- 2 Bahadur G, Ling KLE, Hart R, et al. Semen production in adolescent cancer patients. *Hum Reprod* 2002;17:2654-6.
- 3 Schover LR, Brey K, Lichtin A, et al. Knowledge and experience regarding cancer, infertility, and sperm banking in younger male survivors. *J Clin Oncol* 2002;20:1880-9.
- 4 Schover LR, Brey K, Lichtin A, et al. Oncologists' attitudes and practices regarding banking sperm before cancer treatment. *J Clin Oncol* 2002;20:1890-7.
- 5 Bahadur G, Ling KLE, Hart R, et al. Semen quality and cryopreservation in adolescent cancer patients. *Hum Reprod* 2002;17:3157-61.
- 6 Bahadur G, Whelan J, Ralph D, et al. Gaining consent to freeze spermatozoa from adolescents with cancer: legal, ethical and practical aspects. *Hum Reprod* 2001;16:188-93.

Intravenous rehydration of children with gastroenteritis: which solution is better?

Recent publications have suggested that hyponatraemia may develop in children with gastroenteritis treated with intravenous hypotonic saline.¹⁻³

Even though we believe these papers have been well designed and developed, we cannot agree with their results for we are carrying out a similar study in our centre (81 cases up to now) that is leading to the opposite conclusion: our children with gastroenteritis did not develop hyponatraemia even though they were all treated with hypotonic intravenous solutions (0.3% saline with 5% glucose), while isotonic fluids were only used in "pre-shock" situations.

The incidence of hyponatraemia at the time of diagnosis is lower in our study (9%) than in those published previously (range 30-50%); this could be due to differences in climate or diet.

In the analysis, we separated children according to whether they were hyponatraemic, normonatraemic, or hypernatraemic at presentation. In the first group, hypotonic intravenous saline increased mean plasma sodium (from 132.4 (SD 2.07) to 135.3 (SD 2.21) mEq/l); it was decreased slightly in the second group, without leading to hyponatraemia (139.2 (SD 2.9) to 137.3 (SD 2.9) mEq/l), and also in the third group (150.4 (SD 4.12) to 140.6 (SD 3.6) mEq/l). No cases of hyponatraemia post-infusion were seen. Hoorn and colleagues,⁴ in a sample of 1586 children, showed that the cases of hyponatraemia in their study were due to incorrect treatment, with higher volumes of fluid than needed.

In our study, 10 children (16.3%) presented with glucose levels lower than 70 mg/dl (40 mg/dl in one case). If these children were treated with isotonic fluids without adequate glucose, levels would never increase, with serious consequences.

These data are not definitive, but should be taken into consideration before selecting an appropriate solution in these patients. Further studies with different designs are required.

M Sanchez-Bayle, A Alonso-Ojembarrena, J Cano-Fernandez
Hospital Infantil Niño Jesús, Madrid, Spain

Correspondence to: Dr M Sanchez-Bayle, Hospital Infantil Niño Jesús, Avenida Menéndez Pelayo, 65, Madrid 28009, Spain; msanba@teleline.es

doi: 10.1136/adc.2006.099093

Competing interests: none declared

References

- 1 Neville KA, Verge CF, Rosenberg AR, et al. Isotonic is better than hypotonic saline for intravenous rehydration of children with gastroenteritis: a prospective randomised study. *Arch Dis Child* 2006;91:226-32.
- 2 Duke T, Molyneux EM. Intravenous fluids for seriously ill children: time to consider. *Lancet* 2003;362:1320-3.
- 3 Neville KA, Verge CF, O'Meara MW, et al. High antidiuretic hormone levels and hyponatraemia in children with gastroenteritis. *Pediatrics* 2005;116:1401-7.
- 4 Hoorn EJ, Geary D, Robb M, et al. Acute hyponatremia related to intravenous fluid administration in hospitalized children: an observational study. *Pediatrics* 2004;113:1279-84.

Prediction of vesicoureteral reflux: sibilla or more?

