Correspondence

Clinical governance in pain management

I was disappointed to see that a recent editorial: 'Meeting the challenge of clinical governance in pain management' (Lee. *Anaesthesia* 2003*;* **58**: 205–6) and an accompanying article: 'Clinical governance and chronic pain: towards a practical solution' (Griffiths *et al*. *Anaesthesia* 2003; **58**: 243–7) stimulated little comment from the distinguished members of The Pain Society and the clinicians heading the leading pain management centres in the country. Few pain clinicians would argue with the fact that there is an urgent and real need for a robust system to audit outcomes of clinical intervention and therapeutic modalities in the management of patients with chronic pain, and that monitoring activity, clinical audit and benchmarking are pursuits that all chronic pain services should actively engage in. However, I would be very surprised if many agree that PACS (the Pain Audit Collection System) is the tool capable of delivering it at a local, or indeed a national level as has been claimed in the article by Griffiths.

PACS was designed for the Clinical Information Special Interest Group (CISIG) of The Pain Society and was distributed free of charge to encourage uptake. It was intended to be a tool for collecting dataset items to enable comparisons between pain clinics and to generate useful reports for individual pain clinics and pain clinicians to monitor their activity and audit treatment outcomes for clinical governance purposes. What it has collected at a national level so far is masses of demographic data and case mix. There is nothing in the multicentre downloaded data presented in the article that will help establish clinical standards or guidelines.

Although many pain clinics keen to participate in audit at a local and national level were quick to embrace the PACS, there is little evidence that they have used it or found it useful for local audit and clinical governance purposes. Data entry with this system is arduous and time consuming, and the output barely justifies the time and effort required to input the data. Some effort and time should have been invested by the CISIG in carrying out a nationwide survey of the uptake and usefulness of PACS in achieving its objectives before hailing it as a 'high-quality clinical database designed to meet the needs of pain clinicians in implementing clinical governance and monitoring pain clinic activity'. There is always a danger of assumption that those pain clinics that have not adopted the PACS system are not engaging in relevant audit at a national level with possible implications for future funding and allocation of resources.

S. Vashisht
Hillingdon Hospital,
Uxbridge UB8 3NN, UK

A reply

Thank you for giving me the opportunity to reply to Dr Vashisht. She raises several points, which I hope I can answer. Like Dr Vashisht, I am concerned that the article has generated so little debate. The future of pain management depends on robust clinical governance procedures and part of this is being able to describe case mix, activity levels and define outcomes. There are several steps to be taken to achieve this.

We need to define what information it is feasible to collect in our everyday practice as opposed to well-funded clinical research. The article on PACS describes how that process was achieved and what elements have been established as a result of the process. This would not have been possible without the free distribution, feedback and the co-operation of other centres. One of the lessons we learned is that 'one size does not fit all'. Providing one software package to operate effectively in every centre is difficult and probably not achievable. We have now published the minimum dataset and specified the requirements precisely so that each centre can write their own software package and yet still submit downloads to compare outcomes. The PACS software programme should therefore be regarded as a stopgap.

I would dispute that the amalgamated data does not represent any value. This year we have been funded to provide

All correspondence should be addressed to Dr David Bogod, Editor of *Anaesthesia*, 1st Floor, Maternity Unit, Nottingham City Hospital, Hucknall Road, Nottingham NG5 1PB, UK.
Letters (two copies) must be typewritten on one side of the paper only and double spaced with wide margins. In addition, please include your letter as a Word for Windows or .rtf document on disk or alternatively submit as an e-mail attachment addressed to *anaesthesia@nottingham.ac.uk*. Alternatively, a response to a previously published article or letter can be submitted online at *www.anaesthesiacorrespondence.com*. Copy should be prepared in the usual style and format of the Correspondence section. Authors must follow the advice about references and other matters contained in the Notice to Contributors to *Anaesthesia* printed at the back of the January and July issues. Author guidelines can also be found on *www.blackwellpublishing.com/journals/ana/submiss.htm*. The degree and diploma of each author must be given in a covering letter personally signed by all the authors.
Correspondence presented in any other style or format may be the subject of considerable delay and may be returned to the author for revision.

each centre with a breakdown compared against a national average. We have found, for example, in my own institution that our case mix is substantially worse than average, yet we achieve above average outcomes. This has been an extremely important message to provide to our purchasers when they ask about our performance. Having hard evidence to support our case has proved invaluable. There is no other system available at a national level. More work is required on validation of the database, which in itself is a time consuming and expensive procedure that requires funding.

Dr Vashist raises an important point. Collecting data is time consuming but forms are available to assist with this. Relying on hard-pressed clinicians to perform this task is, however, a poor use of clinicians' time. Recommendations are also needed for the funding of the appropriate staff and technical support as well as provision of a minimum dataset. Audit within pain clinics is now off the bottom rung of the ladder with much work still to be done to reach the top of that ladder. PACS represents just the start of that process.

C. Price
Chair, Clinical Information Special Interest Group, The Pain Society, Southampton SO14 0YG, UK
E-mail: cathy.price@suht.swest.nhs.uk

Fresh frozen plasma for succinylcholine apnoea

We read with interest the correspondence on the use of fresh frozen plasma (FFP) for succinylcholine apnoea (Dabas & Vohra. *Anaesthesia* 2003; **58**: 815–6). The authors stated that FFP transfusion represented a very small risk of transmission of infection according to the report on Serious Hazards of Transfusion (SHOT) [1]. However, transfusion related acute lung injury (TRALI) is a very real problem and it is associated with blood, FFP and platelet concentrate transfusion. This condition is probably under diagnosed and under reported. TRALI occurs with a reported frequency of between one and five per 10,000-blood products containing plasma transfused [2]. Moreover, the recorded overall mortality from TRALI associated with FFP and platelet concentrates is as high as 25% [1]. SHOT data also suggests death to be more frequent in those patients who have been given plasma products than in those who have received isolated red cell transfusions. We believe this represents more than 'a very small risk'. Furthermore, the risk of transmission of prions and non-screened viruses remains unclear. However, the consequences of these diseases may be devastating.

We are curious as to why this patient with mild asthma and reflux oesophagitis received a rapid sequence induction using thiopental and succinylcholine and was subsequently given atracurium. It is not clear from this report whether this patient was deemed to be at serious risk from aspiration, or if there were concerns relating to a potentially difficult airway. It is debatable whether thiopental and atracurium are suitable drugs in asthmatic patients. While succinylcholine remains the rapid onset and short acting muscle relaxant of choice cases like this will no doubt continue to appear. This patient received atracurium after succinylcholine, as well as the first dose of reversal agents, glycopyrronium and neostigmine, before guidance from the use of a nerve stimulator was sought. This is a practice that would undoubtedly pass the 'Bolam test'; however, it illustrates the benefit of best practice. We also wonder whether a delay of 3 h 30 min before FFP treatment was long enough to rule out heterozygous activity, in this specific case.

Interestingly, one of the two reports cited in apparent support of the practice of administering FFP to patients with succinylcholine apnoea actually concludes that FFP was of *no benefit* to recovery of neuromuscular transmission. ('The two units of FFP had no effect on our patient's measured plasma cholinesterase activity, and made no difference to the course of events') [3].

