avoided in this area.

Little consensus in the management of this patient group was found despite several recent high profile publications. Most hospitals performed and reported the investigations listed above within the suggested time frame, however only two were prepared to act on this and discontinue spinal immobilisation if imaging was normal. Six units did not have a protocol for this issue and felt there should be one.

#### **Ventilator-Associated Pneumonia – One Year's Surveillance**

*JP Aldridge, KL Everingham T Barber, DG Swann*

Critical Care, Royal Infirmary, 51 Little France Crescent, Edinburgh, EH16 4SA  
Ventilator-associated pneumonia (VAP) is a complication affecting 8-28% of ventilated patients. VAP has an average device-associated incidence of 7 per 1000 ventilator patient days (range 1-20). It carries a crude mortality rate of 24-76%. VAP is also associated with prolonged lengths of stay in intensive care and the hospital.<sup>1</sup> VAP is preventable<sup>2</sup> and to audit the effect of preventative measures, it is necessary to have a robust surveillance programme.

We present data of one year's surveillance of VAP in our 18-bedded critical care unit, from 1 December 2004 - 30 November 2005. This is part of the ongoing programme of HELICS<sup>3</sup> (Hospitals in Europe Link for Infection Control through Surveillance). A dedicated research nurse prospectively collected data on patients staying more than 2 days. VAP was defined according to the HELICS protocol. A statistical process control chart has been used to track the incidence of VAP on a monthly basis.

1027 patients were admitted with 559 staying more than 2 days. Of these, 442 were ventilated for a total of 4095 days. 46 episodes of VAP occurred in 42

patients. Therefore 9.5% of patients ventilated for more than 2 days developed VAP. The device-associated rate of VAP was 11.2 cases per 1000 ventilator days. 21 VAP cases were caused by Gram positive bacteria, 35 by Gram negative bacteria and fungi responsible for 5 cases. One viral infection was identified. Mixed organisms were found in 9 episodes.

The incidence of VAP in our unit, its morbidity and mortality is in keeping with published series. We are able to produce statistical process control charts to facilitate surveillance and control of this important acquired infection.

## **ABSTRACT OF SOCIETIES**

### **Scottish Society for Rheumatology**

Oral Presentations held on 2nd June 2006

References for all articles can be found online at [www.smj.org.uk](http://www.smj.org.uk)

#### **Assessing Risk of Tuberculosis (tb) in Patients on Anti-Tumour Necrosis Factor $\alpha$ (tnf- $\alpha$ ) Therapies: Impact of the British Thoracic Society (BTS) Guidelines**

*J Argyle, K Wilson, P Reynolds, M Duncan*

**Background:** Patients embarking on anti TNF- $\alpha$  therapies are at risk of reactivation of TB. Changes to current screening practices for TB are necessary following publication of the BTS Guidelines<sup>1</sup> and withdrawal of Heaf strength Tuberculin PPD. **Aim:** To review screening results from our current practice and assess the impact of changing to follow BTS Guidelines. **Methods:** We reviewed records for all our patients treated with anti-TNF- $\alpha$  therapy since 2004. Current practice is to screen all patients with history, examination, chest X-ray (CXR) and Heaf test. Patients identified with latent TB are treated according to Centers for Disease Control Guidelines.<sup>2</sup> Patient records were reassessed according to the BTS Guidelines, and discrepancies identified. **Results:** 22 patients commenced therapy, predominantly for Rheumatoid arthritis (n=18). 18 (82%) are female, median age 60 years (range 20 - 74). All patients are white, 21 born in UK. 19 patients (86%) were on immunosuppressives. No patient had a history of TB. 2 patients had abnormal CXRs, both showing calcified granulomata. 19 patients underwent tuberculin tests. 3 patients were not tested (1 refused, 1 no reagent available, 1 no test advised). 5 patients (1 abnormal CXR, 1 abnormal CXR & positive Heaf test, 3 positive Heaf tests) were treated with anti-TB therapy. All commenced Etanercept after 1 month of therapy and none has evidence of active TB at median follow-up 8 months (range 5-12). Utilising BTS Guidelines, 2 patients with abnormal CXRs would have had anti-TB therapy, completed in full prior to anti-TNF- $\alpha$  therapy. 19 patients would be unsuitable for tuberculin testing, including 3 of those with positive Heaf tests. These 3 patients would have been under observation only. 3 of our 22 patients would have required a tuberculin test. **Discussion:** We have identified a high incidence of latent TB (23%) in this small West of Scotland series. We are concerned about the applicability of the BTS Guidelines to our patient population. Tuberculin testing may still be appropriate despite the use of immunosuppressive drugs. Future alternatives include using interferon-gamma immunological tests for TB. **Conclusions:** Changing practice to implement BTS Guidelines will only identify a minority of patients with latent TB. It is important to ensure BTS Guidelines are appropriate, to reduce the risks of clinical TB in our patients on anti-TNF- $\alpha$  therapy.

