BEST EVIDENCE TOPIC REPORTS

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

Edited by K Mackway-Jones

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.

The BETs published below were first reported at the Critical Appraisal Journal Club at the Manchester Royal Infirmary.[1] Each BET has been constructed in the four stages that have been described elsewhere.[2] The four topics are covered in this issue of the journal are:

- Antibiotics and compound finger fracture
- Troponin T to rule out myocardial damage in chest pain
- Flumazenil and suspected benzodiazepine overdose
- Corticosteroids in acute spinal cord injury

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.

Antibiotics and compound finger fracture

Report by Martin Thomas, *Research Fellow*
Search checked by Steve Jones, *Clinical Research Fellow*

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Clinical scenario
A 25 year old man attends the emergency department having trapped his right index finger in a door. He has a compound fracture of the distal phalanx. You wonder whether antibiotics should be given after wound care.

Three part question
In [patients with compound finger fractures] does [adding antibiotics] reduce [infection rates]?

Search strategy
Medline 1966–01/00 using the OVID interface. ({exp finger injuries OR exp fingers OR finger$.mp OR digit$.mp} AND {exp fractures, open OR open fracture$.mp OR compound fracture$.mp}) LIMIT to human AND english.

Search outcome
Altogether 61 papers found of which 59 were irrelevant or of insufficient quality. The remaining two papers are shown in table 1.

Comments
The two studies found come to quite different conclusions. The second paper specifies much more rigorous wound management and this may explain the outcome.

Clinical bottom line
All compound finger fractures should be rigorously cleaned and debrided. Antibiotics may reduce infection rates even more.

Table 1

Author, date and country	*Patient group*	*Study type (level of evidence)*	*Outcomes*	*Key results*	*Study weaknesses*
Sloan JP *et al*, 1987, UK[1]	85 adult patients with recent (<6 h) open fractures of the distal phalanges No antibiotic *v* cephradine	Controlled clinical trial	Infection rate	30% *v* <3%	
Suprock MD *et al*, 1990, USA[2]	91 patients with open fractures of the finger Surgical irrigation and debridement with or without antibiotics	Controlled clinical trial	Number of infections	4 in each group	

1 Sloan JP, Dove AF, Maheson M, *et al*. Antibiotics in distal fractures of the distal phalanx? *J Hand Surg (Br)* 1987;**12**: 123–4.
2 Suprock MD, Hood JM, Lubahn JD. Role of antibiotics in open fractures of the finger. *J Hand Surg (Am)* 1990;**15**: 761–4.

Troponin T to rule out myocardial damage in chest pain

Report by Katrina Richell-Herren, *Research Fellow*
Search checked by Sue Maurice, *Consultant*

Clinical scenario
A 50 year old man attends the emergency department with a 12 hour history of chest pain that may be cardiac in origin. His ECG is normal. You want to rule out possible myocardial damage and wonder whether a single troponin T measurement taken at this time is sensitive enough to do this.

Three part question
In [patients with cardiac chest pain and a normal ECG] is [a single troponin T measurement] sensitive enough to [rule out myocardial damage in the first 12 hours]?

Search strategy
Medline 1966–01/00 using the OVID interface. ({exp diagnosis OR diagnosis.mp} AND troponin$.mp) LIMIT to human AND english.

Search outcome
Altogether 590 papers found of which 581 were irrelevant or of insufficient quality. The remaining nine papers are shown in table 2.

Comments
No study has systematically evaluated the point at which troponin T becomes sensitive enough to effectively rule out acute myocardial infarction in emergency department patients. No study has shown a high enough sensitivity (> 95%) to allow use as a SnNout at less than 12–24 hours.

Clinical bottom line
Troponin T is not sensitive enough to rule out myocardial damage in the first 12 hours after onset of chest pain.