In our opinion, the risk of ventilator-associated infection in the relatively short period of time that may be required for succinylcholine apnoea to wear off, particularly in a heterozygous patient, probably outweighs the risk of FFP therapy. Human error, infection associated with transfusion and TRALI remain significant risks.

C. C. Harle
R. McKendrick
Blackpool Victoria Hospital, Blackpool FY3 8NR, UK
E-mail: christorpher.harle@exch.bvh-tr.nwest.nhs.uk

References

1 Aasher D, Atterbury CLJ, Chapman C *et al*. Serious Hazards of Transfusion Annual Report 2000/*2001*. Manchester: SHOT Office, 2002.
2 Wallis JP. Transfusion-related acute lung injury, under-diagnosed and under-reported. *British Journal of Anaesthesia* 2003; **90**: 573–6.
3 Smith DC, Ridley SA,Donaldson KF. Fresh frozen plasma and edrophonium in a patient with plasma cholinesterase deficiency. *Anaesthesia* 1993; **48**: 511–3.

A reply

Thank you for providing us with the opportunity to respond to Drs Harle and McKendrick's letter. They have raised some points regarding the conduct of the anaesthetic; particularly the need for rapid sequence induction, which we would like to clarify. This patient's surgery was scheduled as an urgent procedure. Although she was starved for an adequate length of time and had received antacid prophylaxis, gastric emptying could not be guaranteed. A history of gastro-oesophageal reflux and her truncal obesity posed a risk of regurgitation and aspiration. A rapid sequence induction and tracheal intubation was carried out to protect her airway. There is a theoretical risk associated with the use of atracurium in asthmatics. However, the familiarity with its usage was the reason why the junior trainee anaesthetizing the patient chose the drug. As we have already highlighted, the empirical use of muscle relaxants can lead to diagnostic problems and a peripheral nerve stimulator should have been used.

We agree with Drs Harle and McKendrick that 'TRALI' is a serious hazard of transfusion but with a reported frequency of 1 in 5–10 000 transfusions it is still, fortunately, a rare complication [1]. This risk has to be balanced against the more frequent problems associated with artificial ventilation and invasive monitoring as well as the serious morbidity and mortality resulting from hospital acquired infections during ITU stay. The rates of ventilator-associated pneumonia (VAP) are quoted to be 1–3% per day of intubation and mechanical ventilation. Early onset nosocomial pneumonia has an incidence of 6.4% [2]. The overall mortality from VAP is reported to be 45.5% [3]. The transmission of prions may also occur with reusable equipment in a hospital environment. Furthermore an intensive care bed was not available in our hospital, and the risk of transferring the patient to another ITU must be added. Studies have shown a poor outcome in patients who had acute interhospital transfers. There are delays in admission to the ITU, and increased morbidity and adverse physiological effects during the transfer. The length of stay in ITU and hospital is also increased [4].

It is difficult to determine the patient's cholinesterase phenotype merely from the duration of the apnoea. As a guideline, succinylcholine may have a duration of action of about 10 min in a heterozygous patient. A homozygote with one of the silent genes would be very sensitive to succinylcholine and an apnoea of 3–4 h would be expected. An atypical homozygote may have an apnoea for 1–2 h [5]. This patient, a homozygote for the atypical gene, did not conform to any of these guidelines. She had made no spontaneous recovery after 3.5 h and there was no way of predicting the duration of apnoea accurately.

We believe it is important to regularly appraise current practice in the light of new knowledge. Our original correspondence was titled as an open-ended question to stimulate and encourage a debate such as this.

S. H. Vohra
R. Dabas
City Hospital,
Birmingham B18 7QH, UK
E-mail: shashi@vohra.org.uk

References

1 Wallis JP. Transfusion-related acute lung injury (TRALI) – under-diagnosed and under-reported. British Journal of *Anaesthesia* 2003; **90**: 573–6.
2 Ibrahim EH, Ward S, Sherman G, Kollef MH. A comparative analysis of patients with early onset vs. late-onset nosocomial pneumonia in the ICU setting. *Chest* 2000; **117**: 1434–42.
3 Ibrahim EH, Tracy L, Hill C, Fraser VJ, Kollef MH. The occurrence of ventilator-associated pneumonia in a community hospital: risk factors and clinical outcomes. *Chest* 2001; **120**: 555–61.
4 Duke GJ, Greene JV. Outcome of critically ill patients undergoing interhospital transfer. *Medical Journal of Australia* 2001; **174**: 122–5.
5 Davis L, Britten JJ, Morgan M. Cholinesterase. Its significance in anaesthetic practice. *Anaesthesia* 1997; **52**: 244–60.

Training in airway management

Drs Taylor, Lim and Drewery (Taylor *et al. Anaesthesia* 2003; **58**: 1026–7) expressed their concern about our article, showing that a training module for difficult airway management is often not provided in the UK and Japan [1]. We feel that they have misunderstood our claims and, in fact, their messages are generally similar to ours.

They stated that 'it would be wrong to conclude that the absence of a formal module is indicative that airway training is a peripheral activity'. They also implied that a training module during the initial 2-year period would not give much benefit to trainees. Although we stated that a training module for difficult airway management was often not provided, we did not suggest that airway training was a peripheral activity. On the contrary, we also believe that the art of airway management should be learnt throughout our anaesthetic careers [2]. Nevertheless, as explained by Mason [3], the decreased time spent in the operating theatre by trainees has made it imperative that anaesthetic training should become more organised. We believe that standardizing the basic skill requirements of anaesthetists and establishing widely acceptable modules for teaching difficult airway management as part of evidence-based medicine [1] will rationalise and improve the conventional training system based on local practice and personal experience. Such standardization will not prevent trainees from experiencing everyday airway management problems.

They also suggested that it is better to learn to use one technique well rather than a number badly. We entirely agree with this argument. The weakness of algorithms has been that many anaesthetists are unable to implement the technical components, particularly the more complex procedures. The lack of airway skills by UK anaesthetists has recently been emphasised [4]. There is evidence that even basic skills are not taught in an optimum way [5]. In addition, we are being presented with increasing numbers of devices and techniques, many of which do not stand the test of time. We believe that this is the very reason we need to select and have available useful and appropriate airway devices for teaching and managing airway problems.

We suggest that in addition to 'emphasizing the fundamental duty of all practising anaesthetists both to train others and to improve our own airway skills at every opportunity throughout our anaesthetic careers' (as Drs Taylor, Lim and Drewery stated), it is time to tackle this task of managing the difficult airway in a more organised way.

T. Asai
Kansai Medical University,
Moriguchi City, Osaka,
570–8507, Japan
E-mail: asait@takii.kmu.ac.jp
I. P. Latto
University Hospital of Wales
Cardiff, UK

References

1 Kiyama S, Muthuswamy D, Latto IP, Asai T. Prevalence of a training module for difficult airway management: a comparison between Japan and the United Kingdom. *Anaesthesia* 2003; **58**: 571–4.
2 Asai T. A Japanese in Cardiff. Some Thoughts on Western Science. In: Appadurai, IR, Horton, JN, eds. *Essays on the First Fifty Years 1927–1997*. Cardiff: University of Wales College of Medicine, 1997.

