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


Antibiotics and compound finger fracture

Report by Martin Thomas, Research Fellow

Search checked by Steve Jones, Clinical Research Fellow

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>
<thead>
<tr>
<th>Author, date and country</th>
<th>Patient group</th>
<th>Study type (level of evidence)</th>
<th>Outcomes</th>
<th>Key results</th>
<th>Study weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sloan JP et al, 1987, UK</td>
<td>85 adult patients with recent (&lt;6 h) open fractures of the distal phalanges</td>
<td>Controlled clinical trial</td>
<td>Infection rate</td>
<td>30% v &lt;3%</td>
<td></td>
</tr>
<tr>
<td>Suprock MD et al, 1990, USA</td>
<td>91 patients with open fractures of the finger</td>
<td>Surgical irrigation and debridement with or without antibiotics</td>
<td>Controlled clinical trial</td>
<td>Number of infections</td>
<td>4 in each group</td>
</tr>
</tbody>
</table>
**Troponin T to rule out myocardial damage in chest pain**

Report by Katrina Richell-Herren, Research Fellow

**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.

**Table 2**

<table>
<thead>
<tr>
<th>Author, date and country</th>
<th>Patient group</th>
<th>Study type (level of evidence)</th>
<th>Outcomes</th>
<th>Key results</th>
<th>Study weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mair J et al, 1995, Austria¹</td>
<td>114 emergency department patients with chest pain</td>
<td>Diagnostic test study</td>
<td>AMI</td>
<td>Sensitivity 46% on admission</td>
<td>Only admitted patients. Troponin cut off set at 0.032 ng/l</td>
</tr>
<tr>
<td>De Winter RJ et al, 1995, Netherlands¹</td>
<td>309 emergency department patients with chest pain</td>
<td>Diagnostic test study</td>
<td>AMI</td>
<td>Sensitivity 67% in patients with less than 75% chance of AMI</td>
<td>Unclear if gold standard blinded. Risk assessment was by clinical judgement. Patients with abnormal ECGs included</td>
</tr>
<tr>
<td>Tucker JF et al, 1997, USA¹</td>
<td>177 emergency department patients within 24 h of onset of chest pain</td>
<td>Diagnostic test study</td>
<td>AMI</td>
<td>Sensitivity 33.3% at 1 h</td>
<td>Only admitted patients.</td>
</tr>
<tr>
<td>REACTT investigators, 1997, USA¹</td>
<td>926 emergency department patients with chest pain</td>
<td>Diagnostic test study</td>
<td>AMI</td>
<td>Sensitivity 19.6% v 25% on admission</td>
<td>206 patients excluded because of lack of data. Discharged patients not followed up with same gold standard</td>
</tr>
<tr>
<td>Hamm CW et al, 1997, Germany¹</td>
<td>773 emergency department patients within 12 h of onset of chest pain, with no ST increase</td>
<td>Observational</td>
<td>Death or non-fatal AMI within 30 days</td>
<td>44% predicted on arrival</td>
<td>No independent gold standard applied to all patients. Inadequate follow up of discharged patients. Sensitivity could not be calculated</td>
</tr>
<tr>
<td>Moher ER et al, 1998, USA¹</td>
<td>100 patients with chest discomfort</td>
<td>Diagnostic test study</td>
<td>AMI</td>
<td>Sensitivity 90% at 4 h</td>
<td>Cumulative sensitivities at 4 h.</td>
</tr>
<tr>
<td>Sayre MR et al, 1998, USA¹</td>
<td>667 patients with chest pain</td>
<td>Diagnostic test study</td>
<td>AMI</td>
<td>Sensitivity 88% at 12 h post admission</td>
<td>Only admitted patients studied.</td>
</tr>
<tr>
<td>Zimmermann J et al, 1999, USA¹</td>
<td>955 emergency department patients with chest pain</td>
<td>Diagnostic test study</td>
<td>AMI</td>
<td>Sensitivity 87% at 10 h post onset</td>
<td></td>
</tr>
<tr>
<td>Johnson PA et al, 1999, USA¹</td>
<td>1477 emergency department patients with chest pain</td>
<td>Diagnostic test study</td>
<td>AMI in the 24 h after presentation</td>
<td>Sensitivity 99% at 24 h</td>
<td>174 cases excluded</td>
</tr>
</tbody>
</table>

**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.
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. \([\text{exp flumazenil OR flumazenil.mp} \text{ AND } \text{exp overdoses OR overdoses.mp OR exp poisoning OR poisoning.mp} \text{ AND } \text{exp diagnosis OR exp diagnosis, differential OR diagnosis.mp} \text{ OR diagnos$.mp} \text{)] 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.

Table 3

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Hojer J and Baehrendz S, 1988, Sweden</td>
<td>52 ICU patients with suspected drug overdose</td>
<td>PRCT</td>
<td>Glasgow Coma Scale score</td>
<td>Significantly improved</td>
<td>No difference</td>
</tr>
<tr>
<td></td>
<td>52 ICU patients with suspected drug overdose. Flumazenil + placebo</td>
<td></td>
<td>Side effect rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ritz R et al, 1990, Switzerland</td>
<td>23 ICU patients with suspected drug overdose. Flumazenil + placebo</td>
<td>PRCT</td>
<td>Conscious level</td>
<td>Significant improvement</td>
<td>7 overdoses were iatrogenic</td>
</tr>
<tr>
<td>Hojer J and Baehrendz S, 1990, Sweden</td>
<td>105 unconscious adults in whom a benzodiazepine overdose could not be excluded. Flumazenil + placebo</td>
<td>PRCT</td>
<td>Conscious level</td>
<td>Significant improvement</td>
<td>Significant improvement</td>
</tr>
<tr>
<td></td>
<td>61 adults with altered mental status in whom a benzodiazepine overdose could not be excluded. Flumazenil + placebo</td>
<td>Diagnostic test study</td>
<td>Blood gas analysis</td>
<td>No difference</td>
<td>Gold standard (urinary assay for benzodiazepines) only possible in 44 cases</td>
</tr>
<tr>
<td>Chernen T et al, 1993, Taiwan</td>
<td>35 adults admitted to ICU with suspected OD</td>
<td>Retrospective survey</td>
<td>Full wakening</td>
<td>Sensitivity 100%</td>
<td>Specificity 42%</td>
</tr>
<tr>
<td></td>
<td>43 adults with suspected OD and GCS &lt;13 (patients with known tricyclic antidepressant overdose were excluded). Flumazenil + placebo</td>
<td>PRCT</td>
<td>Glasgow Coma Scale score</td>
<td>Significantly improved</td>
<td>Retrospective</td>
</tr>
</tbody>
</table>

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.

Table 4

<table>
<thead>
<tr>
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<th>Study weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braken MB et al, 1984¹ and 1985,² USA</td>
<td>330 patients with acute spinal injury Methylprednisolone 100 mg v methylprednisolone 1000 mg</td>
<td>PRCT</td>
<td>Neurological outcome Adverse effects</td>
<td>No difference at 6 weeks, 6 months and 1 year. Wound infection rate increased in steroid group (RR 3.6)</td>
<td>No placebo. “High” dose is in fact quite low</td>
</tr>
<tr>
<td>Braken MB et al, 1990³ and 1992,⁴ USA</td>
<td>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</td>
<td>PRCT</td>
<td>Neurological outcome Adverse effects</td>
<td>No difference overall. Stratification revealed significant neurological improvements when methylprednisolone was given within 8 h</td>
<td>Much stratification of data with significant risk of type 1 error</td>
</tr>
</tbody>
</table>


The BMA library supplied the papers.