The study of Leroy and colleagues¹ about the predictive value of some simple clinical parameters on the presence of vesicoureteral reflux (VUR) in children with previous pyelonephritis, seems to disclaim previous results of Oostenbrink.² All protocols now recommend that micturating cystourethrography (MCUG) is carried out in children after pyelonephritis.

Some years ago we performed a prospective study which showed that the number of cystourethrographies can be significantly reduced in these children.³ In children (0-4 years of age) without VUR, fever is preceded by symptoms such as low fever, anorexia, irritability, drowsiness, diarrhoea, or foul smelling urine. At least one of these was present in the clinical history of 114 of 218 children with fever >38.5°C; of these children, only 16 later showed VUR. However, 85 of the 104 children without symptoms preceding fever had VUR ($p < 0.001$). If MCUG had been performed only in children with no other symptoms before fever onset (104 of 218 febrile children), VUR would have been detected in 85 of 101 (84.1%), with 16 patients being undiagnosed (most of the undiagnosed VURs were low grade).

The reduction in MCUGs performed would have been considerable (114 instead of 218). Greater sensitivity could be also obtained by performing MCUG in all children <4 months (only nine undiagnosed VUR). Prediction of VUR after a first febrile urinary tract infection in children is possible. Our strategy therefore improves the cost-benefit relationship in children with urinary tract infection by significantly reducing the need for invasive and expensive radiological procedures.⁴

M Pennesi, A Giacomini, A Franzil, L Travan
Department of Paediatrics, IRCCS Burlo Garofolo, Trieste, Italy

Correspondence to: Dr M Pennesi, Department of Paediatrics, IRCCS Burlo Garofolo Trieste, Trieste, Italy; pennesi@burlo.trieste.it

Competing interests: none declared

References

- 1 Leroy S, Marc E, Adamsbaum C, et al. Prediction of vesicoureteral reflux after a first febrile urinary tract infection in children: validation of a clinical decision rule. *Arch Dis Child* 2006;91:241-4.
- 2 Oostenbrink R, van der Heijden AJ, Moons KG, et al. Prediction of vesico-ureteric reflux in childhood urinary tract infection: a multivariate approach. *Acta Paediatr* 2000;89:806-10.

- 3 Pennesi M, Salvatore CM, Peratoner L. Different clinical presentations of pyelonephritis in children with and without vesicoureteral and reflux: an Italian multicenter study. *Pediatrics* 1998;102:1493-4.
- 4 Dick PT, Feldman W. Routine diagnostic imaging for childhood urinary tract infections: a systematic overview. *J Pediatr* 1996;128:15-22.

Scope for improvement: hospital wide sedation practice at a children's hospital

Procedural sedation by non-anaesthesia staff is frequently required in children, yet even "safe" agents can be associated with serious adverse events.¹ Professional societies and professional bodies have published sedation guidelines in a number of countries.² However, no data exist about the characteristics of sedation practice from a hospital wide perspective. We set out to determine the spectrum and quality of procedural sedation performed by non-anaesthesia staff at a tertiary paediatric hospital.

All episodes of procedural sedation by non-anaesthesia staff outside intensive care units were prospectively tracked over three weeks in 2004 at a tertiary children's hospital (Royal Children's Hospital, Melbourne, Australia). Sedations were identified by twice daily hospital "walk through" by the authors. Data collected included patient demographics and circumstances of the sedations.

Table 1 Procedural sedation at a tertiary children's hospital: indications, agents used, and locations (n = 120)

	n (%)
Indications	
Suture placement	14 (11.7)
Drain removal (wound, chest)	14 (11.7)
EEG	13 (10.8)
IV insertion/venepuncture	13 (10.8)
Echocardiography	9 (7.5)
Reduction of fracture/dislocation	8 (6.7)
Bone scan	6 (5.0)
Lumbar puncture	6 (5.0)
Other*	37 (30.8)
Agents	
Midazolam	49 (40.8)
Nitrous oxide	32 (26.7)
Chloral hydrate	15 (12.5)
Trimeprazine	12 (10.0)
Ketamine	5 (4.2)
Other†	7 (5.8)
Location	
Inpatient wards (multiple)	41 (34.2)
Emergency department	35 (29.2)
EEG department	13 (10.8)
Radiology department (x ray, ultrasound, nuclear medicine, CT, MRI)	9 (7.5)
Cardiology (electrocardiogram, echocardiogram)	8 (6.7)
Day surgical and medical units	6 (5.0)
Dental	4 (3.3)
Other	5 (4.2)

*Includes 16 other types of procedures.