3 Mason RA. Education and training in airway management. *British Journal of Anaesthesia* 1998; **81**: 305–7.
4 Stringer KR, Bajenov S, Yentis SM. Training in airway management. *Anaesthesia* 2002; **57**: 967–83.
5 Latto IP, Stacey M, Mecklenburgh J, Vaughan RS. Survey of the use of the gum elastic bougie in clinical practice. *Anaesthesia* 2002; **57**: 379–84.

Cricoid pressure

In their recent paper, Haslam *et al.* (*Anaesthesia* 2003; **58**: 1012–5) measured low levels of intragastric pressure (mean of 5 mmHg, range 0–14) in 100 anaesthetised and paralysed patients, and recommended that the level of protective cricoid force should be reduced to 20 N. They were correct to point out that the relevance of gastric pressure in setting the protective level of cricoid force had been largely ignored in our earlier research published in 1992. This was because at that stage there was no research in the literature of gastric pressure in patients presenting for emergency surgery. We had just discovered that the upper oesophageal sphincter relaxes from an awake pressure of about 40 mmHg to less than 10 mmHg with intravenous thiopental and muscle relaxant drugs. We suggested that the correct cricoid force was one that returned the sphincter pressure back to awake levels. I agree, in retrospect, that this did overestimate the level of cricoid force. However, as they cited, we subsequently measured intragastric pressure in 20 women undergoing emergency caesarean section under general anaesthesia over a two-year period (mean of 11 mmHg, range 4–19) [1]. In that paper we commented that 20 N of cricoid force was probably sufficient to prevent the regurgitation of gastric contents in 99% of patients at these pressures. We recommended, however, that 30 N was a reasonable cricoid force to be applied. We argued that the target force needs to be more than necessary, as about half of anaesthetic assistants when practicing on weighing scales, apply less than the target force by up to 5 N. I agree that the applied cricoid force must be reduced following failed intubation, not just because the assistant cannot sustain the force but also ventilation of the lungs with a facemask may then be easier [2].

I disagree with the comment that the pressure gradient tending to produce regurgitation is reduced during inspiration. Oesophageal pressure rises to equal gastric pressure when the lower oesophageal sphincter relaxes to produce a common cavity between the stomach and the oesophagus, which is the mechanism for gastro-oesophageal reflux or belching [3]. The pressure of oesophageal contents rises further during positive pressure ventilation, which can precipitate regurgitation into the pharynx if the upper oesophageal sphincter is relaxed. Before cricoid pressure was introduced in the late 1960s, patients frequently regurgitated and aspirated soon after intravenous induction of anaesthesia with the onset of muscle relaxation and when positive pressure ventilation with the facemask was commenced [4]. This is why I continue to teach trainees not to ventilate the lungs before intubation in a rapid sequence induction, to further reduce the chance of regurgitation, which does occasionally occur despite cricoid pressure.

On a more technical note, they measured gastric pressure with a manometry catheter, which was threaded through the lumen of a 16 FG nasogastric tube. If the lumen of the nasogastric tube was not completely sealed, the stomach would be open to atmospheric pressure. This may explain the low gastric pressures they recorded and the number of gastric pressures recorded as zero.

R. G. Vanner
Gloucestershire Royal Hospital,
Gloucester GL1 3NN, UK

References

1 Hartsilver EM, Vanner RG, Bewley J, Clayton T. Gastric pressure during general anaesthesia for emergency Caesarean section. *British Journal of Anaesthesia* 1999; **82**: 752–4.
2 Hartsilver EM, Vanner RG. Airway obstruction with cricoid pressure. *Anaesthesia* 2000; **55**: 208–11.
3 Dent J, Dodds WJ, Freidman RH *et al.* Mechanism of gastroesophageal reflux in recumbent asymptomatic human subjects. *Journal of Clinical Investigation* 1980; **65**: 256–67.
4 Report on confidential enquiries into maternal deaths in England and Wales 1964–1966. London: HMSO, 1969.

A reply

We wish to thank Dr Vanner for his interest in our paper and appreciate the opportunity to respond to his comments. His original study remains important because of the information it provides about the occlusive pressures generated in the oesophagus by a range of cricoid forces [1]. We used this data to interpret our measurements of intragastric pressure (Pga), and concluded that a 20 N force is sufficient. We can see why, at the time, he chose the restoration of upper oesophageal sphincter pressure as the goal for cricoid pressure.

If a force of 20 N is protective, should we set the target force at a higher level, as Vanner argues, to ensure protection? Alongside the issue of performance, we need to know if the risks of 'inadequate' force outweigh those of 'excess' force. The risk of inadequate force may seem obvious, but Vanner's work [1] tells us that forces of 10 N and 15 N provide considerable protection if judged against Pga (maximum oesophageal pressures of about 40 mmHg and 55 mmHg, respectively). Excess force may adversely affect airway patency or laryngoscopy. There is good evidence to show that a force of 30 N causes clinically significant airway obstruction [2–5], and that airway obstruction increases with greater force [4,5]. We are not aware of any published data for the level of force that impedes laryngoscopy. We have just completed a study looking at the effect of cricoid pressure on laryngoscopy where we took photographs of the laryngoscopic view to quantify outcome. In approximately 20 of the 40 patients a cricoid force of 30 N caused the laryngoscopic view to deteriorate. Furthermore, in those subjects in whom the view improved at 30 N, almost all the change in view occurred at a lower force. Video clips, taken as cricoid pressure was released, showed considerable displacement and distortion of the larynx at this force (unpublished data; accepted for Anaesthetic Research Society meeting in Manchester, November 2003; abstract

available on the society's web site). We also noted that we had to apply more force to the laryngoscope to restore the optimum laryngoscopic view when cricoid force was increased. We did not measure the forces acting on the laryngoscope, but this is another factor that must be taken into account when considering the ease of laryngoscopy. This problem is compounded by the variable performance of cricoid pressure in clinical practice. Application of very high force (> 50 N) is common [6], but this can be improved by training and practice on a model [6–8].

In response to Vanner's specific criticisms of our study we would like to make the following points. Respiratory variations in the pressure gradient between the thorax and pharynx, which drives regurgitation once stomach contents enter the chest, attributable to changes in Pga during mask ventilation are small, and probably clinically irrelevant (mean difference between inspiratory and expiratory Pga was 3.2 mmHg). However, Dr Vanner has neglected to take into account the change in pharyngeal airway pressure during positive pressure ventilation. In inspiration pharyngeal airway pressure exceeds the pressure in the thorax, and the pressure gradient between them will tend to check regurgitation. This situation is reversed in expiration. When we measured gastric pressure the snug fit of the catheter in the nasogastric tube effectively sealed the pressure manometer and this factor did not affect our pressure measurements.

As a profession we invest a great deal of importance in a technique that is inadequately researched, poorly taught and badly performed. We have no doubt that cricoid pressure is effective and believe that a 20 N force is protective. We believe the risks of 'excess' force have been underestimated. On balance we would argue that the target force should be 20 N and our assistants should be trained to apply it exactly.

