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 Four positive and two negative BETs are reported in this issue of the journal. The six topics covered in this issue of the journal are:

**Positive BETs**
- Ingested coins and metal detection
- Regional anaesthesia for femoral shaft fractures in children
- Activated charcoal in paracetamol overdose
- Management of uncomplicated soft tissue gunshot wounds

**Negative BETs**
- Repair of partial lacerations of the extensor tendons of the hand
- Early management of displaced nasal fractures

For the first time “Guest BETs” are also included. The four BETs shown below were first presented at the monthly Academic Specialty Training in Emergency Medicine (STEM) meetings of the Specialty Registrars on the North Western training scheme.

**Guest BETs**
- Antibiotics in base of skull fractures
- Glucose or glucagon for hypoglycaemia
- Closure of pretrivial lacercations
- Digital or metacarpeal block for finger injuries


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**Ingested coins and metal detection**

Report by Sue Maurice, Consultant
Search checked by Kevin Mackway-Jones, Consultant

**Clinical scenario**

A 3 year old boy is brought into the emergency department by his mother. She says that he swallowed a coin two hours earlier. The boy is asymptomatic. You know it is important to rule out oesophageal impaction and wonder whether a metal detector can accurately show whether the coin is above or below the diaphragm.

**Three part question**

In [children who have swallowed coins] is [a metal detector] accurate at [ruling out oesophageal impaction]?

**Search strategy**

Medline 1966–03/00 using the OVID interface. ((exp numismatics OR coin$.mp OR exp foreign bodies OR foreign body.mp OR foreign bodies.mp) AND (exp pediatrics OR paediatric$.mp OR Paediatric$.mp OR child$.mp) AND (ingest$.mp OR swallow$.mp OR exp esophagus OR esophagus.mp OR esophageal.mp OR oesophagus.mp OR oesophageal.mp)) LIMIT to human AND english.
Altogether 435 papers were found of which 433 were irrelevant or of insufficient quality. The remaining two papers are shown in table 1.

Comments
These studies are small scale and apply only to children. The accuracy in obese children is not established.

Clinical bottom line
Hand held metal detectors are sensitive enough to be used to SnNout the presence of oesophageal metallic foreign bodies in children.

Regional anaesthesia for femoral shaft fractures in children
Report by Rob Williams, Clinical Fellow Search checked by Paul Wallman, Clinical Fellow

Clinical scenario
A 6 year old child presents to the emergency department with an undisplaced fracture of the mid-femur. You have used femoral nerve blocks in adult patients with similar fractures and wonder whether this block is useful in children.

Three part question
In [children with femoral shaft fractures] is [femoral nerve block] effective in [reducing pain and distress and reducing the need for supplemental analgesia]?

Search strategy
Medline 1966–03/00 using the OVID interface. {[(exp femur OR femur.mp OR femoral.mp) AND (exp fractures OR exp fractures-closed OR exp fractures-open OR fracture$.mp)] OR exp femoral fractures OR femoral fracture$.mp} AND [exp anesthesia, local OR local anesthesi$ OR exp nerve block OR regional anesthetic.mp OR nerve block.mp OR femoral block.mp] LIMIT to human AND english.

Table 1

<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>Bassett KE et al, 1999, USA1</td>
<td>176 children attending an emergency department with a known or suspected metallic foreign body. Age range 6 months to 15 years. Hand held metal detector in experienced and inexperienced hands. Radiographic gold standard</td>
<td>Diagnostic</td>
<td>Experienced operators</td>
<td>Sensitivity 100% Specificity 92.4%</td>
<td>Sample size limits power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inexperienced operators</td>
<td>Sensitivity 95.75% Specificity 81%</td>
<td>3 false negatives</td>
<td></td>
</tr>
<tr>
<td>Seikel K et al, 1999, USA1</td>
<td>91 children with suspected coin ingestion. Age range 9 months to 17 years. Radiographic gold standard</td>
<td>Diagnostic</td>
<td>Inexperienced operators</td>
<td>Sensitivity 100%</td>
<td>Sample size limits power</td>
</tr>
</tbody>
</table>

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>Tondare AS and Nadkarni AV, 1982, India1</td>
<td>25 patients with fractured shaft of femur aged 5–35 years. Lignocaine blocks Subjective and objective measures of pain before and after the block</td>
<td>Observational</td>
<td>Pain</td>
<td>Reduced</td>
<td>Not controlled. Pain scores not reported. No statistical analysis.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Need for supplemental analgesia</td>
<td>5 of 25</td>
<td></td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Need for supplemental analgesia</td>
<td>Time to onset of pain 8 +/- 3.5 min</td>
<td></td>
</tr>
</tbody>
</table>
None of the studies are of high quality in that none had a control group. Nevertheless the evidence suggests that femoral nerve block is effective in children.

