**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 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 or placed on the BestBETs web site. Each BET has been constructed in the four stages that have been described elsewhere. The BETs shown here together with those published previously and those currently under construction can be seen at http://www.bestbets.org. Eight BETs are included in this issue of the journal.

- Reduction of pulled elbows
- Alternative treatments for neck sprain
- Tetanus prophylaxis in superficial corneal abrasions
- Gastric lavage in tricyclic antidepressant overdose
- Treatment of uncomplicated subungual haematoma
- Use of sterile gloves in the treatment of simple wounds
- Antibiotics in orbital floor fractures
- Contraindications to thrombolysis in patients on coumarins

K Mackway Jones, Department of Emergency Medicine, Manchester Royal Infirmary, Oxford Road, Manchester M13 9WL, UK; kevin.mackway-jones@man.ac.uk


**Reduction of pulled elbows**

Report by David Lewis, East Anglian Trainees

Checked by Jon Argall, Senior Clinical Fellow

**Abstract**

A short cut review was carried out to establish whether a pronation manoeuvre is better than a supination manoeuvre for first time reduction of pulled elbow. Altogether 57 papers were found using the reported search, 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 tabulated. A clinical bottom line is stated.

**Clinical scenario**

A 2 year old child is brought into the emergency department by her parents. They tell you that she has not used her left arm since tripping over while holding her older sister’s hand. The child is holding her left arm flexed at the elbow and semi-prone. The diagnosis is clearly a pulled elbow. You have heard various colleagues arguing vehemently for pronation and supination manoeuvres, and wonder which is actually the best method for reduction?

**Three part question**

In [a patient with a pulled elbow] is [a pronation manoeuvre better than a supination manoeuvre] at achieving [reduction and return to function at the first attempt]?

**Search strategy**

Medline 1966–10/02 using the OVID interface. [exp Elbow OR exp Elbow joint OR elbow.mp] AND [exp adolescence OR exp child OR exp child of impaired parents OR exp child, institutionalized OR exp child, preschool OR exp child, unwanted OR exp disabled children OR exp homeless youth OR exp infant OR exp only child OR exp5.mp OR exp Pediatrics OR pediatrics.mp OR paediatric$.mp] AND [exp Dislocations OR dislocation.mp OR subluxation.mp] AND [exp Manipulation, orthopedic OR manipulation.mp OR exp Pronation OR pronation.mp OR exp Supination OR supination.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>Macias CG et al, 1998, USA</td>
<td>90 patients with pulled elbow over 12 months Pronation vs supination</td>
<td>PRCT</td>
<td>Success rate</td>
<td>95% v 77%</td>
<td>Not blinded</td>
</tr>
<tr>
<td>McDonald J et al, 1999, USA</td>
<td>148 patients with pulled elbow over 16 months Pronation vs supination</td>
<td>PRCT</td>
<td>Success rate left arm only Pain</td>
<td>80% v 69% (NS) 89% v 71% less with pronation (NS)</td>
<td>Not blinded</td>
</tr>
</tbody>
</table>
Search outcome
Altogether 57 papers were found of which 54 were irrelevant or of insufficient quality. The remaining three were all randomised controlled trials. One of these was looking at supination with flexion compared with extension. The remaining two papers are shown in table 1.

Comment(s)
The classic method for reduction of pulled elbows is supination at the wrist followed by flexion at the elbow. There has been no difference demonstrated between flexion and extension during this manoeuvre. When studying a practical procedure it is impossible to exclude all bias and this may weaken these results.

► CLINICAL BOTTOM LINE
Pronation with or without elbow flexion is the first line method of reduction for pulled elbows.


Alternative treatments for neck sprain

Report by Kerstin Hogg, Clinical Research Fellow
Checked by Rosemary Morton, Consultant
Abstract
A short cut review was carried out to establish whether osteopathy or chiropractic treatments improve outcome in patients with neck sprain. Altogether 206 papers were found using the reported search, of which nine 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 woman attends the emergency department having been in a rear end shunt. She complains of pain in her neck. On examination she has right sternomastoid tenderness and restricted movement. You diagnose a neck sprain and are in a rear end shunt. She complains of pain in her neck. On examination she has right sternomastoid tenderness and restricted movement. You diagnose a neck sprain and recommend a neck examination. She asks you whether she should go and see an osteopath or a chiropractor. You wonder whether there is any evidence for chiropractic treatment of patients with chronic neck pain. Altogether 206 papers were found using the reported search, of which nine 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.

Three part question
In [adults with neck sprain] does [osteopathy or chiropractic] improve [outcome]?