N. Haslam
J. E. Duggan
Wansbeck Hospital
Ashington, UK
E-mail: Nathaniel.Haslam@
northumbria-healthcare.nhs.uk

References

1 Vanner RG, O'Dwyer JP, Pryle BJ, Reynolds F. Upper oesophageal sphincter pressure and the effect of cricoid pressure. *Anaesthesia* 1992; **47**: 95–100.
2 Allman KG. The effect of cricoid pressure on airway patency. *Journal of Clinical Anesthesia* 1995; **7**: 197–9.
3 Hocking G, Roberts FL, Thew ME. Airway obstruction and lateral tilt. *Anaesthesia* 2001; **56**: 825–8.
4 Hartsilver EL, Vanner RG. Airway obstruction with cricoid pressure. *Anaesthesia* 2000; **55**: 208–11.
5 MacG, Palmer JH, Ball DR. The effect of cricoid pressure on the cricoid cartilage and vocal cords: an endoscopic study in anaesthesised patients. *Anaesthesia* 2000; **55**: 263–8.
6 Meek T, Gittins N, Duggan JE. Cricoid pressure: knowledge and performance amongst anaesthetic assistants. *Anaesthesia* 1999; **54**: 59–62.
7 Ashurst N, Rout CC. Rocke DA, Gouws E. Use of a mechanical simulator for training in applying cricoid pressure. *British Journal of Anaesthesia* 1996; **77**: 468–72.
8 Herman NL, Carter B, VanDecar TK. Cricoid pressure: teaching the recommended level. *Anesthesia and Analgesia* 1996; **83**: 859–63.

Images in clinical anaesthesia: extrathoracic post-traumatic lung herniation

Extrathoracic lung herniation through the musculoskeletal chest wall, which usually occurs parasternally, is a rare complication of blunt chest trauma [1–3]. Due to its rarity, the pertinent literature on this subject is limited, and optimal therapeutic management (medical vs. surgical) controversial [1–4]. We present a case (the first in the anaesthetic literature) of extrathoracic post-traumatic lung herniation through the lateral chest wall.

A 32-year-old male was a restrained driver in a high-speed motor vehicle accident and sustained a blunt chest trauma including pneumothorax and left-sided rib fractures (2 through 9 along the axillary line). The trachea was intubated and a left-sided chest tube was placed upon patient's arrival to the Emergency Department. A computed tomography scan of the chest (Fig. 1) revealed left-sided extrathoracic lung herniation through the fractured ribs (5 and 6). Arterial blood gases demonstrated adequate oxygenation and ventilation. The skeletal trauma-related defect was treated

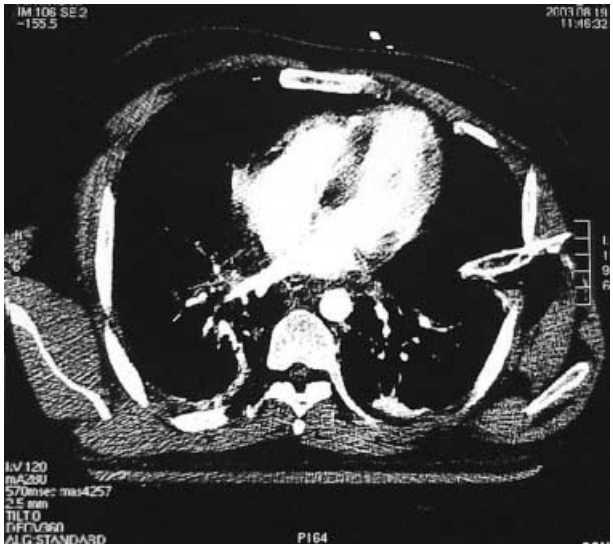

Figure 1 Computerised tomographic (CT) scan of the thorax demonstrating left-sided lung herniation.

non-surgically in the intensive care setting with close monitoring of physical and laboratory findings and avoidance of further injury. His ventilatory status (on positive pressure controlled mechanical ventilation) remained stable.

P. K. Bui
K. M. Kuczkowski
UCSD Medical Center, San Diego, CA 92103–8770, USA
E-mail: kkuczkowski@ucsd.edu

References

1 Francois B, Desachy A, Cornu E *et al*. Traumatic pulmonary hernia. *Journal of Trauma* 1998; **44**: 217–9.
2 Bowley DG, Boffard KD. Penetrating lung hernia with pulmonary evisceration. *Journal of Trauma* 2001; **50**: 560–1.
3 Lang-Lazdunski L, Bonnet PM, Pons F *et al*. Traumatic extrathoracic lung herniation. *Annals of Thoracic Surgery* 2002; **74**: 927–9.
4 Sadler MA, Shapiro RS, Wagreich J, Halton K, Hecht A. CT diagnosis of acquired intercostal lung herniation. *Clinical Imaging* 1997; **21**: 104–6.

Pain and intramuscular injections

A recent audit has highlighted poor patient satisfaction with the frequent use of intramuscular injections. We looked at the drug prescription charts of all patients on 10 surgical wards on two separate occasions. Out of a total of 422 patients, 135 were prescribed intramuscular analgesic or anti-emetic drugs. Of these, 54 patients (40%) had received a total of 74 intramuscular injections. Morphine (30%) was more painful than pethidine (0%). Eighty percent, 40% and 34% of metoclopramide, prochlorperazine and cyclizine injections, respectively, were painful. In summary, 40% of the total number of intramuscular injections was reported as painful by patients.

A separate questionnaire revealed that over half of the anaesthetic staff routinely prescribe intramuscular analgesics and 75% of them prescribe intramuscular anti-emetics. Of particular relevance is that over three-quarters of the qualified nursing staff are trained to administer intravenous drugs. At any one time on a surgical ward there is at least one member of the nursing team capable of giving drugs intravenously.

Our audit has shown that intramuscular injections are painful, the intramuscular route is frequently the preferred method of prescribing postoperative drugs, and most of the ward staff are trained to administer intravenous drugs. Unfortunately, our study did not distinguish between the pain from the needle puncture and the pain from injection of the drug itself. Simini [1] studied pain associated with various injection sites and suggested that intramuscular injections should be avoided. Nurses frequently employ a 21 g needle, which presumably ensures intramuscular rather than subcutaneous deposition of the drug. Other routes of administering analgesics and antiemetics are available but evidently underused. As well as the long established intravenous route, the subcutaneous and the buccal routes are safe and effective methods of drug delivery for particular preparations of analgesic and anti-emetic.

J. M. Cupitt
V. Kasipandian
Blackpool Victoria Hospital, Blackpool FY3 8NR, UK

Reference

1 Simini B. Patient's perceptions of pain with spinal, intramuscular, and venous injections. *Lancet* 2000; **355**: 1076.

Disposable laryngoscopes are not always inferior to non-disposable laryngoscopes

Evans *et al*. (*Anaesthesia* 2003; **58**: 869–73) compared five disposable laryngoscope blades and one reusable blade in a mannequin for the duration of laryngoscopy and the peak force generated by laryngoscopy. They stated that 'this study indicates that plastic (disposable) blades cannot be regarded as equal to non-disposable metal blades', and that 'if a disposable blade is to be used, then disposable metal blades would seem to be superior to plastic ones'.