Clinical bottom line
Femoral nerve block is effective in reducing the pain of femoral shaft fractures in children.


Activated charcoal in paracetamol overdose
Report by Katrina Richell-Herren, Research Fellow
Search checked by Magnus Harrison, Research Fellow

Clinical scenario
A 23 year old woman attends the emergency department having taken 60 500 mg paracetamol tablets two hours before presentation. You wonder whether she should receive activated charcoal.

Three part question
In [patients poisoned with paracetamol] does [activated charcoal alone or in combination with other treatments] reduce [hepatotoxicity]?

Search strategy
Medline 1966–03/00 using the OVID interface. [(acetaminophen.mp OR paracetamol.mp) AND (exp poisoning OR poisoning.mp OR exp overdose OR overdose.mp)] AND (exp charcoal OR charcoal.mp) LIMIT to human AND english.

Search outcome
Altogether 71 papers found of which 68 were irrelevant or of insufficient quality. The remaining three papers are shown in table 3.

Comments
There are no high quality studies in this area. In particular there are no data to indicate how long after poisoning activated charcoal remains effective.

Clinical bottom line
Activated charcoal should be given to all patients with significant paracetamol poisoning who present acutely.


Table 3

<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>Underhill TJ et al, 1990, UK</td>
<td>60 patients who had taken 5 g or more of paracetamol within 4 hours of attendance. Gastric lavage (14) v ipecacuana (21) v activated charcoal (20) v nothing (5)</td>
<td>RCT</td>
<td>Plasma concentrations at 0, 60, 90 and 150 minutes post treatment</td>
<td>Activated charcoal group had significantly better fall in paracetamol concentration at 150 min</td>
<td>Small study</td>
</tr>
<tr>
<td>Spiller HA et al, 1994, USA</td>
<td>122 patients with paracetamol overdose within the previous 12 hours. Activated charcoal (40) v activated charcoal and N acetylcysteine (57) v activated charcoal and high dose N acetyl cysteine (25)</td>
<td>Observational study</td>
<td>Hepatotoxicity (defined as SGOT over 125 units/l)</td>
<td>Significantly less (5% v 20%) in groups receiving activated charcoal</td>
<td>Spectrum is of patients contacting a poisons centre. No power study.</td>
</tr>
<tr>
<td>Buckley NA et al, 1999, Australia</td>
<td>981 consecutive paracetamol poisonings. Gastric lavage and charcoal v charcoal alone v nothing</td>
<td>Observational study</td>
<td>Risk of “high risk” concentration</td>
<td>Significantly less change of toxic level if activated charcoal given (odds ratio 0.36 [0.23–0.58])</td>
<td></td>
</tr>
</tbody>
</table>

Management of uncomplicated soft tissue gunshot wounds
Report by Kevin Mackway-Jones, Consultant
Search checked by Magnus Harrison, Research Fellow

Clinical scenario
A 24 year old man is brought to the emergency department by his friends having been shot in the leg. Examination of the thigh reveals a through and through wound with no bone,
nerve or major vessel involvement. You wonder whether simple entry and exit wound cleaning with or without antibiotics or surgical debridement is the best treatment.

### Three part question

In [a young adult with an uncomplicated gunshot to soft tissue only] is [entry and exit wound care better than formal surgical debridement] in [preventing wound infection]?

### Search strategy

Medline 1966–03/00 using the OVID interface. [(exp firearms OR gun$.mp) AND (exp wounds and injuries OR wound$.mp)] OR exp wounds, gunshot OR gunshot$.mp] AND [exp irrigation OR lavage.mp OR exp debridement OR debridement.mp OR debride$.mp] AND [exp antibiotics OR antibiotic$.mp] LIMIT to human AND english.

