BEST EVIDENCE TOPIC REPORTS

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

Edited by K 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 practicing clinicians. The search strategies used to find the best evidence are reported in detail in order to allow clinicians to update searches whenever necessary. The BETs published below were first reported at the Critical Appraisal Journal Club at the Manchester Royal Infirmary[1] or placed on the BestBETs web site. Each BET has been constructed in the four stages that have been described elsewhere.[2] The BETs shown here together with those published previously and those currently under construction can be seen at http://www.bestbets.org.[3] Six BETs are included in this issue of the journal.

- Diamorphine or morphine for ischaemic cardiac chest pain
- Type of oral corticosteroid in mild to moderate croup
- Glucagon in tricyclic overdose
- Colourimetric CO_2 detector compared with capnography for confirming endotracheal tube placement
- Glucagon for the treatment of symptomatic β blocker overdose
- Buscopan (hyoscine butylbromide) in abdominal colic

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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: Odds on favourite for evidence in emergency medicine reaches the worldwide web. *J Accid Emerg Med* 2000;**17**:235–6.

Diamorphine or morphine for ischaemic cardiac chest pain

Report by Steve Halford, *Specialist Registrar*
Checked by H Simpson, *Consultant*

Abstract

A short cut review was carried out to establish whether morphine is better than diamorphine at allieviating chest pain after an acute myocardial infarction. Altogether 66 papers were found using the reported search, of which one 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 this best paper are tabulated. A clinical bottom line is stated.

Clinical scenario

A 55 year old man presents to the emergency department with chest pain. An ECG shows changes consistent with acute myocardial infarction. He is given aspirin and oxygen. His thrombolytic therapy is started and in the meantime you wonder whether his pain would be best alleviated by either morphine or diamorphine.

Three part question

In [patients with a myocardial infarction] is [morphine better than diamorphine] at [alleviating chest pain]?

Search strategy

Medline 1966–02/03 using the OVID interface. [(exp chest pain OR exp myocardial infarction OR myocard$.mp OR infarct$.mp OR MI.mp) AND (exp morphine OR morphine.mp OR heroin.mp OR diamorphine.mp OR analg$.mp OR exp analgesics, opioid) AND (exp clinical trials OR exp randomized controlled trials OR randomized controlled trial.mp)] LIMIT to human AND English.

Search outcome

Altogether 66 papers were identified of which only one was relevant. Details of this paper are shown in table 1.

Table 1

Author, date and country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
Scott ME and Orr R, 1969, UK	118 patients aged 30–79 yrs with moderate to severe chest pain	PRCT	Complete pain relief at 10 min	47% *v* 32% (p<0.05)	Randomisation unclear
			Complete pain relief at 30 min	NSD	Confidence intervals not stated
	Diamorphine 5 mg *v* morphine 10 mg		Complete pain relief at 60 min	NSD	

Comment(s)
This is the only paper identified that compares morphine and diamorphine in this clinical situation. The doses were fixed.

▸ CLINICAL BOTTOM LINE
There are no significant clinical differences between diamorphine and morphine in patients with chest pain.

Scott ME, Orr R. Effects of diamorphine, methadone, morphine, and pentazocine in patients with suspected acute myocardial infarction. *Lancet* 1969;i:1065–7.

Type of oral cortiosteroid in mild to moderate croup

Report by A Corfield, *Specialist Registrar*
Checked by S Teece, *Clinical Research Fellow*

Abstract
A short cut review was carried out to establish whether oral dexamethasone is better than oral prednisolone at improving outcome in children with mild to moderate croup. Altogether 139 papers were found using the reported search, of which none presented any evidence to answer the clinical question. It is concluded that there is no evidence available to answer this question. Further research is needed.

Clinical scenario
A 3 year old boy arrives in the emergency department in the early hours of the morning. His mother reports that he has been unwell for 24 hours with a barking cough. On examination he is well and active but has stridor at rest. His temperature is normal, there is no indrawing and oxygen saturations are normal. You know that oral corticosteroids reduce the length of illness and need for hospital admission but wonder whether to use oral dexamethasone or oral prednisilone.