I previously assessed the efficacy of another disposable plastic laryngoscope (Vital View™ laryngoscope, Vital Signs, NJ, USA) in 100 patients [1] and found that this disposable laryngoscope was as easy as a non-disposable metal laryngoscope to intubate the trachea, and was associated with no additional problems, such as damage to the blade or loss of light during laryngoscopy. In addition, the light produced by the disposable laryngoscope was brighter than that produced by the conventional non-disposable fibrelight laryngoscope. My colleagues and I have been routinely using this disposable laryngoscope over a few years in patients with and without difficult airways. We have not had the impression that this disposable blade was inferior to the conventional blades, and have not experienced damage to the blade in any case. It is also possible that other disposable laryngoscopes that Dr Evans and colleagues did not study are useful. Therefore, I believe that their claim should be restricted to the five disposable blades they assessed and should not be applied to other disposable blades available.

T. Asai
Kansai Medical University, Moriguchi City, Osaka, 570–8507, Japan
E-mail: asait@takii.kmu.ac.jp

Reference

1 Asai T, Uchiyama Y, Yamamoto K, Johmura S, Shingu K. Evaluation of the disposable Vital View™ laryngoscope. *Anaesthesia* 2001; **56**: 342–5.

A reply

We would like to thank Dr Asai for his interest in our study. On the basis of his study, the Vital View ™ laryngoscope would appear to represent a reasonable choice of blade. From our results we certainly recommend caution in the choice of laryngoscope. Ideally, all new blades should be compared against standard equipment in patients, prior to their introduction.

A. Evans
R. S. Vaughan
J. E. Hall
J. Mecklenburgh

A. R. Wilkes
University of Wales College of Medicine,
Cardiff CF14 4XW, UK

White cell count and intensive care unit outcome: rethinking the vocabulary

Regular full blood count analyses form part of the laboratory monitoring for intensive care unit (ICU) patients. The prognostic value of white cell counts on admission has recently received increased attention. It is in this context that the recently published study (Waheed *et al*. *Anaesthesia* 2003; **58**: 180–2) adds valuable data demonstrating that leucopenia (white blood cells < 4000 μl^{-1}) predicts high mortality among ICU patients. However, we were surprised by the terminology used by the authors to describe increased white blood cell counts. Leucocyte counts between 10 001 and 25 000 μl^{-1} were classified as 'leucemoid' whereas values exceeding 25 000 μl^{-1} were labelled 'exaggerated leucemoid'.

In general, increased leucocyte counts should collectively and simply be named leucocytosis. Purpose pending, leucocytosis can further be subclassified (slight, moderate, marked, etc.). In contrast, the term leucemoid reaction (pseudoleucemia) is by convention restricted to leucocytosis exceeding 50 000 μl^{-1} [1], which is myeloid in nature in most cases and therefore accompanied by marked neutrophilia. The latter feature has not been demonstrated by Waheed *et al*. in their study. Therefore, no conclusions can be drawn if leucemoid reactions were truly present among their patients.

Leucemoid reaction literally means leucemia-like or simulating leucemia. Indeed, extreme leucocytosis requires a careful work-up to rule out an underlying haematological malignancy, which may be a challenging task in the presence of coexisting disease requiring ICU treatment. However, these patients constitute a minority among the many ICU patients demonstrating leucocytosis of varying degree.

M. Steiner
P. Schuff-Werner
University of Rostock, D-18057
Rostock, Germany
E-mail: michael.steiner@med.uni-rostock.de

Reference

1 Jandl JH. *Blood: Textbook of Hematology*, 2nd edn. Boston: Little, Brown, 1996: 639.

A reply

We would like to thank Drs Steiner and Schuff-Werner for their helpful comments regarding the nomenclature of a raised white cell count. We concur with their suggestions. The raised white cell count would have been more appropriately termed moderate and marked leucocytosis. The term leucemoid, which we had been advised was reasonable, is in fact not only vague in definition but has other connotations in haematology. In the paper, we did define what we meant by these terms. We sincerely hope that this does not detract from the important message of this paper which is that leucopenia on presentation in an otherwise non-immunocompromised patient should be a cause for concern.

N. Soni
Chelsea and Westminster Hospital,
London SW10 9NH, UK
E-mail: simone.seychell@chelwest.nhs.uk

Peripartum anaesthetic management of a parturient with spinal cord injury and autonomic hyperreflexia

We read with interest the case report on the peripartum anaesthetic management of a parturient with spinal cord injury and autonomic hyperreflexia (Kuczowski. *Anaesthesia* 2003; **58**: 823–4). In our hospital, as we hold the National Spinal Injury Centre (NSIC) in England, we have a reasonable number of patients with spinal injuries who come to deliver their babies in our Maternity Unit (about 2–5 per year). These patients come from all areas of the country and are assessed well in advance by the obstetricians and by the obstetric anaesthetist.

Patients are admitted to a dedicated ward for pregnant women in the NSIC, usually after 37 weeks of gestation [1]. All patients with a history of autonomic hyperreflexia are advised, as per our protocol, to have an early epidural as soon as they are diagnosed to be in labour [2] as this has been shown to prevent/reduce the incidence of this reflex. Uterine contractions are known to trigger autonomic hyperreflexia in patients with a previous history. We then start an infusion of bupivacaine 0.1% with fentanyl 2 $\mu g.ml^{-1}$ at 10–12 $ml.h^{-1}$. We do not routinely perform a combined spinal epidural (CSE), as the patients are not in pain because of the level of their injury (usually above T6). In the case reported by Dr Kuczkowski acute autonomic hyperreflexia was already occurring and he was obviously more pressed for time to establish a regional anaesthetic block. We, at the NSIC, had a case last year when the patient was fully dilated and a subarachnoid block was chosen as the preferred technique for instrumental delivery as the patient was showing signs of autonomic hyperreflexia. We would agree that a CSE should be the technique of choice for spinal patients with high spinal lesions particularly when quite advanced in labour.

We believe pregnant patients with spinal injury lesions should be admitted to a specialised centre whenever possible, especially if they have spinal cord lesions above T6.

M. P. Ribes Pastor
M. Vanarase
Stoke Mandeville Hospital,
Aylesbury HP21 8AL, UK
E-mail: pura.ribes@smh.nhs.uk

References

1 Hughes SJ, Short DJ, Usherwood MMcD, Tebbutt H. Management of the pregnant woman with spinal cord injuries. *British Journal of Obstetrics and Gynaecology* 1991; **98**: 513–8.
2 Hambly PR, Martin B. Anaesthesia for chronic spinal cord lesions. *Anaesthesia* 1998; **53**: 273–89.

Caesarean section in a parturient with type III spinal muscular atrophy and pre-eclampsia

We would like to report a case of a patient with spinal muscular atrophy

(SMA) type III complicated by severe pre-eclampsia necessitating Caesarean section. Our patient was a 38 years old female admitted at 31 weeks gestation. She had developed SMA at the age of 4 and had been wheelchair bound from the age of 11. A previous pregnancy had been complicated by pre-eclampsia and collapse requiring emergency tracheostomy on the labour ward followed by a six week period of ventilation. During her current pregnancy she had developed pre-eclampsia at 28 weeks and on admission her diastolic blood pressure was 117. She was placed on a hydralazine infusion and her blood pressure stabilised allowing administration of steroids and Caesarean section was planned for the following day.