### Search outcome

Altogether 77 papers found of which 75 were irrelevant or of insufficient quality for inclusion. The two remaining papers are shown in table 4.

### Comment

There are no randomised trials in this area. The largest study has identified complicating factors but does not directly answer the question posed.

### Clinical bottom line

Simple soft tissue gunshot wounds without complicating factors can be managed with minimum wound debridement and antibiotics.

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### Repair of partial lacerations of the extensor tendons of the hand

Report by Martin Smith, Specialist Registrar

Search checked by Bruce Martin, Clinical Fellow

### Clinical scenario

A 24 year old man is brought into the emergency department having sustained a laceration over the dorsal aspect of the metacarpophalangeal joint of the left index finger. You explore the wound and find that there is a 50% laceration of the extensor tendon. You wonder whether this requires repair.

### Three part question

In [patients with partial extensor tendon lacerations] does [surgical repair or conservative management] result in [the quickest and fullest recovery]?

### Search strategy

Medline 1966–03/00 using the OVID interface. [(exp tendon injuries OR tendon injuries.mp OR exp tendons OR extensor tendon$.mp OR partial tendon laceration$.mp] AND (exp extensor$ OR dorsal$) AND (exp casts, surgical OR exp splints OR splint$.mp OR exp surgical procedures, operative OR exp suture techniques OR conservative treatment$.mp OR surgical repair$.mp OR tendon repair.mp)] AND maximally sensitive RCT filter LIMIT to human AND english.

### Search outcome

Altogether 141 papers were found of which none were relevant.

### Comments

There is no direct evidence that can assist in answering this question. The trials of partial tendon repair that have been reported all involved flexor tendons. These results cannot be extrapolated to the extensor tendon.

### Clinical bottom line

Local advice should be followed.
Early management of displaced nasal fractures
Report by Terry Gilpin, Specialist Registrar
Search checked by Simon Carley, Specialist Registrar

Clinical scenario
A 27 year old man attends the emergency department having been involved in a fight. He had been hit on the nose and has an obvious displaced nasal fracture without septal haematoma. As yet there is no gross swelling. You wonder whether immediate reduction would be better than delayed reduction.

Three part question
In [adults with displaced nasal fractures without gross swelling] is [early reduction better than late reduction] at [optimising functional and cosmetic recovery]?

Search strategy
Medline 1966–03/00 using the OVID interface. (exp nose OR exp nose deformities, acquired OR nose.mp) AND (exp fractures OR fracture.mp)) AND maximally sensitive RCT filter LIMIT to human AND english.

Search outcome
Altogether 104 papers were found of which none were relevant.

Comments
There is no direct evidence that can assist in answering this question.

Clinical bottom line
Local advice should be followed.

Antibiotics in base of skull fractures
Report by John Butler, Specialist Registrar
Search checked by Simon Carley, Specialist Registrar

Clinical scenario
A 19 year old man attends the emergency department having been assaulted in a night club. He has sustained an isolated head injury with no loss of consciousness and is fully alert and orientated. He has CSF rhinorrhoea secondary to base of skull fracture. You wonder whether the administration of antibiotics will reduce the chances of meningitis developing.

Three part question
In [adults with isolated base of skull fractures without gross swelling] does [the administration of antibiotics] reduce [the incidence of meningitis]?

Search strategy
Medline 1966–03/00 using the OVID interface. ([exp skull fractures OR skull fracture$.mp] OR (exp fractures OR fracture$.mp)) AND (base.mp OR basilar.mp) AND (exp antibiotics OR antibiotic$.mp).

Search outcome
Altogether 27 papers were found of which 25 irrelevant or of insufficient quality for inclusion. The remaining two meta-analyses are shown in table 5.

Comment
There are two meta-analyses in this area. One is of high quality1 while the other is not.2 Whatever the quality of the meta-analysis the studies that they analyse are poor. A well designed randomised controlled trial is still needed to answer this question properly.

Clinical bottom line
Antibiotics have not been shown to decrease the risk of meningitis in patients with base of skull fractures with or without CSF leaks.