1 Mair J, Smidt J, Lechleitner P, *et al*. Rapid accurate diagnosis of acute myocardial infarction in patients with non-traumatic chest pain within one hour of admission. *Coron Artery Dis* 1995;**6**:539–45.
2 De Winter RJ, Koster RW, Sturk A, *et al*. value of myoglobin, troponin T and CK-MB mass in ruling out acute myocardial infarction in the emergency department. *Circulation* 1995;**92**:3401–7
3 Tucker JF, Collins RA, Anderson AJ, *et al*. early diagnostic efficiency of cardiac troponin I and troponin T for acute myocardial infarction. *Acad Emerg Med* 1997;**4**:13–21.

Table 2

Author, date and country	*Patient group*	*Study type (level of evidence)*	*Outcomes*	*Key results*	*Study weaknesses*
Mair J *et al*, 1995, Austria[1]	114 emergency department patients with chest pain	Diagnostic test study	AMI	Sensitivity 46% on admission	Only admitted patients. Troponin cut off set at 0.032 ng/l
De Winter RJ *et al*, 1995, Netherlands[2]	309 emergency department patients with chest pain	Diagnostic test study	AMI	Sensitivity 67% in patients with less than 75% chance of AMI	Unclear if gold standard blinded. Risk assessment was by clinical judgement. Patients with abnormal ECGs included
Tucker JF *et al*, 1997, USA[3]	177 emergency department patients within 24h of onset of chest pain	Diagnostic test study	AMI	Sensitivity 33.3% at 1 h Sensitivity 33.3% at 2 h Sensitivity 59.3% at 6 h Sensitivity 96.3% at 12–24 h Specificity 86.7% at 12–24 h	Only admitted patients.
REACTT investigators, 1997, USA[4]	926 emergency department patients with chest pain Rapid bedside test *v* laboratory test	Diagnostic test study	AMI	Sensitivity 19.6% *v* 25% on admission Sensitivity 59% *v* 69.6% at 3 h Sensitivity 69.7% *v* 79.8% at 6 h	206 patients excluded because of lack of data. Discharged patients not followed up with same gold standard
Hamm CW *et al*, 1997, Germany[5]	773 emergency department patients within 12 h of onset of chest pain, with no ST increase	Observational	Death or non-fatal AMI within 30 days	44% predicted on arrival 79% predicted after 4 h	No independent gold standard applied to all patients. Inadequate follow up of discharged patients. Sensitivity could not be calculated
Moher ER *et al*, 1998, USA[6]	100 patients with chest discomfort	Diagnostic test study	AMI	Sensitivity 90% at 4 h	Cumulative sensitivities at 4 h.
Sayre MR *et al*, 1998, USA[7]	667 patients with chest pain	Diagnostic test study	AMI	Sensitivity 88% at 12 h post admission Sensitivity 97% at 24 h post admission	Only admitted patients studied.
Zimmermman J *et al*, 1999, USA[8]	955 emergency department patients with chest pain	Diagnostic test study	AMI	Sensitivity 87% at 10 h post onset	
Johnson PA *et al*, 1999, USA[9]	1477 emergency department patients with hest pain	Diagnostic test study	AMI in the 24 h after presentation	Sensitivity 99% at 24 h Specificity 86% at 24 h	174 cases excluded

4 REACTT investigators study group. Evaluation of a bedside whole blood rapid troponin T assay in the emergency department. Rapid evaluation by assay of cardiac troponin T (REACTT). *Acad Emerg Med* 1997;**4**:1015–17.
5 Hamm CW, Goldman BU, Heeschen C, *et al*. Emergency room triage of patients with acute chest pain by means of rapid testing for cardiac troponin T or I. *N Engl J Med* 1997;**337**:1648–53.
6 Moher ER 3rd, Ryan T, Segar DS, *et al*. Clinical utility of troponin T levels and electrocardiography in the Emergency Department. *Am Heart J* 1998;**135**:253–60.
7 Sayre MR, Kaufmann KH, Chen I-W, *et al*. Measurement of cardiac troponin T is an effective method for predicting complications among emergency department patients with chest pain. *Ann Emerg Med* 1998;**31**:539–49.
8 Zimmermman J, Fromm R, Meyer D, *et al*. Diagnostic marker co-operative study for the diagnosis of myocardial infarction. *Circulation* 1999;**99**:1671–7.
9 Johnson PA, Goldmman L, Sacks DB, *et al*. Troponin T as a marker for myocardial ischaemia in patients seen at the emergency department for acute chest pain. *Am Heart J* 1999;**137**:1137–44.

