

## From the journals

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### Postural modification to the standard Valsalva manoeuvre for emergency treatment of supraventricular tachycardias (REVERT): a randomised control trial.

Appelboam A, Reuben A, Mann C, Gagg J et al.  
*Lancet* 2015; **386**: 1747–53.

The Valsalva manoeuvre is an internationally recognised treatment for supraventricular tachycardia. However, cardioversion is rare (5–20%), necessitating the use of other treatments, including intravenous adenosine, which may have unpleasant side effects.

This multicentre randomised controlled trial investigated whether postural modifications to a standard Valsalva technique could improve its effectiveness. Patients with suspected supraventricular tachycardia on presentation were screened for enrolment, with those that were unstable requiring immediate cardioversion, and those in suspected atrial fibrillation or flutter excluded.

The control group received a standard Valsalva manoeuvre in the semirecumbent position, whereas the treatment group received the modified Valsalva manoeuvre performed in the semirecumbent position followed by repositioning to the supine position with legs elevated immediately after the Valsalva strain.

A total of 428 participants were enrolled into the study from 10 emergency departments in the south-west of England (two teaching hospitals and eight district general hospitals), with 214 patients allocated to each group. In the control group 37 patients were converted to sinus rhythm (17%), compared with 93 (43%) in the treatment group (adjusted odds ratio 3.7; 95% confidence interval 2.3–5.8;  $P < 0.0001$ ).

The authors suggest that, in patients with supraventricular tachycardia, a modified Valsalva manoeuvre with patient repositioning to the supine position and

legs elevated immediately after the Valsalva strain should be considered as routine first-line treatment.

### 5th National Audit Project (NAP 5): Accidental Awareness during General Anaesthesia (AAGA) in the United Kingdom. Available at: <http://www.nationalauditprojects.org.uk/NAP5report>

The 5th National Audit Project concentrated on the incidence of AAGA in the UK. The project relied on patient reports of AAGA and calculated incidence from an activity survey that estimated that 2.8 million general anaesthetics are performed annually in the UK. Reports were then categorised into how likely it is that they represented a true case of AAGA. The incidence of AAGA ranged from a 'pessimistic estimate' 1:6500, which included all reports of AAGA regardless of calibre, and an incidence of 1:20 000 if only reports from 'certain/probable/possible' categories were used.

Almost two-thirds of all experiences reported involved either induction or emergence from anaesthesia whilst only one-third of reported experiences occurred during the maintenance phase of anaesthesia.

There were considerable variations in incidence when various subspecialties and anaesthetic techniques were taken into account. The cases of AAGA reported to NAP5 were overwhelmingly cases of unintended awareness when neuromuscular blockade was employed. When neuromuscular blockade was used, the incidence was 1:8000; when no blockade used the incidence fell to 1:136 000. Within the cohort in which neuromuscular blockade was used, reports of AAGA were overrepresented in those patients in whom no nerve stimulator or no reversal of blockade was used.

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Subspecialties with increased incidence included cardiothoracic surgery (1:8600), which may reflect the largely opioid-based anaesthetic techniques, and anaesthesia for Caesarean section, which had a significantly greater incidence of 1:670, possibly owing to the avoidance of volatile agent prior to and sometimes even after delivery.

Other factors that were more common in cases of AAGA included;

- the use of thiopental
- 'rapid sequence induction'
- total intravenous anaesthesia
- female patients
- out-of-hours operating
- a junior anaesthetist and
- previous incidence of AAGA.

AAGA was less prevalent in:

- children
- trauma, orthopaedic and plastic surgery patients.

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### **The First Patient Report of the National Emergency Laparotomy Audit (NELA). Available at: <http://www.nela.org.uk/>**

The National Emergency Laparotomy Audit was established in order to describe and compare inpatient care and outcomes of patients undergoing non-elective laparotomy in England and Wales.

More than 30 000 patients undergo emergency laparotomy each year in the UK. These procedures are associated with high rates of postoperative complications and mortality. Recent studies suggest that 1-month mortality in this group is as high as 15%.

The NELA report compares hospital performance against a number of previously set standards and guidelines, designed to improve the outcome of patients undergoing emergency laparotomy.

These standards and recommendations included aspects concerned with patient care before, during and after surgery, and auditing factors such as consultant-led care throughout, early diagnostic investigations, prompt access to theatre and planned admission to intensive care as decided by calculating a risk of mortality.

Data were collected for over 20 000 patients from 192 hospitals in England and Wales in the first year of the project. Thirty-day inpatient mortality was 11%, which may reflect a real reduction in mortality but the authors advise caution in the interpretation of these results pending validation with independent mortality data from the Office for National Statistics.