Three part question
In [patients with mild to moderate croup] is [oral dexamethasone better than oral prednisilone] at [improving outcome]?

Search strategy
Medline 1966–02/03 and EMBASE 1980–02/03 using the OVID interface. [exp prednisilone OR prednisilone$.mp OR exp prednisone OR prednidsone$.mp OR exp steroids OR steroid$.mp OR exp dexamethasone OR dexamethasone$.mp] AND [exp croup OR croup$.mp OR exp laryngotracheobronchitis OR laryngotracheobronchitis$.mp OR exp laryngotracheitis OR laryngotracheitis$.mp] LIMIT to human AND English.

Search outcome
Altogether 139 papers were identified. None answer the question.

Comment(s)
Croup is a common problem in the paediatric population. Oral corticosteroids are as effective as nebulised corticosteroids and are cheaper. Oral dexamethasone has an effective half life of 48 hours compared with 24 hours for prednisilone. Unfortunately there are no data directly comparing the efficacy of these two treatments.

▸ CLINICAL BOTTOM LINE
There is no evidence available to answer this question. Local advice should be followed.

Glucagon in tricyclic overdose

Report by S Teece, *Clinical Research Fellow*
Checked by K Hogg, *Clinical Research Fellow*

Abstract
A short cut review was carried out to establish whether the addition of glucagon to standard treatments improves clinical outcome in patients who have taken an overdose of tricyclic antidepressants. Altogether 31 papers were found using the reported search, of which three 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 tabulated. A clinical bottom line is stated.

Clinical scenario
A 27 year old woman attends the emergency department with a suspected amitrptyline overdose. She has a Glasgow Coma Scale score of 7, is trypsilating, and has a broad complex tachycardia with a blood pressure of 70/30. After intubation and ventilation and sodium bicarbonate she remains tachycardic at 130 although her complexes have narrowed

Table 2

Author, date and country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
Ruddy JM *et al*, 1972, Australia	4 year old ingested about 1000 mg imipramine, episode of PEA 1.5 hours duration	Case report	Cardiac status	Improved with 1 mg boluses glucagon	Case report Patient also received pyridostigmine, sodium bicarbonate, isoprenaline, digoxin, lignocaine and mannitol
Sener EK *et al*, 1995, UK	25 year old woman. Plasma toxicology - imipramine 3.0 mg/l, desipramine 0.18 mg/l, diazepam 2.9 mg/l, nordiazepam 2.2 mg/l, chlorpromazine 0.3 mg/l, temazepam 0.25 mg/l	Case report	Blood pressure	No response to 1 mg bolus glucagon. 40 mm Hg systolic rise after glucagons	Multiple drugs ingested in overdose
			Cardiac rhythm	No response to 1 mg bolus glucagon. Broad complex reverted to sinus after 10 mg bolus	Patient also received sodium bicarbonate, phenytoin and isoprenaline and fluid resuscitation
Sensky PR and Olczak SA, 1999, UK	36 year old OD-admission toxicology dothiepin 2.58 mg/l, desmethyldothiepin 0.51 mg/l, paracetamol 135 mg/l, diazepam 0.33 mg/l, nordiazepam 0.12 mg/l	Case report	Blood pressure	No response to 1 mg bolus glucagon. 30 mm Hg systolic rise after glucagons	Case report Multiple drugs ingested in overdose
			Cardiac rhythm	No response to 1 mg bolus glucagon. Broad complex reverted to sinus after 10 mg bolus	Patient also received n-acetylcysteine, adrenaline, noradrenaline, ephedrine, dobutamine, and aminophylline with fluid restriction

somewhat and her blood pressure is still low at 80/40. You have heard that tricyclic overdoses may respond to glucagon and wonder whether there is any evidence for this.

Three part question

In [overdose with tricyclic antidepressants] does [the addition of glucagon to standard treatments] improve [clinical outcome]?

Search strategy

Medline 1966–02/03 using the OVID interface. [(exp antidepressive agents OR exp antidepressive agents, tricyclic OR exp desipramine OR exp amitriptyline OR tricyc$.af. OR amitriptyline.af. OR amoxapine.af. OR clomipramine.af. OR doxepin.af. OR dothiepin.af. OR imipramine.af. OR lofepramine.af. OR nortriptyline.af. OR trimipramine.af.) AND (exp glucagon OR glucagon.af.)] LIMIT to human AND English.