Search strategy
Medline using the OVID interface 1966-10/02, Cochrane Library 2002 Issue 3 and hand search of paper references. [(exp Neck injuries OR exp Neck pain OR neck.mp OR whiplash.mp) AND (exp Osteopathic medicine OR osteopaths.mp OR chiropractors.mp)] LIMIT to human AND English.

Search outcome
Altogether 206 papers were found, of which 13 were relevant. One literature review is not included in table 2 as all the papers are either represented in another review or described separately. Three papers were excluded on the basis of having 10 or fewer patients. The remaining nine papers are shown in table 2.

Many of the studies also include patients with lower back pain—only the neck pain patients are described in table 2.

Comments
Virtually all of these studies are flawed and the numbers tiny. In particular there are no powerful studies comparing best conventional treatment with best alternative treatments. There were no papers relating directly to osteopathy.

► CLINICAL BOTTOM LINE
Chiropractic therapy is associated with improvement in neck symptoms but there is no evidence to show whether this improvement is greater or worse than that obtained with conventional therapy.


Tetanus prophylaxis in superficial corneal abrasions

Report by Prodeep Mukherjee, Specialist Registrar
Checked by A Sivakumar, Consultant
Abstract
A short cut review was carried out to establish whether tetanus prophylaxis is indicated after non-penetrating corneal abrasion. Altogether 30 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 44 year old man presents to the emergency department with a foreign body sensation in his right eye. Fluorescein examination reveals a piece of grit. After removal there is a small corneal abrasion with no evidence of perforation. The patient has had a primary course of tetanus antitoxin and thinks his only tetanus booster was less than 10 years ago but is not sure. You wonder whether the patient requires a tetanus booster to reduce any risk from the abrasion.

Three part question
In [patients with non penetrating corneal abrasion] is [tetanus toxoid booster] necessary to [prevent clinical tetanus infection]?
Search strategy
Medline 1966–10/02 using the OVID interface. [(exp tetanus OR exp tetanus antitoxin OR exp tetanus toxoid OR tetanus.mp) AND (exp Cornea OR corneal abrasion.mp OR exp Eye Injuries OR exp Eye Foreign Bodies OR exp Wounds, Nonpenetrating)].

Search outcome
Altogether 31 papers found of which 21 were irrelevant or of insufficient quality for inclusion. Five papers on cases of tenu

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**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>Koes BW et al, Netherlands, 1991</td>
<td>5 RCTs all comparing cervical manipulation to a control</td>
<td>Review</td>
<td>Recovery</td>
<td>3 studies concluded manipulation better than collar and analgesics.</td>
<td>Studies rated poor-moderate on methodology scoring</td>
</tr>
<tr>
<td>Cassidy JD et al, Canada, 1992</td>
<td>100 patients with mechanical neck pain, One manipulation v mobilization</td>
<td>RCT</td>
<td>Mean improvement in pain as measured by visual analogue scale</td>
<td>17.3 (SD19.5) v 10.5 (SD14.8)</td>
<td>Only one treatment with pain score repeated immediately afterwards</td>
</tr>
<tr>
<td>Koes BW et al, Netherlands, 1993</td>
<td>29 patient with neck pain physiotherapy (n=17) v manual therapy n=12 (manipulation and mobilisation)</td>
<td>RCT</td>
<td>Subjective pain measurement and physical function over 12 months</td>
<td>Both groups improved without any statistical difference between groups</td>
<td>Patients were also assigned to receive treatment by their GP and placebo. These results were not reported</td>
</tr>
<tr>
<td>Skargren EI et al, Sweden, 1996</td>
<td>70 patients with neck pain physiotherapy (n=29) v chiropractic (n=41)</td>
<td>RCT</td>
<td>Subjective pain; Function, general health</td>
<td>Significant improvement in pain, function and general health in both groups</td>
<td>No breakdown of results between back and neck pain patients given for the last 2 outcomes</td>
</tr>
<tr>
<td>Verhoef MJ et al, Canada, 1997</td>
<td>106 patients with neck pain and 88 with neck and back pain. All had chiropractic manipulation</td>
<td>Prospective cohort</td>
<td>Disability (Neck Disability Index)</td>
<td>Baseline mean score 23.5, mean score at 6 weeks 13.3 p&lt;0.001</td>
<td>No control group</td>
</tr>
<tr>
<td>Woodward MN et al, UK, 1999</td>
<td>28 patients with chronic “whiplash” syndrome. All had chiropractic manipulation</td>
<td>Retrospective cohort</td>
<td>Disability at baseline and following treatment</td>
<td>26/28 patients had reduction in disability</td>
<td>Follow-up time period not specified</td>
</tr>
<tr>
<td>Jordan A et al, Denmark, 1998</td>
<td>119 patients with neck pain for more than 3 months intensive training physiotherapy v chiropractic treatment</td>
<td>RCT</td>
<td>Self reported pain and disability</td>
<td>All treatment modality groups had improved pain levels and disability scores</td>
<td>All groups underwent intervention.</td>
</tr>
<tr>
<td>Giles LGF and Muller R, Australia, 1999</td>
<td>33 patients with neck pain for at least 13 weeks, chiropractor manipulation (n=18), acupuncture (n=7) or medication (n=7)</td>
<td>RCT</td>
<td>Disability (Neck Disability Index) Measured at 4 weeks</td>
<td>Manipulation group median index score reduced by 10 points p=0.001.</td>
<td>Very small numbers particularly in acupuncture and medication groups</td>
</tr>
<tr>
<td>McMorland G and Suter E, Canada, 1999</td>
<td>61 patients presenting to chiropractic with neck pain. All received chiropractic manipulation</td>
<td>Retrospective cohort</td>
<td>Neck Disability Index score</td>
<td>Reduction in score after 4 weeks of treatment</td>
<td>No statistics displayed</td>
</tr>
</tbody>
</table>