#### **Psoriatic Arthritis – Documentation of PUVA Exposure Must be Accurately Recorded**

*LL Wong, RD Baxter, DW McCarey, JA Hunter, MM Gordon*

Gartnavel General Hospital<sup>1</sup> and University of Glasgow<sup>2</sup>

**Background** Psoriatic arthritis (PsA) is the second most common peripheral inflammatory arthropathy in Rheumatology clinics. Recent advances have seen new agents licensed for treatment for PsA including biological agents. **Methods** Consecutive patients attending a rheumatology unit over a four week period were identified. Using the BSR guidelines on anti-TNF therapy in PsA, we sought to identify which patients fulfilled the criteria. Data was collected on demographics, pattern of disease, previous and current treatment and contraindications to anti-TNF treatment. **Results** 50 patients age 15-78ys (median 48yrs) were identified. 50% were male, 94% Caucasian and 60% had erosive disease. Median PsA duration was 9 years. Pattern of arthritis (Moll & Wright): 62% had asymmetrical polyarthritis, 30% seronegative RA and 60%

patients had  $\geq 3$  tender and swollen joints. All patients received NSAIDs before DMARDs. At time of study, 16% were on NSAIDs only and 38% had received  $\geq 2$  DMARDs. 9.5% had received  $\geq 5$  DMARDs, 5 patients on Etanercept. Commonest 1<sup>st</sup> DMARD was Sulphasalazine (76%) followed by Methotrexate (19%). The most frequent reason for DMARD failure was toxicity (29/42). In 34%, anti-TNF was contraindicated due to unknown quantities of PUVA treatment but in 64% there was no contraindication. Overall, 3/50 satisfied the BSR guidelines but were not receiving such therapy. 3 others would qualify if gold were recognised in the guidelines. **Conclusions** In our cohort, 16% of patients would be eligible for anti-TNF treatment of whom 10% are receiving this therapy. Although 60% met the required number of tender and swollen joints, previous PUVA would be a contraindication in more than a third due to lack of documentation. PUVA is therefore an important potential contraindication and documentation of total doses administered is important.

### Angiotensin II Receptor Blockers as Potential Anti-Inflammatory Agents

MM Cbe<sup>1</sup>, ME Perry<sup>2</sup>, AG Price<sup>3</sup>, RD Sturrock<sup>1</sup>, WR Ferrell<sup>1</sup>, JC Lockhart<sup>3</sup>

1Centre for Rheumatic Diseases, Glasgow Royal Infirmary, 2Department of Rheumatology, Gartnavel General Hospital, Glasgow, Scotland, UK, 3School of Engineering & Science, University of Paisley, Scotland, UK

