

## BEST EVIDENCE TOPIC REPORTS

# Towards evidence based emergency medicine: best BETs from the Manchester Royal Infirmary

Edited by Kevin Mackway-Jones

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Best Evidence Topic reports (BETs) summarise the evidence pertaining to particular clinical questions. They are not systematic reviews, but rather contain the best (highest level) evidence that can be practically obtained by busy practising clinicians. The search strategies used to find the best evidence are reported in detail in order to allow clinicians to update searches whenever necessary. Each BET is based on a clinical scenario and ends with a clinical bottom line which indicates, in the light of the evidence found, what the reporting clinician would do if faced with the same scenario again.

The BETs published below were first reported at the Critical Appraisal Journal Club at the Manchester Royal Infirmary<sup>1</sup> or placed on the BestBETs website. Each BET has been constructed in the four stages that have been described elsewhere.<sup>2</sup> The BETs shown here together with those published previously and those currently under construction can be seen at <http://www.bestbets.org>.<sup>3</sup> Four BETs are included in this issue of the journal.

- ▶ Midazolam or ketamine for procedural sedation of children in the emergency department
- ▶ Use of octreotide acetate to prevent rebound hypoglycaemia in sulfonyleurea overdose
- ▶ Ultrasound to detect haemothorax after chest injury
- ▶ Aminophylline in bradycardic cardiac arrest

1. Carley SD, Mackway-Jones K, Jones A, *et al*. Moving towards evidence based emergency medicine: use of a structured critical appraisal journal club. *J Accid Emerg Med* 1998;15:220–2.
2. Mackway-Jones K, Carley SD, Morton RJ, *et al*. The best evidence topic report: A modified CAT for summarising the available evidence in emergency medicine. *J Accid Emerg Med* 1998;15:222–6.
3. Mackway-Jones K, Carley SD. [bestbets.org](http://www.bestbets.org): Odds on favourite for evidence in emergency medicine reaches the worldwide web. *J Accid Emerg Med* 2000;17:235–6.

## Midazolam or ketamine for procedural sedation of children in the emergency department

Report by Andrew Munro, *Specialist in Emergency Medicine FACEM*

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### Abstract

A short cut review was carried out to establish whether ketamine or midazolam is superior at providing safe and

effective conscious sedation in children in the emergency department. A total of 203 papers were found using the reported searches, of which four presented the best evidence to answer the clinical question. The author, date and country of publication, patient group studied, study type, relevant outcomes, results and study weaknesses of these best papers are summarised in table 1. It is concluded that midazolam and ketamine have similar efficacy and safety profiles but that ketamine is preferred by parents and physicians.

### Three-part question

In [children needing painful procedures in the emergency department] is [midazolam or ketamine] [safer and more effective at achieving conscious sedation]?

### Clinical scenario

A mother brings her 5-year-old son to the emergency department with a deep scalp laceration, having fallen onto the corner of a coffee table. The wound requires sutures. For various reasons the option for procedural sedation in this department is limited to midazolam. Due to your past experience, you are more comfortable using ketamine. Although there is a large amount of data in the emergency literature to show efficacy and safety for both agents, you are not aware of direct comparisons to back your preference for ketamine in children in the emergency department setting.

### Search strategies

Medline 1960–April 2007 using the OVID interface: (exp ketamine/or ketamine.mp.) AND (exp midazolam/or midazolam.mp.) AND (exp child/ or “children”.mp. or exp pediatrics/ or “pediatric”. mp.). LIMIT to human AND English language.

The Cochrane Library Issue 2, 2007: MeSH descriptor Ketamine explode all trees AND MeSH descriptor Midazolam explode all trees AND (emergency department):ti,ab,kw 7 papers none relevant

### Outcome

Of the 203 papers found in Medline, 199 were found to be irrelevant or of insufficient quality for inclusion. Of seven papers found in Cochrane none were relevant. The remaining four papers are summarised in table 1.

### Comments

The available comparative studies involved multiple agents and combinations, routes of administration and doses. No head to head trials of intravenous ketamine versus intravenous midazolam for procedural sedation in children in the emergency setting could be found. Secondary findings show that satisfaction of parents and physicians was greater with ketamine and that physicians felt it was safer.