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Comment(s)

The only relevant paper found was an experimental animal study. Unlike skin, corneal epithelium does not have an underlying blood supply (receiving nutrients from the aqueous humor) and often shows substantial healing within six hours of
injuries. Criteria for deciding if a corneal abrasion is tetanus prone or not should therefore probably be different than that for standard skin abrasions. Finally there are no case reports in the literature of clinical tetanus developing from a simple corneal abrasion. In clinical practice it should be remembered that there may be public health benefits in encouraging tetanus prophylaxis whenever the opportunity arises.

► CLINICAL BOTTOM LINE

There is no clinical reason to provide tetanus prophylaxis in the emergency department following superficial corneal abrasions with no evidence of perforation, infection, or devitalised tissue.


Gastric lavage in tricyclic antidepressant overdose

Report by Stewart Teece, Clinical Research Fellow

Checked by Kirsten Hogg, Clinical Research Fellow

Abstract

A short cut review was carried out to establish whether gastric lavage is indicated after tricyclic antidepressant overdose. Altogether 82 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 23 year old air hostess is brought into the emergency department having been found collapsed next to an empty bottle of amitriptyline. She has a Glasgow Coma Scale score of 7/15, is tachycardic and twitchy. After a rapid sequence induction and intubation you wonder whether there is any benefit from gastric lavage.

Three part question

[In overdose of tricyclic antidepressant] is [gastric lavage better than charcoal or nothing] at [reducing toxicity]?

Search strategy

Medline 1966–10/02 using the Ovid interface. [(exp gastric lavage OR gastric lavage.mp OR washout.mp OR exp irrigation or lavage.mp OR gastric emptying.mp) AND (exp disimipramine OR exp antidepressive agents, tricyclic OR exp antidepressive agents OR exp amitriptyline OR exp imipramine OR tricyclic.mp OR amitriptyline.mp) AND (exp poisoning OR poisoning.mp OR exp overdose OR over-dose.mp)] LIMIT to human AND English Language.

Search outcome

Altogether 82 papers found, 81 of which were not relevant to the question. The remaining paper is shown in table 4.

Comment(s)

This study shows no statistically significant difference between the three groups. Although it seems small it has 80% power for showing a change of ITU admission time of 12 hours at p=0.05. Furthermore, a study by Watson et al showed that only 8.7% (95% CI 0.4 to 21.7%) of the estimated dose of tricyclic was recovered by gastric lavage.

► CLINICAL BOTTOM LINE

There is no evidence for gastric lavage in tricyclic antidepressant overdose.


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>Benson WH et al, 1993, USA</td>
<td>Unimmunised mice</td>
<td>Experimental animal model</td>
<td>Incidence of clinical tetanus following:</td>
<td>- corneal abrasion: 0/9</td>
<td>C. tetani organisms and toxin used pure - not representative of usual clinical mixed flora</td>
</tr>
<tr>
<td></td>
<td>Animal model surgically injecting live C tetani or tetanus toxin into mice cornea</td>
<td>(Prospective)</td>
<td>- corneal penetration: 0/9</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- corneal perforation: 10/27</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Incidence in immunised mice: 0/42</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4