On anaesthetic assessment she was noted to have severe kyphoscoliosis, immobile lower limbs and weak upper limbs. Flexion of her neck produced obstructed breathing. She was a known failed intubation (hence the previous tracheostomy). Following initial unsuccessful attempts to site a lumbar epidural we proceeded with an awake fibreoptic intubation (FOI). The airway was anaesthetised topically with 4% lidocaine/phenylephrine solution and a size 6 cuffed nasal tracheal tube passed into the trachea. Anaesthesia was then induced with alfentanil and propofol and maintained with isoflurane, nitrous oxide and oxygen. No neuromuscular blocking agents were required. A live infant was delivered and the mother received morphine, 5 mg IV and diclofenac, 100 mg PR. Following the Caesarean section the mother was sedated and admitted to the intensive care unit. She was rapidly weaned, her trachea extubated, and she was placed onto a CPAP circuit. The pre-eclampsia rapidly settled and she was discharged home after 2 days.

The spinal muscular atrophies are a group of uncommon neurological disorders associated with anterior horn degeneration and affecting peripheral motor neurones. Inheritance is autosomal recessive and three types are described. Type I is fatal in infancy. Type III (Kugelberg-Welander disease) starts in childhood and is milder with near normal life expectancy. Once thought to preclude successful pregnancies a number of women with SMA have progressed to delivery, by all modalities [1]. Features associated with SMA include proximal and respiratory muscle weakness, kyphoscoliosis, restrictive chest defects and bulbar dysfunction all of which are of concern to the anaesthetist. Regional techniques may be difficult due to kyphoscoliosis producing technical problems and the altered distribution of local anaesthetics. Epidural anaesthesia has the advantage of titratibility and has been used in SMA and similar scoliotic conditions [2–4]. The spinal deformity may make intubation difficult, compounded by the aspiration risk due to the bulbar weakness. Suxamethonium is probably contraindicated due to chronic denervation and the risk of hyperkalaemia [2]. Rocuronium may now be the agent of choice in rapid sequence induction.

In our patient the only available options following failed regional technique were awake FOI or tracheostomy under local anaesthesia. We opted for awake FOI with the presence of an ENT surgeon in theatre. Although awake FOI has been described in patients with SMA before [5], our main concern was the potential pressor response to both airway manipulation and topical vasoconstrictors in a patient with pre-eclampsia. In fact, awake FOI probably produces far less pressor response than oral intubation and the effect of the topical vasoconstrictor was minimal. Later examination of the airway (under GA) confirmed a grade IV (Cormack & Lehane) view. As both pre-eclampsia and SMA are associated with difficult intubations awake FOI may carry some advantage in these conditions.

In conclusion we have described a case of a parturient with type III SMA, kyphoscoliosis, grade IV intubation and pre-eclampsia requiring Caesarean section in which awake fibreoptic intubation proved to be a useful technique.

R. Kitson
V. Williams
C. Howell
City General Hospital,
Stoke-on-Trent, UK
E-mail: ross.kitson@
nstaffsh.wmids.nhs.uk

References

1 Rudnik-Sconeborn S, Zerres K, Ignatius J, Rietschel M. Pregnancy and spinal muscular atrophy. *Journal of Neurology* 1992; **239**: 26–30.
2 Wilson RD, Williams KP. Spinal muscular atrophy and pregnacy. *British Journal of Obstetrics and Gynaecology* 1992; **99**: 516–7.
3 Harris SJ, Moaz K. Caesarean section conducted under subarachnoid block in two sisers with spinal muscular atrophy. *International Journal of Obstetric Anaesthesia* 2002; **11**: 125–7.
4 Buettner AU. Anaesthesia for a Caesarean section in a patient with spinal muscular atrophy. *Anaesthesia and Intensive Care* 2003; **31**: 92–4.
5 Pugh CP, Healey SK, Crane JM, Young D. Successful pregnancy and spinal muscular atrophy. *Obstetrics and Gynaecology* 2000; **95**: 1034.

Upper airway obstruction in a patient with a tracheostomy

A 68 year-old man was admitted into the intensive care unit following an abdominal aortic aneurysm repair. During his 33-day stay, he required cardiovascular, respiratory and renal support. A 'Blue Rhino' percutaneous tracheostomy was performed on day six to aid ventilator weaning.

Over the subsequent few days he was slow to wean and unable to tolerate periods of tracheal mask oxygen therapy, tiring quickly without positive pressure ventilatory support. On day 17 following the tracheostomy, evidence of bleeding on tracheal suctioning was detected. The patient was sedated and paralysed whilst oral and per-tracheostomy fibreoptic bronchoscopy was performed. Above the stoma the trachea was essentially normal. However we could see what appeared to be a large blood clot at the tip of the tracheostomy tube. We attempted to dislodge the clot using forceps and fine-bore suction but with little success. Consequently, we elected to remove the tracheal tube. An extensive cylindrical blood and tissue 'cast' of the trachea, adherent to the tracheostomy tube, was found (Fig. 2). Finally, an adjustable-flange

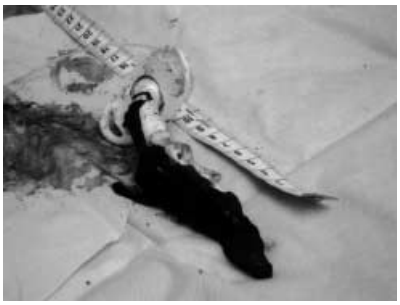

Figure 2 Tracheostomy tube with 'cast' of trachea attached.

tracheostomy tube was inserted with immediate improvement in ventilation.

The hypothesis for this patient's impaired ventilatory weaning was that the cast was acting like a ball valve at the base of the tracheostomy tube. This probably caused the patient only slight inspiratory difficulties but was seriously impeding passive expiration.

There are multiple causes of weaning difficulties in the intensive care setting. It is often attributed to lung infection and respiratory muscle wasting. This case highlights an uncommon but potentially serious cause of ventilatory compromise in patients in whom a percutaneous tracheostomy has been performed. Fibreoptic bronchoscopy should be considered early to detect reversible upper airway obstruction.

R. McKendrick
V. Godbole
J. M. Cupitt
Blackpool Victoria Hospital,
Lancashire FY3 8NR, UK

An audit of an audit: local causes of inaccuracy in 'Who operates when II?'

In Leicester, the data for the National Confidential Enquiry into Perioperative Death (NCEPOD)'s 'Who operates When II' audit were collected, with NCEPOD's permission, using a locally designed form and the FORMIC® Optical Document Recognition System. This avoided the confusion of trying to complete both the routine theatre activity and the NCEPOD forms. When the local results were analysed, there were obvious anomalies. This led us to audit a sample of 13 fields in 130 returned forms, which was a 1 : 5 sample from one hospital. We present the findings in the hope that readers may benefit from our problems.