Search outcome

Altogether 31 papers found, 28 failed to answer the three part question, the three relevant papers are case reports summarised in table 2.

Comment(s)

Although all three patients received multiple treatments the authors state the improvement in condition was immediately after high dose glucagon administration. No reports of failure to respond to glucagon are found in the literature. This is most probably attributable to reporting and publication bias. Further research is required.

▸ CLINICAL BOTTOM LINE

There is not enough evidence currently available to support the use of glucagon in tricyclic overdose.

Ruddy JM, Seymour JL, Anderson NG. Management of tricyclic antidepressant ingestion in children with special reference to the use of glucagon. *Med J Aust* 1972;**1**:630–3.
Sener EK, Gabe S, Henry JA. Response to glucagon in imipramine overdose. *J Toxicol Clin Toxicol* 1995;**33**:51–3.
Sensky PR, Olczak SA. High dose intravenous glucagon in severe tricyclic poisoning. *Postgrad Med J* 1999;**75**:611–12.

Colourimetric CO_2 detector compared with capnography for confirming ET tube placement

Report by K Hogg, *Clinical Research Fellow*
Checked by S Teece, *Clinical Research Fellow*

Abstract

A short cut review was carried out to establish whether colourimetric carbon dioxide detectors are as reliable as capnometry at verifying tracheal placement of endotracheal tubes after emergency intubation. A total of 69 papers were found using the reported search, 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 tabulated. A clinical bottom line is stated.

Table 3

Author, date and country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
Goldberg JS *et al*, 1990, UK	62 men aged 18–70 years old, ASA I, II and III. Simulated difficult intubation drill, using laryngoscope to increase larynoscopy grade.	Prospective observational study	3 separate observers recorded time to recognition of tracheal and oesophageal intubation, by observing IR capnography, FEF end-tidal colourimeter, and auscultaion respectively.	All three methods confirmed correct positioning in 100% (n=51) cases. Colourimeter and capnograph were faster than chest auscultation. All oesophageal intubations (n=11) confirmed by all 3 methods. One oesophageal intubation gave mild colour change but correctly interpreted.	Study only used haemodynamically stable patients Observers were specialist anaesthetic staff as were those intubating Observers not blinded to other detection methods
Anton WR *et al*, 1991, USA	60 emergency intubations, out with theatre – respiratory failure n=29, CPR n=9, self-extubation n=7, ET tube change n=6, airway protection n=3. ? other 6	Prospective observational study	Observation of colour change in FEF colourimeter within 6 breaths post intubation. Observation of a positive signal from portable TRIMED IR CO_2 detector within 6 breaths post intubation	Positive signal of exhaled CO_2 produced within 6 breaths by 59 of 60 by FEF detector, and 58 of 60 by TRIMED.Of the 9 CPR patients 5 showed a colour change that was "subtle", into the brown range.One patient receiving CPR took 20 breaths before a positive signal was received in either	Doctors were presumably anaesthetists There were no oesophageal intubations
Kelly JS *et al*, 1992, USA	20 children age 6 months to 8 years undergoing elective anaesthesia	Prospective observational study	Colour change in Fenem CO_2 detector versus IR capnographer reading in 1.spontaneous mask ventilation 2.post tracheal intubation10 breaths during each point were monitored	Of total 400 breaths, 398 registered yellow colour in the FEF colourimeter with expiration. This correlated with capnography readings. 2 breaths fell into brown range–both of these during mask ventilation, corrected by mask adjustment	All patients haemodynamically stable, with optimal intubating conditions There were no oesophageal intubations Participants were specialist anaesthetists
Puntervoll SA *et al*, 2002, Norway	14 female patients undergoing general anaesthesia All had both tracheal and oesophageal tubes passed CO_2 *v* capnography	Experimental study	Detection of tracheal placement Detection of oesophageal misplacement	100% in both devices In 5 patients with expired air placed in the oesophagus the colourimeter changed colour	Small numbers Not emergency intubation