<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>Villalobos T et al, 1998, USA1</td>
<td>12 studies with data allowing analysis of the effectiveness of antibiotic use in preventing meningitis in basal skull fracture. 1241 patients of whom 719 received antibiotics and 522 did not.</td>
<td>Meta-analysis</td>
<td>Exact odds ratio of meningitis risk (odds of developing meningitis in the untreated vs treated group) in all patients</td>
<td>1.15 (95% CI 0.68, 1.94)</td>
<td>Only 15 cases of meningitis. No formal review of paper quality. No odds ratios or confidence intervals calculated.</td>
</tr>
<tr>
<td>Brodie H, 1997, USA2</td>
<td>6 studies with data allowing analysis of the incidence of meningitis resulting from posttraumatic CSF fistula. 324 patients of whom 237 received antibiotics and 87 did not.</td>
<td>Meta-analysis</td>
<td>Meningitis rate</td>
<td>2.5% of those receiving antibiotics ± 10% of those that did not</td>
<td></td>
</tr>
</tbody>
</table>
Table 6

<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>Collier A et al, 1987, UK</td>
<td>52 consecutive insulin dependent diabetic patients with hypoglycaemic coma. IV glucagon 1 mg v IV glucose 25 g</td>
<td>Controlled clinical trial</td>
<td>Recovery time to “full orientation”</td>
<td>6.5 min v 4 min</td>
<td>Not randomised. Not blinded.</td>
</tr>
<tr>
<td>Patrick AW et al, 1990, UK</td>
<td>29 consecutive insulin dependent diabetic patients with hypoglycaemic coma. IM glucagon 1 mg v IV glucose 25 g</td>
<td>PRCT</td>
<td>Recovery time to “full conscious level”</td>
<td>9 min v 3 min</td>
<td>Not blinded. Small numbers.</td>
</tr>
<tr>
<td>Hvidberg A et al, 1992, Denmark</td>
<td>10 healthy non-diabetic subjects with experimental insulin induced hypoglycaemia. IM glucagon 1 mg v IV glucose 25 g</td>
<td>Controlled experiment</td>
<td>Time to normoglycaemia</td>
<td>No significant difference</td>
<td>Non-diabetic subjects</td>
</tr>
<tr>
<td>Howell MA and Guly HR, 1997, UK</td>
<td>28 insulin dependent diabetic patients with hypoglycaemic coma in the prehospital environment. IM glucagon 1 mg v IV glucose 25 g</td>
<td>Controlled clinical trial</td>
<td>Time to Glasgow Coma Scale score of 15</td>
<td>Significantly longer after glucagon</td>
<td>Block randomised. Not blinded. Small numbers.</td>
</tr>
</tbody>
</table>

Glucose or glucagon for hypoglycaemia

Report by Russell Boyd, Specialist Registrar
Search checked by Bernard Foëx, Specialist Registrar

Clinical scenario
An insulin dependent diabetic adult is brought into the emergency department uncooperative and acutely confused. A blood glucose stick test confirms hypoglycaemia. You wonder whether parenteral glucose or glucagon is the drug of first choice.

Three part question
In [insulin dependent diabetic adults with accidental hypoglycaemia] does [intravenous glucose or intramuscular glucagon] provide [faster, more reliable restoration of normoglycaemia]?

Search strategy
Medline 1966–03/00 using the OVID interface. {((exp glucose OR glucose.mp OR dextrose.mp) AND (IV.mp OR exp injections, intravenous OR intravenous.mp)) AND (exp glucagon OR glucagon.mp) AND (exp hypoglycaemia OR hypoglycaemia.mp OR hypoglycaemia.mp)} LIMIT to human AND english.

Comment
Although no high quality evidence exists in this area it is clear that intravenous glucose works faster than intramuscular glucagon once the treatment has been given. The time to establish access has not, however, been accounted for. Glucagon “failures” have been reported.

Clinical bottom line
Intravenous glucose is the most reliable treatment for accidental hypoglycaemia. Once venous access is established it is also has the fastest effect.

Closure of pretibial lacerations

Report by Muhammad Ahmad, Specialist Registrar
Search checked by Bruce Martin, Specialist Registrar

Clinical scenario
A 70 year old woman presents to the emergency department with a pretibial flap laceration. The wound will need cleaning and then closing. You wonder whether adhesive strips or sutures should be used to achieve closure.