Table 1

Author, date, country	Patient group	Study type	Outcomes	Key results	Study weaknesses
McGlone <i>et al</i> , 1998, UK	102 children (1–7 years). Divided into either midazolam (0.5 mg/kg nasal) or ketamine (2.5 mg/kg IM)	Prospective "allocation"	Behaviour before, during and after procedure. Vomiting before and after discharge. Time to discharge. Parental and nursing satisfaction	Significantly less restraint required in ketamine group ( $p < 0.01$ ). Ketamine caused more vomiting during recovery ( $p = 0.012$ ). Midazolam children discharge 7 min earlier. Ketamine significantly preferred ( $p = 0.018$ )	? randomised. Two different routes of administration, uncertain final bioavailability of intranasal route. Small numbers. Atropine added to ketamine group
Everitt <i>et al</i> , 2002, Australasia	54 Australasian EDs. Ketamine 12%, midazolam 77%	Survey of agents used and ED physicians. 45 of 54 surveyed departments responded	Linear analogue depiction of perceived efficacy of sedation	IV ketamine 14% better sedation than midazolam	One respondent per ED. Open to responder bias. Not patient focused. No standard doses. Not limited to ketamine and midazolam alone
Roback <i>et al</i> , 2005, USA	2500 consecutive children (median age 6.7 years) receiving IV or IM procedural sedation. Ketamine 59%, midazolam/ketamine 12%, midazolam 10.4%	Prospective database. Retrospectively analysed	Respiratory complications. Apnoea/larygospasm/desaturation Vomiting	Ketamine 6.1%, ketamine/midazolam 10%, midazolam 5.8%  Ketamine 10.1%, ketamine/midazolam 5.4%, midazolam 0.8%	Not randomised, not blinded. Multiple drug combinations. ?standardised doses. Glycopyrolate was given to all who had ketamine. ?mandatory reporting
Sacchetti <i>et al</i> , 2007, USA	226 children aged <13 years. Ketamine 60%, midazolam 28%. Across 14 community EDs	Prospective database	Adverse events	Nil recorded for both drugs	Database "self-reported", ?reliability. Low rate of respiratory events reported

ED, emergency department; IM, intramuscular; IV, intravenous.

### ► CLINICAL BOTTOM LINE

Ketamine and midazolam have similar safety profiles in the emergency setting for children. Ketamine causes more vomiting but appears to be the preferred agent for most parents and many emergency department physicians.

**McGlone RG**, Ranasinge S, Durham S. An alternative to "brutacaine": a comparison of low dose intramuscular ketamine with intranasal midazolam in children before suturing. *Emerg Med J* 1998;15:231–6.

**Roback MG**, Wathen JE, Bajaj L, *et al*. Adverse events associated with procedural sedation and analgesia in a pediatric emergency department: a comparison of common parental drugs. *Acad Emerg Med* 2005;12:508–13.

**Everitt I**, Younge P, Barnett P. Paediatric sedation in emergency departments: what is our practice? *Emerg Med* 2002;14:62–6.

**Sacchetti A**, Stander E, Ferguson N, *et al*. Pediatric procedural sedation in the community emergency department: results from the ProSCED registry. *Pediatr Emerg Care* 2007;23:218–22.

## Use of octreotide acetate to prevent rebound hypoglycaemia in sulfonylurea overdose

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### Abstract

A short cut review was carried out to establish whether octreotide can prevent rebound hypoglycaemia after sulfonylurea overdose. Fourteen papers were found using the reported searches, of which two presented the best evidence to answer the clinical question. The author, date and country of publication, patient group studied, study type, relevant outcomes, results and study weaknesses of these best papers are summarised in table 2. It is concluded that octreotide may be safe and effective in this situation.

### Three-part question

In [patients with sulfonylurea overdose] does [octreotide acetate] prevent [rebound hypoglycaemia]?

### Clinical scenario

A 56-year-old man known to have non-insulin dependent diabetes mellitus presents to the emergency department after having taken an overdose of his own oral hypoglycaemic, glipizide. The initial blood sugar value was very low, so he was given a 50 ml bolus of 50% dextrose. The patient recovered but, despite a continuous intravenous infusion of 10% dextrose, hypoglycaemia recurred. You know that intravenous dextrose stimulates insulin release, and that sulfonylurea compounds have a long half-life. You wonder about the use of the somatostatin analogue octreotide, which causes pronounced suppression of serum immunoreactive insulin and C-peptide concentration, and whether it is safe.

### Search strategy

Medline 1950 to April 2007 using Ovid interface: [exp.hypoglycemia or rebound hypoglycaemia. mp] AND [exp. Hypoglycaemic agent/ or Sulfonylurea compounds/ or sulfonylurea overdose.mp or sulfonylurea poisoning.mp] AND [exp octreotide acetate or octreotide .mp] and LIMIT to human AND English.

The Cochrane Library issue 2 2007 Exp hypoglycemia [MeSH] and exp sulfonylurea compounds [MeSH] and exp octreotide [MeSH].

### Outcome

No relevant papers found on Cochrane library. Fourteen papers were identified on Medline of which only two were directly relevant to the question. These are summarised in table 2.

### Comments

There are very few reports and most of them are reviews, case reports and letters. Each of these studies has small numbers of patients. It is difficult to recruit a large series of patients in a single centre. A large multicentre study is needed.