## **KEY FINDINGS**

### **Timeliness of care**

- Only half (48%) of patients who were admitted as an emergency and underwent bowel surgery were reviewed by a consultant surgeon within 12 hours of admission.
- Further analysis showed that two-thirds (68%) received a review within 12 hours of admission by a consultant surgeon, if admitted between the hours of midnight and 8 am, compared with only one-third (34%) if admitted between midday and 6 pm.
- There was a large variation between individual hospitals.
- For those patients admitted with peritonitis requiring emergency laparotomy, almost half waited for more than 4 hours for their first dose of antibiotics. A quarter waited more than 7 hours.

### **Assessment and appreciation of risk**

- Risk of surgery (for example with P-POSSUM score) was documented before surgery in just over half (56%) of all patients.
- Where risk was documented prior to surgery, more high-risk patients received the required standards of care such as early consultant review and planned admission to intensive care.
- Again there was large variation between hospitals.

### **Resources**

- Overall, two-thirds of operations had direct input from both a consultant surgeon and consultant anaesthetist.
- This varied greatly between hospitals but also the time of day; both consultants were present for just 41% of operations carried out at night, after midnight, compared with 75% during daylight hours.
- Among those requiring a CT scan prior to surgery, in two-thirds (68%) CT was carried out by a consultant radiologist.
- Overall, 60% of patients were admitted directly to intensive care following surgery, with a large variation between hospitals.

While the authors suggest that emergency laparotomy care overall is improving, they suggest that the large variation between hospitals seen in all areas remains a problem. They suggest that individual hospitals use the findings of this NELA report to implement their own care pathways to improve patient care.

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### **Bubble continuous positive airway pressure for children with severe pneumonia and hypoxaemia in Bangladesh: an open, randomised controlled trial.**

Christi MJ, Salam MA, Smith JH, et al. *Lancet* 2015; **386**: 1057–65.

Mortality from severe pneumonia in children in low-income countries is high. In 2011, an estimated 1.3 million children died from pneumonia even with standard oxygen therapy, appropriate antibiotics and other supportive care. The authors of this paper

investigated whether oxygen delivery by bubble continuous positive airway pressure (CPAP) improved outcome.

Bubble CPAP is a low-cost method of delivering positive end-expiratory pressure to patients, in order to improve oxygenation. The method consists of connecting the expiratory limb of a breathing circuit to a tube, which is submerged in water. The distance at which the open end of the tube is submerged under water is equivalent to the pressure (in  $\text{cmH}_2\text{O}$ ). The system can be made cheaply from locally available materials including standard oxygen nasal prongs, tubing used for the administration of intravenous fluids and a shampoo bottle.

The randomised controlled trial was undertaken in a large hospital in Bangladesh, recruiting children less than 5 years old with severe pneumonia and hypoxaemia. A total of 225 patients were recruited over a 2-year period and were randomised to receive treatment with one of three oxygen therapies:

- bubble CPAP ( $5 \text{ L min}^{-1}$  starting at CPAP level of  $5 \text{ cmH}_2\text{O}$ )
- low flow nasal cannula ( $2 \text{ L min}^{-1}$ ) or
- high-flow nasal cannula ( $2 \text{ L kg}^{-1} \text{ min}^{-1}$  up to maximum of  $12 \text{ L min}^{-1}$ ).

In addition, all patients received WHO standard management of very severe pneumonia. The primary outcome was treatment failure, i.e. clinical failure, intubation and mechanical ventilation, death, or termination of hospital stay against medical advice.

Of the patients who received bubble CPAP, five (6%) failed treatment, compared with 16 (24%) in the low-flow group, and 10 (13%) in the high-flow group. Treatment failure was experienced by significantly fewer children in the bubble CPAP group than in the low-flow group (relative risk 0.27, 99.7% confidence interval (CI) 0.07–0.99,  $P=0.0026$ ). No significant difference was noted between the bubble CPAP and high flow oxygen groups (RR 0.50, 99.7% CI 0.11–2.29;  $P=0.175$ ). Mortality was also significantly lower in the group of children who received bubble CPAP than in the group that received standard low-flow oxygen therapy. The trial was stopped early owing to the higher mortality rate in the low-flow group.

The authors suggest that bubble CPAP is a low-cost technique that could improve care in those hospitals where the only respiratory support for severe pneumonia is low-flow oxygen therapy.

### The effect of patient warming during Caesarean delivery on maternal and neonatal outcomes: a meta-analysis.

Sultan P, Habib AS, Cho Y, Carvalho B. *Br J Anaesth* 2015; **115**: 500–10.