Clinical scenario
A 30 year old man is brought to the emergency department with a Glasgow Coma Scale score of 8 after falling down stone steps while drunk. Although he has not vomited, you are concerned that he cannot protect his airway. You decide to do a rapid sequence induction. As you organise and check your equipment, you ask the nurse to bring the departmental capnograph to the bedside. She tells you that it is still in ITU where it was left after transferring the last intubated patient. She does, however, suggest you use a disposable colourimetric CO_2 detector found in the paediatric arrest trolley. You wonder whether you should wait five minutes while the capnograph is brought from ITU, or whether the colourimetric indicator will be just as accurate?

Three part question
In an [emergency intubation] is [a colourimetric carbon dioxide detector as reliable as capnography] at [verifying endotracheal tube placement]?

Search strategy
Medline 1966–02/03 using the OVID interface. [(exp Carbon Dioxide OR end-tidal.mp OR exp Capnography OR carbon dioxide.mp OR capnograph$.mp) AND (colorimetric.mp OR exp Colorimetry OR colourimetric.mp)] LIMIT to human AND English language.

Search outcome
Altogether 69 papers were found of which four were relevant to the question. Details of these papers are shown in table 3.

Comment(s)
There have been no studies investigating the use of these devices exclusively within the emergency department.

▸ CLINICAL BOTTOM LINE
The colourimetric CO_2 detector is as accurate as IR capnography at detecting tracheal intubation, but is potentially less accurate at detecting oesophageal intubation.

Goldberg JS, Rawle PR, Zehnder JL, *et al*. Colorimetric end-tidal carbon dioxide monitoring for tracheal intubation. *Anesth Analg* 1990;**70**:191–4.
Anton WR, Gordon RW, Jordon TM, *et al*. A disposable end-tidal CO2 detector to verify endotracheal intubation. *Ann Emerg Med* 1991;**20**:271–5.
Kelly JS, Wilhoit RD, Brown RE, *et al*. Efficacy of the FEF colourimetric end-tidal carbon dioxide detector in children. *Aneth Analg* 1992;**75**:45–50.
Puntervoll SA, Soreide E, Jacewicz W, *et al*. Rapid detection of oesophageal intubation: take care when using colourimetric capnometry. *Acta Anaethesiol Scand* 2002;**46**:455–7.

Glucagon for the treatment of symptomatic β blocker overdose

Report by R Boyd, *Consultant*
Checked by A Ghosh, *Senior Clinical Fellow*

Abstract
A short cut review was carried out to establish whether the intravenous glucagon can support blood pressure in β blocker overdose. A total of 51 papers were found using the reported search, of which six 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 tabulated. A clinical bottom line is stated.

Clinical scenario
A 25 year old patient presents to the emergency department two hours after taking a significant overdose of propanolol. She is bradycardic and hypotensive despite initial resuscitation with oxygen and intravenous fluids. An ECG shows a sinus bradycardia of 50 bpm. You have heard of treatment with intravenous glucagon but wonder if it has been of any proved benefit.

Three part question
In [symptomatic significant beta-blocker overdose] is [intravenous glucagon] effective at [reversing the induced hypotension]?

Search strategy
Medline 1966–02/03 using the OVID interface. [exp glucagon Or glucagon.mp] AND [{exp adrenergic beta antagonist} AND {exp poisoning OR exp overdose OR poisoning.mp OR intoxication.mp overdose.mp} OR {beta blocker overdose.mp OR beta blocker poisoning.mp}]

Search outcome
Altogether 51 papers were found of which six were deemed relevant. No clinical trials were identified and all the papers available were case reports. Details of these papers are shown in table 4.