The ASA grade, an important field, was missing from half the forms. This seemed to be due to that question being among the early questions, completed by the theatre receptionist, rather than the anaesthetist. Staff showed a reluctance to complete multiple boxes. Thus for day surgery, 45% failed to enter the admission day and 6% the day of surgery. Likewise 16% omitted the induction time and 9% the surgical start time. The true facts can be guessed but a scanner accepts only what is entered. A particular problem occurred with 'year of birth', FORMIC could not read 22%. NCEPOD requested a four figure 'year of birth' but many overwrote the boxes with the familiar ddmmyy 'date of birth'. The word 'emergency' caused considerable confusion. It was used in three different ways: admission status (Emergency Admission cf. Daycase & In-patient), type of list (Emergency List, e.g. Emergency Trauma) and category of urgency (Emergency Case, Urgent, Scheduled & Elective) [1]. There was the understandable tendency for an emergency admission to have all the 'emergency' categories ticked, whereas urgency is rarely 'emergency' by NCEPOD's classification (immediate life-saving operation, resuscitation simultaneous with surgical treatment, operation usually within one hour) [2]. It might be better to use the term 'immediate' for this group, which is the NHS Information Board's preferred term (immediate – requires immediate surgery without time for preparation or resuscitation) [3].

Where data were given, FORMIC's accuracy was 87–98% in different fields. However, there was a problem with type 2 error grossly inflating rare categories. Thus, there were 11 ASA category 5 cases recorded in our entire NCEPOD return, but only two were genuine. Eight were Roman numerals misread by the scanner. With the increasing use of scanned data entry, perhaps we should be instructing people to use only Arabic numerals for grades. Human frailty (carelessness?) was also evident. The scanner read some numerals incorrectly because they extended beyond the boxes and, not infrequently, ticks had missed the boxes (crosses would have been better).

As so often occurs, human weaknesses caused more error than the hardware, in poor audit design, and misunderstood or poorly completed forms. Although NCEPOD's intention to hold this audit was well known, the details were released at very short notice. To prevent these problems, adequate time for design, explanations and staff training must be allowed before any audit starts. A trial of any audit system is imperative.

R. Hugh James
Leicester Royal Infirmary,
Leicester LE1 5WW, UK
E-mail: hugh.james@uhl-tr.nhs.uk

References

1 Campling EA, Devlin HB, Hoile RW, Lunn JN. *The report of the National Confidential Enquiry into Perioperative Deaths 1992/93*. Appendix, C. 'Glossary'. London: 1995, National Confidential Enquiry into Perioperative Deaths.
2 National Confidential Enquiry into Perioperative Deaths. *Extremes of Age*. London: National Confidential Enquiry into Perioperative Deaths 1999.
3 NHS Information Standards Board. *Data set change control procedure*. DSC Notice, 54/ 2002, 2002. NHS Information Standards Board.

Introductory day for new college tutors

Drs Edgar and Glavin have written on the need for 'an introductory learning package' for the newly appointed college tutor (Edgar and Glavin. *Anaesthesia* 2003; **58**: 1003-7). I would like to update members on the progress that the tutors and the Royal College of Anaesthetists have made since this was discussed at the annual college tutors meeting in April 2002. In December 2002, Dr John Peacock and myself (both national college tutors' representatives), with the help of the College, ran

the first introductory day for newly appointed tutors. The agenda was simple and covered the majority of the topics identified in Drs Edgar's and Glavin's article. We had presentations from the College, a Deanery, the Regional Advisors and, of course, the tutors themselves, with an emphasis on discussion. The feedback was very positive and the induction day is now a bi-annual event – a whole day in December and a morning before the annual college tutors meeting. However, the new tutors do seem much better informed at these events than we ever were, which must reflect a welcome increase in local support and advice.

F. M. Dodd
Wythenshawe Hospital
Manchester M23 9LT, UK
E-mail: fiona.dodd@smuht.nwest.nhs.uk

Modified Magill's forceps revisited

A modification of Magill's intubating forceps described in 1976. by Dr D. F. Rees [1] has proved invaluable over many years at our hospital for intubation of the difficult airway. We describe a case that illustrates the usefulness of the modified Magill's forceps in a 58 year-old man with a tongue base carcinoma and a grade IV laryngoscopic view. At original presentation three months previously, this patient revealed a grade III laryngoscopic view and underwent a transoral laser excision of the tumour and a selective right neck dissection. When he presented again to us in the Day Surgery Unit, his airway assessment revealed a Mallampati score III with adequate mouth opening, good neck movement and a thyromental distance greater than 6.5 cm. Following preoxygenation, intravenous induction and confirmation of manual bag-mask ventilation, a muscle relaxant was administered. On laryngoscopy, he was found to have a grade IV view with external laryngeal pressure. A first attempt at intubation was unsuccessful. On the second attempt we used a modified Magill's forceps to insert the tracheal tube through the cords. The larynx was not visualised at any stage.

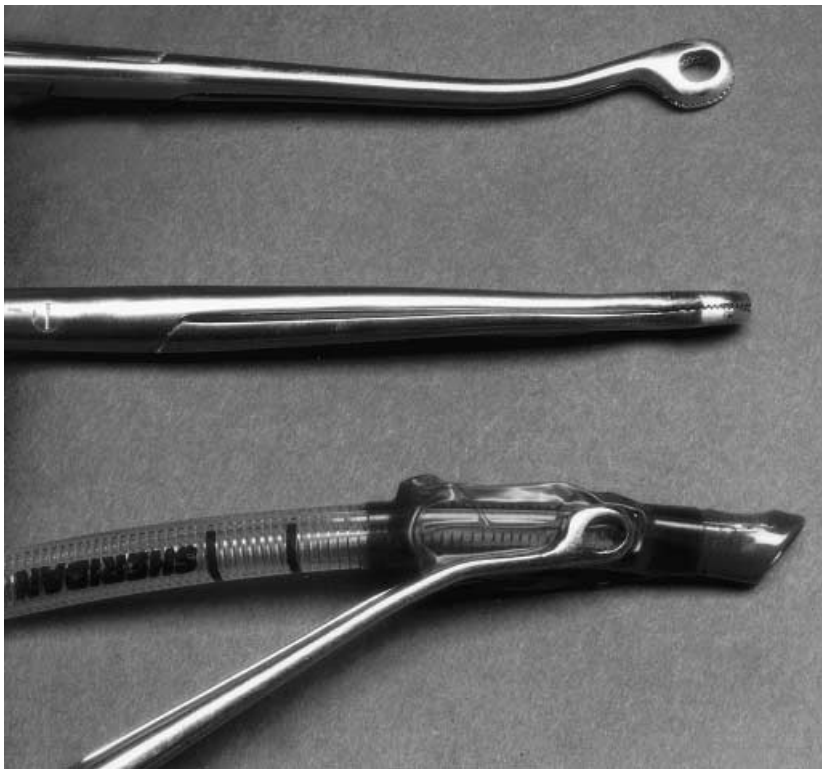

Figure 3 Modified Magills' forceps.

In our department, some of the Magill's forceps have been modified as illustrated (Fig. 3) and have proved very useful on many occasions over the years. The tip of the forceps is bent at two points which conforms to the curve of a Mackintosh laryngoscope blade, thus providing easier handling of a tube at the glottis. More recently, because of the inability of disposable bougies to maintain their preformed shape, our use of the modified Magill's forceps for tube placement has increased.