<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>Bosse GM et al, 1995, USA</td>
<td>51 patients presenting with tricyclic overdose</td>
<td>RCT</td>
<td>Mean length of stay</td>
<td>93.3 (+/- 94.3) hours v 107.2 (+/- 106.8) hours v 66.7 (+/- 41.7) hours</td>
<td>Not blinded</td>
</tr>
<tr>
<td></td>
<td>Charcoal only [n=22] v charcoal then lavage then charcoal [n=14] v charcoal then lavage then charcoal [n=15]</td>
<td></td>
<td></td>
<td>[p=0.473]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>39 intubated</td>
<td>Mean length ICU stay</td>
<td>66.9 (+/- 54.1) hours v 54.1 (+/- 27.3) hours</td>
<td></td>
<td>Variations between presenting GCS and drug levels between groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean mechanical ventilation time</td>
<td>43.4 (+/- 24.1) hours v 43.4 (+/- 18.3) hours v 17.8 (+/- 14.0) hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aspiration</td>
<td>2/22 v 3/14 v 3/15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Treatment of uncomplicated subungual haematoma

Report by Nicola Batrick, Specialist Registrar
Checked by Kambiz Hashemi and Ramzi Freij, Consultants

Abstract

A short cut review was carried out to establish whether nail removal and nail bed repair is better than simple trephining in patients with significant subungual haematoma. Altogether 312 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.

Clinical scenario

A patient attends the emergency department having sustained a crush injury to the tip of their right index finger. This has resulted in a painful subungual haematoma but no other significant fingertip injury.

Three part question

In a patient presenting with a sizeable uncomplicated subungual haematoma is [removing the nail and repairing the nail bed laceration better than simple trephining] at [providing the best cosmetic and functional result]?

Table 5

<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>Simon RR and Wolgin M, 1987, USA</td>
<td>47 consecutive patients presenting to an emergency department with subungual haematoma &gt;25% nail bed. +/− fracture of distal phalanx Digital block, nail removed and lacerations of nail bed greater than 2–3 mm repaired using vicryl and nail replaced</td>
<td>Prospective observational study</td>
<td>Association of SUH size and repairable laceration.</td>
<td>16/27 patients with haematoma &gt;50% had nail bed laceration requiring repair</td>
<td>Often quoted paper but no follow up of patients and no control group</td>
</tr>
<tr>
<td>Seaberg DC et al, 1991, USA</td>
<td>48 patients presenting to an emergency department with subungual haematoma Nail and nail margin intact. +/− distal phalanx fracture Electrocautery nail trephination Follow up at least 6/12</td>
<td>Prospective observational study</td>
<td>Pain relief, infection and cosmetic appearance</td>
<td>94% follow up. All reported a reduction in pain. No infective complications or major nail deformities regardless of SUH size or fracture</td>
<td>Major nail deformities not clearly defined No control group</td>
</tr>
<tr>
<td>Meek S and White M, 1997, UK</td>
<td>123 patients presenting to emergency departments treated by simple trephining 94 followed up for 5–13 months</td>
<td>Retrospective</td>
<td>Functional and cosmetic appearances</td>
<td>Excellent ie no residual abnormality or very good in 85% of those followed up. 2% poor outcome caused by nail splitting. Major nail abnormality defined by Zook’s criteria occurred in 11% Infection</td>
<td>Retrospective Coding inadequate No control group Loss of patients to FU</td>
</tr>
<tr>
<td>Roser SE and Gellman H, 1999, USA</td>
<td>53 finger injuries in children with intact nail and nail margin, +/− tuft fracture. Formal nail bed repair v simple trephining/conservative. FU at least 4/12</td>
<td>Sequential study</td>
<td>Cosmetic deformity of nail and functional deficit Infective complications Costs</td>
<td>Operative and non-operative nil at No randomisation long term FU</td>
<td>No infective complications in either group Costs significantly higher in operative group</td>
</tr>
</tbody>
</table>

Search strategy

Medline 1966–10/02 using the OVID interface. [subungual hematoma.mp OR nail bed laceration.mp OR nail bed injuries.mp OR exp NAILS/su] LIMIT to human AND English.

Search outcome

Altogether 312 papers were identified of which 308 were considered to be irrelevant or of insufficient quality for inclusion. The other four papers are shown in table 5.

Comment(s)

It has been suggested that for subungual haematomas greater than 50% of the nail bed, the nail should be removed and the associated nail bed laceration repaired to ensure optimal cosmetic and functional results. However, there are insufficient clinical studies comparing treatment modalities to support this. It seems from the studies quoted that simple trephining of the nail in an uncomplicated subungual haematoma with no other significant finger tip injury gives good cosmetic and functional results.