Comment(s)
No clinical trials or even case controlled studies have been published. There is therefore only anecdotal evidence for the use of glucagon. The doses of glucagon suggested are higher than the usual therapeutic doses given in hypoglycaemia and

Table 4

Author, date and country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
Peterson CD *et al*, 1984, USA	2 cases of mixed overdose including β blockers	Case report	Survival	Bolus of 12 mg and 4 mg used to reverse cardiogenic shock	Case report
Weinstein RS *et al*, 1985, USA	1 case of propanolol overdose	Case report	Survival	80 mg glucagon intravenous given over 18 hours to reverse cardiogenic shock	Case report
Khan MI and Miller MT, 1985, South Africa	1 case of propanolol overdose	Case report	Survival	Use of 20 mg glucagon to reverse cardiogenic shock	Case report
Tai YT *et al*, 1990, Hong Kong	Single case of metoprolol overdose	Case report	Survival	1 mg of glucagon is claimed to have reversed cardiogenic shock	Case report
O'Mahony D *et al*, 1990, Eire	One patient after oxprenolol overdose	Case report	Survival	30 mg bolus with 10 mg/h infusion of glucagon, successful resuscitation from beta blocker induced cardiogenic shock	Case report
Mansell PI, 1990, Australia	Single mixed overdose including propanolol	Case report	Survival	Bolus of 4 mg glucagon with an infusion of 10 mg in 3 hours	Case report

this is expensive. No reports of failure to respond to glucagon are found in the literature. This is most probably attributable to reporting and publication bias. Further research is required.

▸ CLINICAL BOTTOM LINE

There is not enough evidence currently available to support the use of glucagon in β blocker overdose.

Peterson CD, Leeder JS, Sterner S. Glucagon therapy for beta-blocker overdose. Drug intelligence and clinical pharmacy. *Exp Toxicol* 1984;**18**:394–8.
Weinstein RS, Cole S, Knaster HB, *et al*. Beta blocker overdose with propranolol and with atenolol. *Ann Emerg Med* 1985;**14**:161–3.
Khan MI, Miller MT. Beta blocker toxicity-the role of glucagon. *S Afr Med J* 1985;**67**:1062–3.
Tai YT, Lo CW, Chow WH, *et al*. Successful resuscitation and survival following massive overdose of metoprolol. *Br J Clin Pharmacol* 1990;**44**:746–7.
O'Mahony D, O'Leary P, Molloy MG. Severe oxprenolol poisoning: the importance of glucagon infusion. *Hum Exp Toxicol* 1990;**9**:101–3.
Mansell PI. Glucagon in the management of deliberate self-poisoning with propranolol. *Arch Emerg Med* 1990;**7**:238–40.

Buscopan (hyoscine butylbromide) in abdominal colic

Report by K Mackway-Jones, *Consultant*
Checked by S Teece, *Clinical Research Fellow*

Abstract

A short cut review was carried out to establish whether buscopan (hyoscine butylbromide) is better than analgesics at controlling pain in abdominal colic. A total of 31 papers were found using the reported search, of which none presented any evidence to answer the clinical question. It is concluded that there is no evidence available to answer this question. Further research is needed.

Clinical scenario

A 38 year old man presents to the emergency department with moderate to severe non-specific abdominal pain that is colicy in nature. He has no significant past history. Examination reveals mild tenderness but no signs of peritonism. Oral analgesia seems unlikely to control his pain. You speak to a colleague who suggests that you use buscopan (hyoscine butylbromide)—an antispasmodic. You wonder if there is any evidence that this works.

Three part question

In [a patient with colicy abdominal pain] is [buscopan (hyoscine butylbromide) better than analgesics] at [controlling pain]?

Search strategy

Medline 1966–02/03 using the OVID interface. [exp abdominal pain OR (abdominal adj5 pain).af OR (stomach adj5 ache).af OR exp abdomen, actue OR {(abdom$.af OR tummy.af OR belly.af OR gut.af) AND (exp pain OR pain.af OR ache.af OR exp colic OR colic$.af OR discomfort.af)}] AND [exp butylscopolammonium bromide OR butylscopolammonium.af OR buscopan.af OR exp scopolamine OR scopolamine.af OR hyoscine.af OR exp scopolamine derivatives OR hyocine.af] LIMIT to human AND English.

Search outcome

Altogether 31 papers were found of which none were relevant.

Comment(s)

There is very little research into the effects of buscopan on any form of pain.

▸ CLINICAL BOTTOM LINE

There is no evidence supporting the use of buscopan in non-specific abdominal pain.