**Objective** Angiotensin II (AngII) plays an important role in regulating blood pressure via the renin-angiotensin-aldosterone system. Subsequently, it was found to have pro-inflammatory properties and long-term effects on tissue structure. Studies on angiotensin converting enzyme inhibitors (ACEi) and AngII receptor blockers (ARB) have suggested that their therapeutic effects are mediated by inhibiting AngII. In theory, ACEi and ARB could be used as anti-inflammatory agents. Captopril is already established as having anti-inflammatory properties, mediated by the thiol moiety unique to the drug. The purpose of this study was to establish in an animal model of arthritis whether ARBs have anti-inflammatory effects and in a retrospective audit to establish the anti-inflammatory effects of ARB by comparing inflammatory markers of rheumatoid arthritis patients who were on ACEi (ramipril or lisinopril), or ARB or neither. **Study Method** Adjuvant monoarthritis was induced under anaesthesia in the rat knee joint (n=6) treated with vehicle or the selective AT<sub>1</sub> receptor antagonist losartan (15mg/kg s.c. alternate days), these being administered both prophylactically and therapeutically. Joint swelling was monitored as an indicator of inflammation. Patients were identified from 2 centres – Glasgow Royal Infirmary (GRI) and Gartnavel General Hospital (GGH). Data were collected by patient questionnaire at GRI and by computer database at GGH. Data included disease modifying anti-rheumatic drug (DMARD) therapy, ACEi (ramipril and lisinopril) and ARB use, and corresponding C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) values. Results of CRP and ESR values of all patients were consolidated and statistical analysis performed. **Results** Rat joint swelling was significantly ( $P < 0.0001$ ) reduced ( $\geq 50\%$ ) by losartan treatment, both with prophylactic and therapeutic (day 12) intervention. Mean ( $\pm$  SD) ESR from RA patients on ARB (n=42), was lower ( $25.1 \pm 22.5$ ) than that from patients on ACEi ( $30.8 \pm 29.2$ , n=58) or those on no angiotensin inhibition therapy (control group:  $40.1 \pm 29.4$ , n=38), and these differed significantly ( $P=0.02$ , 1-way ANOVA, log<sub>10</sub> transformed). *Post-hoc* testing (Bonferroni) revealed only the ARB-treated group differed significantly ( $P=0.021$ ) from the control group. Although a similar trend between groups was apparent for CRP, this was not significant using non-parametric statistics (data set not normalised by log<sub>10</sub> transformation). Adjusting for statin use, the difference in ESR between groups remained significant ( $P=0.036$ , 1-way ANCOVA). **Conclusions** Inhibiting AngII has anti-inflammatory potential and ARB may be more effective than ACEi.

### Dietary n-3 Fatty Acids as Non-Steroidal Anti-Inflammatory Drug Sparing Agents in Rheumatoid Arthritis

B Galarraga<sup>1</sup>, HM Youssef<sup>2</sup>, M Ho<sup>1</sup>, A Hill<sup>1</sup>, C Hall<sup>2</sup>, S Ogston<sup>3</sup>, G Nuki<sup>2</sup>, JFF Belch<sup>1</sup>

<sup>1</sup>Vascular and Inflammatory Diseases Research Unit, University Division of Medicine and Therapeutics, Ninewells Hospital and Medical School, Dundee <sup>2</sup>Rheumatic Diseases Unit, Western General Hospital, Edinburgh, <sup>3</sup>Public health Section, Community Health Science Division, University of Dundee, Dundee

**Background:** Non-steroidal anti-inflammatory drugs (NSAID) are frequently used in the management of patients with rheumatoid arthritis (RA). Dose dependant gastrointestinal and cardiovascular side effects are common, limiting their use. N-3 essential fatty acids have previously demonstrated some anti-inflammatory and NSAID sparing properties. The objective of this study was to determine whether fish oil supplementation reduces the daily NSAID