†Includes three other sedative agents.

We identified 120 episodes of procedural sedation for 24 indications, utilising eight agents in 26 different locations (table 1).

Mean patient age was 6.6 years (range 12 weeks to 19 years). Twenty two per cent of sedations were performed after hours. Neither medical nor nursing staff were present during 7% of sedations nor during 23% of recovery periods. Formal monitoring of any vital signs was performed in 72%. Only 11% of patients were fasted for 6 hours solids/2 hours liquids or longer. Non-pharmacological or psychological techniques were used in 39% of patients and 28% were physically restrained. Staff rated the quality of the sedations episodes as very satisfactory or satisfactory in 86%. Where restraint was required the quality of the sedation episode was rated as very satisfactory or satisfactory in 76% and unsatisfactory or very unsatisfactory in 24%. The procedures were completed successfully in 95%.

This hospital wide study indicates that procedural sedations occur frequently (estimated 2000 episodes/year) and with variable quality of care. Areas for improvement have become apparent. Unmonitored or parent or technician only sedations should be abolished. Sedations should be shifted from low frequency and remote locations to higher frequency settings. Requirements for pre-sedation assessment, personnel, monitoring, and recovery should be defined and embedded into an educational process.² Deeper sedation requires participation of trained senior medical or anaesthesia staff as it is associated with higher risk of sedation related adverse events.³ Non-pharmacological interventions should be increased⁴ and staff understanding of an "ideal sedation" in terms of restraint use should be reviewed. We suspect that our core findings might be similar in other institutions that also lack a comprehensive sedation programme.

Acknowledgements

We thank Dr Annie Moulden, Clinical Support Service, and Prof Mike South, Department of General Medicine, Royal Children's Hospital for their support and review of the manuscript.

F E Babl

Emergency Department, Royal Children's Hospital and Murdoch Children's Research Institute, Melbourne, Australia

J Munro

Department of General Medicine, Royal Children's Hospital and Murdoch Children's Research Institute, Melbourne, Australia

G Kainey

Clinical Support Service, Royal Children's Hospital and Murdoch Children's Research Institute, Melbourne, Australia

G M Palmer

Department of Anaesthesia and Pain Management Service, Royal Children's Hospital and Murdoch Children's Research Institute, Melbourne, Australia

A Iser

Department of General Medicine, Royal Children's Hospital and Murdoch Children's Research Institute, Melbourne, Australia

Correspondence to: Dr F E Babl, Consultant in Emergency Medicine, Emergency Department, Royal Children's Hospital, Parkville, Victoria 3055, Australia; franz.babl@rch.org.au

Ethics approval: the project was approved as a quality improvement audit by the Ethics in Human Research Committee at Royal Children's Hospital

doi: 10.1136/adc.2006.098673

Competing interests: none

References

- 1 Cote CJ, Karl HW, Notterman DA, *et al*. Adverse sedation events in pediatrics: analysis of medications used for sedation. *Pediatrics* 2000;**106**:633–44.
- 2 Krauss B, Green SM. Procedural sedation and analgesia in children. *Lancet* 2006;**367**:766–80.
- 3 Hoffman GM, Nowakowski R, Troshynski TJ, *et al*. Risk reduction in pediatric procedural sedation by application of an American Academy of Pediatrics/American Society of Anesthesiologists Process Model. *Pediatrics* 2002;**109**:236–43.
- 4 Duff AJA. Incorporating psychological approaches into routine paediatric venepuncture. *Arch Dis Child* 2003;**88**:931–7.