Flumazenil and suspected benzodiazepine overdose

Report by Pranay Kumar Singh, *Medical Student*
Search checked by Katrina Richell-Herren, *Research Fellow*

Clinical scenario
An unresponsive young adult is brought to the emergency department. No history is available. Neurological examination reveals no focal abnormality and pupils are mid-size and reactive. Blood glucose is normal. You suspect an overdose and wonder whether flumazenil should be given to ascertain whether benzodiazepines are involved.

Three part question
In [patients with suspected overdose] is [a single dose of flumazenil] indicated to [safely diagnose benzodiazepine ingestion]?

Search strategy
Medline 1966–01/00 using the OVID interface. [({exp flumazenil OR flumazenil.mp} AND {exp overdoses OR overdoses.mp OR exp poisoning OR poisoning.mp}) AND {exp diagnosis OR exp diagnosis, differential OR diagnosis.mp OR diagnos$.mp}] LIMIT to human AND english.

Search outcome
Altogether 45 papers were found of which 39 were irrelevant or of insufficient quality. The remaining six papers are shown in table 3.

Comments
All the studies are small. Most are PRCTs investigating the use of flumazenil in the management of benzodiazepine overdose. These show that flumazenil improves conscious levels in patients who have taken overdoses. Significant adverse reactions occurred including fitting and transient increases in conscious level. Only the diagnostic study gives some idea of the clinical utility of the test.

Clinical bottom line
The sensitivity of a single dose of flumazenil is high enough to allow failure to respond to be used as a SnNout for benzodiazepine overdose. The specificity is too low to allow it to be used to rule-in. The possibility of mixed overdose is a relative contraindication to using flumazenil.

1 Hojer J, Baehrendz S. The effect of flumazenil in the management of self-induced benzodiazepine poisoning. *Acta Med Scand* 1988;**224**:357–65.
2 Ritz R, Zuber M, Elsasser S, *et al*. Use of flumazenil in intoxicated patients with coma. A double blind placebo controlled study in ICU. *Intensive Care Med* 1990;**16**:242–7.
3 Hojer J, Baehrendz S. Diagnostic utility of flumazenil in comatose patients. *BMJ* 1990;**301**:1308–11.
4 Chern T, Hu S, Lee C, *et al*. Diagnostic and therapeutic utility of flumazenil in comatose patients. *Am J Emerg Med* 1993;**11**:122–4.
5 Gueye PN, Hoffman JR, Taboulet P, *et al*. Empiric use of flumazenil in comatose patients: limited applicability of criteria to define low risk. *Ann Emerg Med* 1996;**27**:730–5.
6 Barnett R, Grace M, Boothe P, *et al*. Flumazenil in drug overdose: randomized placebo controlled study to assess cost effectiveness. *Crit Care Med* 1999;**27**:10–11.

Table 3

Author, date and country	*Patient group*	*Study type (level of evidence)*	*Outcomes*	*Key results*	*Study weaknesses*
Hojer J and Baehrendz S, 1988, Sweden[1]	52 ICU patients with suspected drug overdose. Flumazenil *v* placebo	PRCT	Glasgow Coma Scale score Side effect rate	Significantly improved No difference	
Ritz R *et al*, 1990, Switzerland[2]	23 ICU patients with suspected drug overdose. Flumazenil *v* placebo	PRCT	Conscious level Side effect rate	Significant improvement No significant side effects	7 overdoses were iatrogenic
Hojer J and Baehrendz S, 1990, Sweden[3]	105 unconscious adults in whom a benzodiazepine overdose could not be excluded Flumazenil *v* placebo	PRCT	Conscious level Blood gas analysis Side effect rate	Significant improvement Significant improvement No difference	
Chern T *et al*, 1993, Taiwan[4]	61 adults with altered mental status in whom a benzodiazepine overdose could not be excluded	Diagnostic test study	Benzodiazepine OD	Sensitivity 100% Specificity 42%	Gold standard (urinary assay for benzodiazepines) only possible in 44 cases
Gueye PN *et al*, 1996,[5]	35 adults admitted to ICU with suspected OD	Retrospective survey	Full wakening Partial wakening Seizures	7 cases 6 cases 5 cases	Retrospective
Barnett R *et al*, 1999, Canada[6]	43 adults with suspected OD and GCS <13 (patients with known tricyclic antidepressant overdose were excluded) Flumazenil *v* placebo	PRCT	Glasgow Coma Scale score	Significantly improved	