> CLINICAL BOTTOM LINE

In both adults and children with a subungual haematoma with no other significant finger tip injury, treatment by trephining gives a good cosmetic and functional result.


Use of sterile gloves in the treatment of simple wounds

Report by Derek Keith Sage, East Anglian Trainees

Checked by Jon Argall, Senior Clinical Fellow

Abstract
A short cut review was carried out to establish whether the use of sterile gloves during the treatment of simple wounds reduces infections. Altogether 48 papers were found using the reported search, but none presented any evidence to answer the clinical question. More research is needed in this area and, in the mean time, local advice should be followed.

Clinical scenario
A patient presents to the emergency department with a laceration to his left hand. The wound needs cleaning and suturing. You wonder whether sterile gloves are really necessary in the treatment of simple wounds.

Three part question
In [patients with simple wounds] does the use of [sterile gloves rather than clean non-sterile gloves] produce less [wound infections]?

Search strategy
Medline 1966–10/02 using the OVID interface. [exp “wounds and injuries” OR exp wounds, penetrating OR exp lacerations OR laceration.mp] AND [exp gloves, surgical OR exp gloves, protective OR glove.mp] AND [exp infection OR infection.mp OR exp focal infection OR exp surgical wound infection OR exp wound infection] LIMIT to human AND English.

Search outcome
Altogether 48 papers were found of which all were of irrelevant or of insufficient quality.

Comment(s)
There seems to be no available evidence for the use of sterile gloves over clean non-sterile gloves in the treatment of simple traumatic wounds.

► CLINICAL BOTTOM LINE
It is arguably unethical to start using non-sterile gloves where the tradition has been to use sterile gloves but this is an area for potential research.

Antibiotics in orbital floor fractures

Report by Bruce Martin, Specialist Registrar

Checked by Angaj Ghosh, Senior Clinical Fellow

Abstract
A short cut review was carried out to establish whether prophylactic antibiotics are indicated in patients with undisplaced maxillary or orbital floor fractures. Altogether 214 papers were found of which all were of any kind looking at the incidence of infection in patients with undisplaced orbital floor fractures. There is clearly a need for further investigation into this area.

CLINICAL BOTTOM LINE
Local advice should be followed.

Three part question
In [patients with undisplaced maxillary or orbital floor fractures] are [antibiotics better than no antibiotics] at [preventing infective complications]?

Search strategy
Medline 1966–10/02 using the OVID interface. [exp maxillary bones OR exp maxillary fractures OR exp orbital fractures OR exp zygomatic fractures OR fracture$.mp) AND (exp antibiotics OR antibiotic$.mp)] LIMIT to human AND English.

Search outcome
Altogether 214 papers were found of which all were of irrelevant or of insufficient quality.

Comment(s)
In the tradition has been to use sterile gloves but this is an area for potential research.

CLINICAL BOTTOM LINE
It is arguably unethical to start using non-sterile gloves where the tradition has been to use sterile gloves but this is an area for potential research.

Contraindications to thrombolysis in patients taking coumarins

Report by Andy Ashton, Senior Clinical Fellow

Checked by Stewart Teece, Clinical Research Fellow

Abstract
A short cut review was carried out to establish what level of INR was a contraindication to thrombolysis in patients taking warfarins. Altogether 296 papers were found using the reported search, but none presented any evidence to answer the clinical question. More research is needed in this area and, in the mean time, local advice should be followed.

Clinical scenario
A 73 year old woman presents to the emergency department with chest pain. Her ECG shows left bundle branch block. She is taking warfarin for recurrent pulmonary emboli. Her INR is 2.7. While you look for her old notes to see if her INR was a contraindication to thrombolysis in patients taking warfarins. Altogether 296 papers were found using the reported search, but none presented any evidence to answer the clinical question. More research is needed in this area and, in the mean time, local advice should be followed.

Three part question
In [a patient with myocardial infarction who is anticoagulated] at what [INR] is [thrombolysis contraindicated]?

Search strategy
Medline 1966–10/02 using the OVID interface. [exp urinary plasminogen activator OR exp thrombolytic therapy OR exp fibrinolytic agents OR exp streptokinase OR thrombolysis af OR streptokinase af OR urokinase af OR TPA af OR (tissue adj5
Search outcome
Altogether 96 papers were found none of which were relevant to the three part question.

Comment(s)
Although various guidelines exist for thrombolysis in a patient who is anticoagulated, there does not seem to be any research evidence base for this.

CLINICAL BOTTOM LINE
Local advice should be followed.