Three part question
In [elderly patients with pretibial lacerations] are [adhesive strips or sutures] better at [promoting rapid healing and minimising necrosis and infection]?

Search strategy
Medline 1966–03/00 using the OVID interface. {exp tibia OR tibia$ OR pretibial.mp OR pre tibial.mp OR shin$} AND [(tape$ OR strip$) OR (exp adhesives OR adhesive$)] OR (steristrip$) LIMIT to human AND english.

Search outcome
Altogether five papers were found of which four were irrelevant or of insufficient quality for inclusion. The one remaining paper is shown in table 7.
This study shows that pretibial lacerations heal faster with steristrips and exhibit less necrosis. This effect is more marked for flap lacerations. The study does not address the question of primary grafting of these injuries.

Clinical bottom line
Pretibial lacerations should be steristripped rather than sutured.


Digital or metacarpal block for finger injuries
Report by Stuart McKirdy, Senior House Officer
Search checked by Simon Carley, Specialist Registrar

Clinical scenario
A 25 year old man presents to the emergency department after a crush injury to the left middle finger. There is a laceration over the distal phalanx involving the nail bed, which is disrupted. You wish to achieve local anaesthesia to allow wound exploration and repair and wonder whether ring block or metacarpal block is the best approach.

Three part question
In [patients requiring local anaesthesia to the finger] is [metacarpal block better than ring block] at [minimising pain during infiltration, achieving adequate anaesthesia and achieving rapid onset]?

Search strategy
Medline 1966–03/00 using the OVID interface. [(exp wounds and injuries OR injur$.mp] AND [exp fingers OR finger$.mp OR digit$.mp]) AND [exp nerve block OR nerve block.mp OR exp anesthesia,local OR local anesthesia.mp OR ring block.mp] LIMIT to human AND english.

Comment
The results of a single study must be interpreted with caution especially as practical procedures are operator dependent and high failure rates may reflect operator error rather than intrinsic problems. Metacarpal blocks may still have a role when anaesthesia is required in more than one finger, when proximal anaesthesia is needed or when the circulation to the finger is suspect.

Clinical bottom line
Digital nerve (ring) block is the technique of choice for emergency digital anaesthesia.


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Table 7

<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>Sutton R and Pritty P, 1985, UK1</td>
<td>45 patients with pretibial flap lacerations. Sutures (22) v steristrips (23)</td>
<td>PRCT</td>
<td>Healing time</td>
<td>53 days v 39 days</td>
<td>Small numbers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of wounds with necrosis</td>
<td>16 v 8</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of infected wounds</td>
<td>7 v 7</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number requiring rescue grafting</td>
<td>3 v 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Healing time</td>
<td>25 days v 23 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31 patients with pretibial linear lacerations. Sutures (15) v steristrips (16)</td>
<td></td>
<td>Number of wounds with necrosis</td>
<td>3 v 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of infected wounds</td>
<td>2 v 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number requiring rescue grafting</td>
<td>none</td>
<td></td>
</tr>
</tbody>
</table>

Table 8

<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>Knoop K, et al, 1994, USA1</td>
<td>Convenience sample of 30 adult patients with middle or ring finger injuries distal to the proximal interphalangeal joint requiring anaesthesia. Metacarpal block (one side of finger) v digital block (other side of finger). Both blocks with 2% lignocaine. Order of blocks was randomised.</td>
<td>PRCT</td>
<td>Time of onset of anaesthesia</td>
<td>6.35 min v 2.82 min (p&lt;0.001)</td>
<td>Parametric analysis for non-normally distributed pain scores. No power study.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Adequacy of analgesia (% needing rescue anaesthesia)</td>
<td>23% ± 3% (p=0.227)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pain during administration (10 point VAS)</td>
<td>3.38 v 2.53 (NS)</td>
<td></td>
</tr>
</tbody>
</table>

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Comment
This study shows that pretibial lacerations heal faster with steristrips and exhibit less necrosis. This effect is more marked for flap lacerations. The study does not address the question of primary grafting of these injuries.
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