Corticosteroids in acute spinal cord injury

Report by Paul Wallman, *Clinical Fellow*
Search checked by Kevin Mackway-Jones, *Consultant*

Clinical scenario
A 40 year old man is involved in a road traffic accident. He has bony disruption at C7/T1 with acute spinal cord injury. He has no associated head injury and no other life threatening injuries. You wonder whether he should be given high dose corticosteroids for his cord injury.

Three part question
In [patients with acute traumatic spinal cord injury] do [high dose corticosteroids] improve [neurological outcome]?

Search strategy
Medline 1966–01/00 using the OVID interface. [({exp spinal injuries OR spinal injury.mp OR spinal injuries.mp} AND {exp acute disease OR acute.mp}) OR acute spinal injury.mp OR acute spinal injuries.mp] AND maximally sensitive RCT filter LIMIT to human AND english.

Search outcome
Altogether 245 papers were found of which 241 were irrelevant or of insufficient quality. The remaining four papers are shown in table 4.

Comments
No study has shown a benefit of corticosteroids in unselected patients. Stratification of data in NASCIS 2 has shown a subgroup of patients in whom high dose methylprednisolone appears to be of benefit but the method of analysis has been criticised.

Clinical bottom line
Patients presenting within eight hours of an acute spinal cord injury should be given methylprednisolone 30 mg/kg as soon as possible. Further corticosteroid treatment should be discussed with the admitting spinal unit.

1 Braken MB, Collins WF, Freeman DF, *et al*. Efficacy of methylprednisolone in acute spinal cord injury. *JAMA* 1984;**251**:45–52.
2 Braken MB, Shepard MJ, Hellenbrand KG, *et al*. Methylprednisolone and neurological function 1 year after spinal cord injury. results of the National Acute Spinal Cord Injury Study. *J Neurosurg* 1985;**63**:704–13.
3 Braken MB, Shepard MJ, Collins WF, *et al*. A randomized controlled trial of methylprednisolone or naloxone in the treatment of acute spinal cord injury. Results of the second National Acute Spinal Cord Injury Study. *N Engl J Med* 1990;**322**:1405–11.
4 Braken MB, Shepard MJ, Collins WF, *et al*. methylprednisolone or naloxone treatment after acute spinal cord injury: 1-year follow-up data. Results of the second National Acute Spinal Cord Injury Study. *J Neurosurg* 1992;**76**:23–31.

The BMA library supplied the papers.

Table 4

Author, date and country	*Patient group*	*Study type (level of evidence)*	*Outcomes*	*Key results*	*Study weaknesses*
Braken MB *et al*, 1984[1] and 1985,[2] USA	330 patients with acute spinal injury Methylprednisolone 100 mg *v* methylprednisolone 1000 mg	PRCT	Neurological outcome Adverse effects	No difference at 6 weeks, 6 months and 1 year. Wound infection rate increased in steroid group (RR 3.6)	No placebo. "High" dose is in fact quite low
Braken MB *et al*, 1990[3] and 1992,[4] USA	487 patients with acute spinal injury Methylprednisolone 30 mg/kg and 5.4 mg/kg/h for 24 h *v* naloxone 5.4 mg/kg and 4 mg/kg/h for 24 h *v* placebo	PRCT	Neurological outcome Adverse effects	No difference overall. Stratification revealed significant neurological improvements when methylprednisolone was given within 8 h No significant differences	Much stratification of data with significant risk of type 1 error