requirement of patients with RA. **Methods:** This was a dual centre, double blind placebo controlled, randomised study of 9 months duration. Ninety-seven patients with RA were randomised to take either 10g of marine oil (Seven Seas Ltd) containing 2.2g of n-3 essential fatty acids (32% docosahexaenoic acid, 68% eicosapentaenoic acid) a day or air filled identical placebo capsules. NSAID daily requirement, clinical and laboratory parameters of RA disease activity and safety checks were done at 0, 4, 12, 24 and 36 weeks. At 12 weeks patients were instructed to gradually reduce and if possible stop their NSAID intake. Reduction of NSAID intake by at least 30% without an associated flare in disease activity was the primary endpoint. **Results:** Both groups were matched for baseline characteristics. 29/49 patients who received marine oil and 23/48 of the placebo treated patients completed the study. 17 out of 29 (59%) patients in the active group and 5 out of 23 (22%) patients in the placebo group were able to reduce their daily NSAID requirement by more than 30%. ( $p = 0.08$  Chi-squared test). There was a significant improvement in the visual analogue scale of pain in the active group ( $p = 0.032$  Mann-Whitney test), but no differences between the groups were observed in the remaining clinical parameters of RA disease activity or in the type or number of side effects observed. Plasma measurements of eicosapentaenoic acid and returned tablet counts suggested good compliance. **Conclusions:** More than half of the patients who took marine oil supplements for 9 months were able to reduce NSAID therapy without any change in disease activity. This study confirms that fish oil supplements containing N-3 fatty acids can be NSAID sparing agents in RA patients.

### Audit of Feasibility and Implementation of the Scottish Early Warning Scoring on a Rheumatology Ward

D Wong, VB Dhillon, CM Lambert

Rheumatic Diseases Unit, University of Edinburgh

**Purpose** There is often documented deterioration of physiological parameters before patients become critically ill. The Scottish Early Warning Scoring (SEWS) chart is a colour-coded chart for documenting patient physiological parameters including pulse, respiratory rate, oxygen saturation, temperature and blood pressure. SEWS dictates the frequency of observations and the threshold for prompting medical review. A 1-month audit was used to assess the feasibility of implementing SEWS routinely in rheumatology in-patients at the Edinburgh Western General Hospital (WGH). A 6-month prospective study was used to record patient outcome and to assess whether patients at risk of deterioration are identified for early interventions that might prevent catastrophic deterioration or admission to critical care units. **Methods** The rheumatology nursing team was trained in the use of SEWS. Rheumatology in-patients at WGH during September 2004 had observations documented using SEWS charts. The charts were examined retrospectively to assess the rate of complete documentation of physiological parameters. Questionnaires were used to assess staff satisfaction. During the 6-month study, SEWS was used to guide the frequency of measuring observations and the threshold for prompting medical review. SEWS charts and clinical notes of rheumatology in-patients at WGH from November 2004 to May 2005 were examined. **Results** During the 1-month audit, 84.2% of patients (n=19) had complete documentation of physiological parameters using SEWS. 85% of the nursing team agreed that a tool is required to identify sick patients; 100% agreed that the SEWS score was easy to calculate; 77% agreed that SEWS was helpful in identifying sick patients and 85% agreed that SEWS prompted earlier intervention. Data was collected from 117 patients during the 6-month prospective study. Eighty-eight patients had a maximum SEWS score of 2 or less; 8 patients with a score of 3; 2 with a score of 4; 2 with a score of 5 and 1 with a score of 6 (see Figure 1). All the patients with SEWS score of 3 or more were identified and reviewed by medical staff. Seven of these patients required additional intervention. There was no mortality and no transfers to critical care units. **Conclusions** SEWS charts were feasible to use on the Rheumatology ward. There was a high rate of full documentation of physiological parameters after the introduction of SEWS. SEWS charts were an easy-to-use bedside tool for alerting nursing and medical teams that patients are at risk of deteriorating. Patients with high SEWS scores were reviewed, and additional treatment was initiated when appropriate. Early identification of ill patients and intervention was achieved.