L. Sims
A. Patel
D. Enderby
Royal National Throat Nose and Ear Hospital,
London WC1X 8DA, UK
E-mail: Lisamlsim@yahoo.co.uk

Reference

1 Rees DF. A modification of Magill's intubating forceps. *Anaesthesia* 1976; **31**: 302–3.

Theoretical value of Hüfner's constant

Haemoglobin oxygen capacity is expressed by the maximum volume of oxygen that combines with 1 g of haemoglobin – Hüfner's constant. The theoretical, i.e. calculated value, of the Hüfner's constant is 1.39 ml g^{-1}. The calculation is based on the molecular weight of haemoglobin (64458 g) and the fact that one molecule of haemoglobin combines with four molecules of oxygen [1]. The actual calculation is:

$$(22414 \text{ ml} \times 4)/64458 \text{ g} = 1.3909212 \text{ ml g}^{-1}$$

The value of 22414 ml is the volume of one mole of ideal gas (Avogadro's law), at STP – Standard Temperature Pressure, 0 °C and 760 mmHg. The volume of 1 mole of gas at body temperature (37 °C) will be larger, and the conversion factor is derived from $V = KT$ (Charles' Law) where T is absolute temperature (provided pressure is constant):

$$V_{body}/V_{STP} = T_{body}/T_{STP} = (273°K + 37°K)/273°K = 1.136$$

Thus, 1 mole of gas at 37 °C will occupy 22414 ml × 1.136 = 25462 ml. The calculated value of Hüfner's constant at body temperature should be:

$$(25462 \text{ ml} \times 4)/64458 \text{ g} = 1.58 \text{ ml g}^{-1}$$

In reality, the haemoglobin oxygen capacity is less than the calculated value and, according to Nunn's Applied Respiratory Physiology, 1.306 (or 1.31) ml g^{-1} is now generally accepted for clinical use [2].

V. Gorelov
University of Michigan Health System,
Ann Arbor MI 48109–0048, USA
E-mail: vgorelov@umich.edu

References

1 Comroe JH. *Physiology of Respiration*, 2nd edn. Chicago: Year Book. Medical Publishers 1974.
2 Lumb AB. *Nunn's Applied Respiratory Physiology*, 5th edn. Oxford: Butterworth-Heinemann 2000.

Confusion relating to drug syringe labels

Recent correspondence (Souter. *Anaesthesia* 2003; **58**: 713) has drawn attention to incidents affecting patient care as a result of syringe labelling changes. I wish to report an incident that highlights the potential for harm to patients in our care as a result of the proposed national changes.

A patient requiring care in a regional neurosurgical centre was transferred by ambulance from a district general hospital. The patient was paralysed and ventilated prior to transfer, and sedated with propofol until hand-over in the anaesthetic room of the neurosurgical theatre. A syringe of atracurium was handed over to the receiving anaesthetist, labelled appropriately with a blue atracurium Medilabel®, as used in the district general hospital. This was placed next to an identical syringe, containing fentanyl, labelled appropriately for use in the receiving hospital, and in accordance with the 'internationally' recognised Hospicode® system. The fentanyl syringe label was therefore also blue. The potential for confusion was recognised before any drug administration and no adverse events occurred. Whilst I realise that the text on the labels clearly identified the contents of both syringes, I feel strongly that this highlights an important source of potential error during this period of change in syringe labelling policy.

Clearly the decision has been made to comply with international (but not European) standards, but in accordance with other correspondents I am concerned that this could lead to potential harm, or even fatal consequences, in the near future. A recent national survey [1] found 98% of departments to be currently using the Medilabel® scheme, and so the potential for confusion especially between different departments during this time of change seems high. I am surprised that the Royal College of Anaesthetists or the AAGBI have not issued clear guidelines on this matter; it would seem sensible to have a nationally agreed date for the change to occur to avoid this kind of incident.

J. Loader
Musgrove Park,
Taunton TA1 5DA, UK
E-mail: jloader@doctors.org.uk

Reference

1 Christie IW, Hill MR. Standardised colour coding for syringe drug labels: a national survey. *Anaesthesia* 2002; **57**: 793–8.

A reply

This was exactly the reason that we included in all our correspondence a warning for extra vigilance during the changeover period for syringe labelling.

We did consider a suggestion that all units should change over at the same time. The manufacturers told us that this would have been impossible in terms of their capacity to produce old and new labels in sufficient quantity to allow this to happen.

The case sited however, in my opinion, represents a serious system failure rather than a failure attributed to the new labelling system. The receiving anaesthetist should have surely drawn up his own atracurium for use and labelled it accordingly! If there had been an urgent requirement during handover then the accompanying anaesthetist should have used the syringe he had brought with him.

R. J. S. Birks
Association of Anaesthetists of
Great Britain and Ireland,
London W1B 1PY, UK

Another foreign body in a laryngeal mask airway

The laryngeal mask airway is a widely used reusable airway device. Laryngeal mask airways are often placed on work surfaces, trolleys and in receptacles alongside other objects. Foreign bodies can gain access into laryngeal mask airways or other reusable airway devices at any time during their cycle of clinical use, disinfection, sterilisation and repackaging processes [1–3]. An airway device with a foreign body presents a serious hazard. I would like to report a case of a foreign body, which was found lodged in an laryngeal mask airway.

A four-year-old child was anaesthetised for examination of both eyes by an experienced anaesthetist in our department. Anaesthesia was induced and the airway secured with a reusable, size 2.5 laryngeal mask airway. The laryngeal mask airway had been removed from a sealed package just prior to its use. The surgical procedure lasted approximately 10 min and the anaesthetic and recovery were essentially uneventful. The laryngeal mask airway was removed in due course and put away for cleaning. When the laryngeal mask airway was being washed a foreign body was discovered, lodged at the junction of the cuff and the distal shaft. The foreign body was translucent and the shaft of the laryngeal mask airway had become opaque due to repeated sterilisations. This made detection of the foreign body by external inspection difficult. On closer inspection the foreign body was identified as the cut pilot balloon of a Mallinckrodt tracheal tube. The pilot balloon formed a tight fit in the shaft of the laryngeal mask airway resulting in an almost complete obstruction to the

Figure 4 Simulation of foreign body in shaft of laryngeal mask airway.

gas flow. A similar foreign body in the wider shaft of a larger size laryngeal mask airway might not cause a complete obstruction but could fall out of the laryngeal mask airway and enter the patient's airway. To demonstrate this case further a pilot balloon was placed in the shaft of an old laryngeal mask airway (Fig. 4). A clearer shaft or a contrast in colour between the pilot balloon and the laryngeal mask airway might have made it easier to identify.

An investigation was unable to determine when or by what mechanism the foreign body entered the lumen of the laryngeal mask airway. On this occasion no harm came to the patient. It is conceivable, however, that the laryngeal mask airway might have gone through the process of resterilisation and repackaging with an undetected foreign body thus posing a serious problem on subsequent use.

This case highlights the dangers of reusable airway equipment. Translucent foreign bodies may escape detection on external examination and internal inspection of reusable airway devices such laryngeal mask airways should be undertaken prior to their use. Perhaps it is time to move towards single use laryngeal mask airways?

S. B. Vohra
City Hospital,
Birmingham B18 7QH, UK

References

1 Riley RH, Browning FS. Another foreign body in a laryngeal mask airway. *Anaesthesia* 1996; **51**: 286–7.
2 Cameron D, Onslow J. Obstruction of airway equipment. *Anaesthesia* 2002; **57**: 188–9.
3 Srikanth K. Yet another foreign body in a laryngeal mask airway. *Anaesthesia* 2002; **57**: 189–90.