Cost minimisation of RSV prevention with palivizumab

An outpatient respiratory syncytial virus (RSV) prophylaxis programme has been provided in Glasgow since 1999. Initially only high risk neonates were included but subsequently patients with congenital heart disease, congenital lung abnormalities, and other complex histories have been offered prophylaxis. Early attempts to minimise drug wastage via a buddy system were unsuccessful, with only a 1.4% cost saving in 2003–04. During the 2004–05 RSV season we aimed to strictly coordinate the delivery of effective prophylaxis while minimising drug costs through patient cohorting and vial sharing.

Local referral criteria were agreed. Referring clinicians were contacted to encourage timely referral to a designated coordinator (SW). Standardised information letters were then sent to parents and general practitioners.

Breakthrough infections immediately prior to or following the second dose of palivizumab had occurred during the early years of our prophylaxis programme. We therefore administered the second dose after three weeks with subsequent doses prescribed at four weekly intervals.

Outpatient clinics were held in the Ambulatory Ward of the Royal Hospital for Sick Children, Glasgow. The start date was chosen to predate the appearance of RSV infection and to avoid the need to attend for subsequent doses on Christmas or New Year holidays. Three cohorts of between 20 and 30 infants attended on consecutive afternoons. Referrals to the coordinator continued throughout the RSV season as eligible babies were discharged home. These infants were grouped together and, where possible, joined an initial cohort for subsequent doses.

We calculated projected vial usage if every infant had been individually dosed and compared this with our actual usage identified from our pharmacy database.

Eighty six referrals were received prior to the start of the season. These were divided into three cohorts. By the end of the season 93 infants were receiving prophylaxis in Glasgow in eight cohorts. In total 356 doses were given to 114 patients. Four patients (4.4%) were hospitalised with RSV infection. None required intensive care. Total drug costs for the year were £220 847, representing a saving of 16% (table 1).

Our experience shows that it is possible to minimise the cost of palivizumab administration by large group cohorting. This allowed us to maximise the use of 100 mg vials in preference to the more expensive 50 mg vials (table 1). This does however require tight coordination and appropriate outpatient resources. A national consensus on patient selection would facilitate coordinated local administration and perhaps positively influence the cost-benefit analysis of palivizumab prophylaxis.

S Wills, J H Simpson, J Coult

Queen Mother's Hospital, Glasgow, UK

Correspondence to: Dr J H Simpson, Paediatric Department, Queen Mother's Hospital, Glasgow, UK; judith.simpson@yorkhill.scot.nhs.uk

doi: 10.1136/adc.2005.093484

Competing interests: none declared

Patient's consent for publication of case report: need for developing a universal consent form

A patient's consent for publication of case report is a contentious issue and difficulties in this context have been reported.^{1,2} One of the lesser recognised problems is the lack of a universal patient consent form. Thus, different journals may have their own patient consent forms; for example, the consent form of *The Lancet* is not acceptable to *Archives of Disease in Childhood*. This means that the patient has to sign another consent form should the manuscript be rejected by one journal. This requires a repeat visit by the patient to his doctor. Since many of the patients, especially those receiving treatment at tertiary care centres, live a long way away, the repeat visit may be delayed, or worse, may not materialise at all. An alternative is to obtain the signature on the consent form by mail. This, in our experience, is not a rewarding exercise, especially if the patient does not understand the significance of this exercise.

Another alternative is to ask the patient to sign the consent forms of multiple journals. However, this has the potential of causing unnecessary alarm for the patient and may

Table 1 Palivizumab wastage and monetary savings

	Usage if individually dosed	Actual usage	Savings with vial sharing
50 mg vials	154	52	102
100 mg vials	322	317	5
Total mg	39900 mg	34300 mg	5600 mg
Drug discarded	7255 mg	1730 mg	5495 mg
Total cost	£262 374	£220 847	£41 527