# ABSTRACT OF SOCIETIES

## Scottish Programme for Clinical Effectiveness in Reproductive Health

### Oral Presentations held on 21st September 2006

References for all articles can be found online at [www.smj.org.uk](http://www.smj.org.uk)

#### Postnatal Thromboprophylaxis

*B Singhania, S Bollapragada, F MacKenzie, P Owen*

Princess Royal Maternity Hospital, Glasgow

**Objective:** To assess the compliance of a large maternity unit in administering appropriate postnatal thromboprophylaxis. **Methods:** All deliveries for the month of December 2005 (n=373) were reviewed for the risk of venous thromboembolism and the use of thromboprophylaxis. The unit's protocol on postnatal thromboprophylaxis provided the audit standard. The results were discussed at the labour ward meeting in February 2006 and a memo was circulated to all the relevant health professionals to improve performance. The audit cycle was closed with further data collection for all the deliveries in June 2006 (n=348). **Results:** 1. Overall 38.3% (143 of 373) women were assessed to be medium or high risk by the auditing team and required thromboprophylaxis in the first audit as compared to 32.7% (114 of 348) in the re-audit. 2. The correct documented risk assessment was noted in only 19.3% (72 of 373) in the first audit as compared to 34.2% (119 of 348) in re-audit. The risk factors most commonly overlooked were obesity and maternal age in the first audit as compared with obesity and long labour (>12hours) in the re-audit. 3. Of those requiring thromboprophylaxis, only 24.5% (35 of 143) were documented to have received adequate thromboprophylaxis in the first audit as compared to 44.7% (51 of 114) receiving adequate thromboprophylaxis in the re-audit. 4. 75% (75 of 100) of women in the high risk group did not receive thromboembolic deterrent stockings the first audit as compared to 59.5% (47 of 79) in the re-audit. 5. The correct dose, duration and timing of first dose of LMWH was given in only 50.3% (72 of 143) of women in the medium or high risk group in Dec 2005 as compared to 64% (73 of 114) in June 2006. **Conclusions:** There was a significant failure to implement the correct thromboprophylaxis measures in the first audit. While the performance in the re-audit did improve as compared to the first audit there were still significant failures. Continuing education of health care professionals is important and alternative measures such as introduction of a proforma for assessing the risk of VTE may be required.

#### Antepartum Anti-D Prophylaxis! How Well is it Received?

*R Rajagopal, B Joseph, R Urquhart*

Forth Park Hospital, Kirkcaldy, KY2 5RA

**Objectives:** Antepartum anti-D prophylaxis has been introduced recently into clinical practice and we wanted to see how this concept is received by the antenatal women. **Materials and Methods:** This is a retrospective study conducted at Forth Park Hospital, Kirkcaldy during the period between April 2004 and April 2005 and one hundred and seventy cases were studied. **Results:** During the analysis we found that 11% of women had antepartum sensitising events (bleeding, amniocentesis, antepartum haemorrhage, abdominal trauma) and when women were offered anti-D prophylaxis all were happy to receive the same (100%). 3% of women who had sensitising events (bleeding 1st /2nd trimester, abdominal trauma) were not offered anti-D by the staff. Routine antepartum anti-D prophylaxis were offered to all women between 28 and 34 weeks (100% coverage) and to our surprise we found that only 86% of the women were willing to receive anti-D and the rest 24% had declined the same. Of the women who had declined 57% were multiparous and the reason was that they had not received it in their previous pregnancies and were unwilling to accept this new concept. 7% of primiparous women had declined and the reason was that none of their friends/relatives had received this earlier. 36% of the women had declined because their partners were rhesus negative. 24% of the women who received antepartum prophylaxis did not require it in the postpartum period. **Conclusion:** Overall in our study we found that antepartum anti-D prophylaxis was well received by most of the women. But to make this programme an outstanding success further awareness and education of all the staff and antenatal women are essential.