The benefits of patient warming in the perioperative period are well

recognised. Such benefits include reductions in wound infections, myocardial ischaemia, the risk of perioperative coagulopathy, blood loss and transfusion requirement. However, the benefits of patient warming in Caesarean delivery remain unclear. There are currently no European or US guidelines regarding the use of warming during Caesarean delivery, and thus routine patient warming during Caesarean delivery is rarely used despite widespread availability of the facility to do this. The authors of this meta-analysis aimed to determine the efficacy of active warming on outcomes after elective Caesarean delivery.

The primary outcome in this meta-analysis was maximum maternal temperature change in the perioperative period, as this was deemed the most important clinical outcome linked to the harmful effects of hypothermia. Secondary outcomes included thermal comfort, shivering, vasopressor use, hypothermia, neonatal temperature, umbilical cord pH, maternal nausea and vomiting, and Apgar scores at 1 and 5 minutes.

Forty randomised controlled trials were considered for this meta-analysis, of which 12 were analysed for the primary outcome. There were 394 patients in the warmed groups and 366 patients in the control group, receiving no warming. Overall, warming significantly reduced maximum temperature change compared with control (standard mean difference  $-1.27^\circ\text{C}$ ; confidence interval  $-1.86^\circ\text{C}$  to  $-0.69^\circ\text{C}$ ;  $P=0.00002$ ). The subgroup analysis revealed no significant difference between the types of warming method used (forced air warming or fluid warming). Of the secondary outcomes, patient warming resulted in a significant reduction in shivering, a reduction in the incidence of hypothermia, improvement in thermal comfort and increase in umbilical artery pH.

The main finding of this meta-analysis is that the magnitude of perioperative temperature change was smaller when active warming was used. The authors believe that this is clinically significant as the mean temperature change of  $1.27^\circ\text{C}$  is more than twice the normal physiological variation ( $\pm 0.5^\circ\text{C}$ ), which would therefore result in a greater number of patients becoming hypothermic. However, the authors acknowledge the significant heterogeneity between the studies included. There were marked variations in patient warming techniques, temperature measurement, the volume of warmed fluid administered and local anaesthetic and opioid combinations used in regional anaesthesia. Publication bias (the higher likelihood that studies with positive findings get published) may also be a factor.

The authors conclude by recommending that active warming should be used for elective Caesarean delivery in order to minimise decreases in maternal temperature, to reduce the incidence of hypothermia and shivering and to improve thermal comfort. They also suggest that more studies need to be conducted to determine optimum warming technique (fluid or air), and whether a combination of techniques offers an advantage over a single modality.

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### **Implementation of the WHO Surgical Safety Checklist and surgical swab and instrument counts at a regional referral hospital in Uganda – a quality improvement project.**

M Lilaonitkul, Kwikiriza A, Ttendo S, Kiwanuka J. *Anaesthesia* 2015; **70**: 1345–55.

The World Health Organization (WHO) checklist and surgical instrument and swab counts have been shown to be cost-effective tools that improve patient outcome. The authors of this study investigated their applicability to low income settings by conducting a prospective study in large hospital in Uganda.

Mbarara Regional Referral Hospital is located in a large urban area in Uganda, and performs approximately 4000 operations per year. The checklist was first introduced to this hospital's busy obstetric department over a period of 5 months several years previously by a volunteer anaesthetist. However, the use of the checklist was not sustained after the volunteer left the hospital. Barriers to checklist implementation were identified as lack of clarity about responsibilities; lack of leadership and support from higher-level staff; and not enough time to complete the checklist. With these issues in mind, the authors attempted to re-implement the checklist with a formal year-long quality improvement project with multiple 'plan–do–study–act' (PDSA) cycles, hoping this would lead to a sustained change in practice.

An 'implementation team' was formed from senior representatives from surgery, obstetrics and gynaecology, anaesthetics and theatre

nursing. During the pre-implementation phase, educational meetings were held for staff, emphasising the importance of the checklist in improving patient care. Following testing in two theatres the checklist was reviewed for its relevance and practicality, and finally a locally adapted version was produced. As there were no standardised instrument packs for most surgical procedures and no formal instruments lists, each surgical department was asked to submit a list of instruments most commonly used for each procedure. These were then tabulated and printed on the reverse of the checklist in order to make counts easier to conduct.

Monthly feedback meetings were held for each department and a summary of findings were formally presented by one of the authors. Feedback information included rate of checklist compliance, patient consent, swab and instrument counts, and run charts were also kept and shared between departments to keep staff up to date with the progress of implementation and individual performance.

A total of 3341 operations were conducted in the study period. During the study, checklist and surgical count compliance rates increased from a baseline median of 29.5% to 85% and from 25.5% to 83% respectively.

The authors suggest that the success of the project was attributed to quality improvement methodology, prospective data collection, PDSA cycles and regular structured feedback to users to improve their performance. They believe that the introduction of basic paperwork, together with adaptation of the checklist to suit local practice, were key interventions to support implementation.