#### Management of 3rd and 4th Degree Perineal Tears

*R Panigrahy, F MacKenzie, J Wilsb, P Owen on behalf of the Perinatal Effectiveness Committee (PEC)*

**Setting:** Princess Royal Maternity Hospital, Southern General Hospital, and the Queen Mothers Hospital, Glasgow. **Introduction:** 3rd & 4th degree tears have

considerable influence on a woman's future continence with 20-50% experiencing faecal incontinence following sphincter disruption. A sphincter repair performed under optimal conditions is associated with improved outcome. **Aims:** To audit the management of women identified with 3rd & 4th degree tears in the Glasgow maternity units and evaluate the findings against the recommendations of the relevant RCOG guideline (no.29). **Method:** Data were collected prospectively over a six-month period using a specifically designed data collection form. A report was published and widely disseminated. An operative proforma was also designed and introduced. The audit cycle was closed with data collection over a further 6 month period. **Results:** 98 women were identified in the re-audit, with an incidence of 3<sup>rd</sup>/4<sup>th</sup> degree tears of 2.5%. This compared with 66 women and an incidence of 1.6% in the initial audit. 88% of the repairs were carried out by middle grade obstetricians with Consultant presence in 58%. This compared with 75% and 67% respectively for the first audit. 98% of the repairs took place in theatre compared with 92% in the initial audit. 99% were carried out under regional anaesthesia in the re-audit compared with 92% in the initial audit. None of the repairs in re-audit were performed under local anaesthetic compared to 6% in initial audit. 91% were documented to have an overlap technique repair and 8% had end to end repair in the re-audit. This compared with 62% and 24% respectively in the initial audit. There was no documentation of method of repair in 14% in the initial audit and this reduced to 1% in the re-audit. In all the repairs in the re-audit a monofilament suture was used compared with 89% in the first audit. The use of intra-operative antibiotics improved from 59% in the initial audit to 91% for the re-audit. All women received post-operative antibiotics and laxatives in both audit cycles. In the initial audit 89% had their 6 week follow-up appointment arranged with the obstetric clinic, 6% with a colorectal surgeon and 5% with their GP. In the re-audit, 99% of women had a follow up in the obstetric clinic. 17% compared with 5% in the first audit were documented as having a six-month follow-up appointment with a colorectal surgeon. Use of the operative proforma in the re-audit was associated with higher compliance. **Conclusions:** The results of the re-audit highlight improvements in practice in all areas. The increase in the incidence of 3rd and 4th degree perineal tears suggests that more tears are being correctly identified at the time of delivery. The interval between audits broadly coincided with the availability of a local, one day training course in the repair of these tears. In addition, the introduction of the operative proforma has contributed to the improvement in the compliance with the RCOG guideline and we encourage its continued and more widespread use.

#### Audit of Intrapartum Group-B Streptococcal (GBS) Prophylaxis (01/09/05 – 30/09/05)

*L Hermis, P Owen*

Department of Obstetrics & Gynaecology, Princess Royal Maternity Hospital, Glasgow

**Objectives:** To establish the adequacy of intrapartum antibiotic prophylaxis in women with GBS risk factors in routine clinical practice. To identify areas where adequate prophylaxis could not be achieved. **Introduction:** Group B streptococcus is the most frequent cause of severe early onset infection in newborn infants. Our department at PRMH employs a protocol which recommends that all women with GBS risk factors should receive intrapartum antibiotic prophylaxis >2hrs prior to delivery to prevent early onset neonatal GBS disease. **Method:** Audit against established protocol. Case notes of consecutive deliveries over a prospective 4 week period were reviewed retrospectively for the presence of GBS risk factors & the adequacy of intrapartum prophylaxis. **Results:** 452 deliveries occurred during the 4 week audit period, 61 of these women (13.5%) were eligible for intrapartum antibiotic prophylaxis. 74% of the eligible women received adequate prophylaxis in labour. The remaining 16 women (26%) received inadequate or no prophylaxis. **Conclusion:** The majority of women received adequate intrapartum prophylaxis. This re-inforces and confirms previously published audit data demonstrating a rise in compliance from 40% to >70% when the time interval for adequacy is shortened. **Recommendations:** Certain areas in our routine clinical practice could be improved to maximise the number of infants benefiting from intrapartum antibiotic prophylaxis.