BETting on the Evidence in Emergency Medicine

Kevin Mackway-Jones
Manchester
Outline

• We have a problem
• We have a dream
• We have a plan
• We take a gamble
• Las Vegas!
The Problem
The Problem – How we practiced

FBEM

“Faith is the substance of things hoped for, the evidence of things not seen”

Hebrews 11:1
The fact that an opinion has been widely held is no evidence whatever that it is not utterly absurd; indeed in view of the silliness of the majority of mankind, a widespread belief is more likely to be foolish than sensible

Bertrand Russell
Marriage and Morals (1929)
The Problem – How we practiced

ABEM

“Charismatic expertise based upon subjective self-confidence unsupported by objective ability"
The greater the ignorance the greater the dogmatism

William Osler
Montreal Medical Journal (1902)
The Problem – How we practiced

TBEM

"The triumph of hope over experience"
The Dream
"Evidence-based medicine (EBM) is the integration of best research evidence with clinical expertise and patient values"
The Plan
• Establish a journal club

• Change practice

• Save more lives
A downward spiral

LACK OF INTEREST

POOR ATTENDANCE

NO CHANGE
• Get help
• Reflect on failure
• Recognise the limitations of the department

• Recognise the limitations of the evidence

• Set achievable goals
• Formalise critical appraisal
• Formalise journal scanning
• Formalise attendance
The Gamble
The birth of BETs
BETs

- Clinical scenario
- 3 part question
- Search strategy
- Evidence table
- Discussion
- Clinical bottom line
• For the busy clinician

• The best available evidence (not just the best)

• Simple questions - understandable answers
Does a normal CT scan rule out a subarachnoid hemorrhage

Report by: Simon Carley - Specialist Registrar
Search checked by: Paul Wallman - Specialist Registrar
Institution: Manchester STEM
Date submitted: 1st March 2000
Date completed: 4th October 2000
Last modified: 10th October 2001
Status: Green (Complete)
Clinical scenario
A 24 year old man who has been previously well presents to the emergency department complaining of headache. He describes the headache as the worst he has ever had. It came on suddenly approximately 2 hours previously and has not resolved with paracetamol. It was so severe as to cause him to collapse when it started. He has no other neurological symptoms and clinical examination reveals no neurological signs. You are concerned that he may have had a subarachnoid hemorrhage and arrange a CT scan. The CT is reported as normal. You wonder if this rules out the diagnosis of subarachnoid hemorrhage (SAH) in your patient.

Search strategy
Medline 1966-12/00 using the CVID interface.
[(exp subarachnoid hemorrhage OR subarachnoid.mp) AND (exp cerebrospinal fluid OR spinal fluid.mp OR exp spinal puncture OR lumbar puncture.mp OR xanithochromia.mp) AND (exp tomography, x-ray computed OR ct.mp OR computed tomography.mp)] LIMIT to human, english and abstracts.

Search outcome
140 papers of which 134 were irrelevant or insufficient quality for inclusion. The remaining 5 papers are shown below.

Relevant paper(s)

<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>MacDonald and Mendelow AD, 1967, Scotland</td>
<td>100 patients with diagnosis of SAH confirmed on angiography in tertiary centre</td>
<td>Retrospective chart review</td>
<td>Sensitivity of CT</td>
<td>99 patients had had a CT, of these 20 were normal. Sensitivity=30% (CI=15-25%)</td>
<td>This paper did not specifically address the original question. It is subject to referral bias as only patients in a tertiary centre were examined. The CT scanners used at</td>
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<tr>
<td>McDonald A and Mendedow AD, 1987, Scotland</td>
<td>100 patients with diagnosis of SAH confirmed on angiography in tertiary centre</td>
<td>Retrospective chart review</td>
<td>Sensitivity of CT</td>
<td>99 patients had a CT, of these 20 were normal. Sensitivity = 90% (CI=15-25%)</td>
<td>This paper did not specifically address the original question. It is subject to referral bias as only patients in a tertiary centre were examined. The CT scanners used at this time were early models.</td>
</tr>
<tr>
<td>Van der Wae N et al, 1994, Netherlands</td>
<td>175 consecutive patients with clinical suspicion of SAH Patients with negative CT than want or to have LP. CT was performed immediately, LP after 12 hours from headache onset</td>
<td>Retrospective chart review</td>
<td>Sensitivity for CT</td>
<td>117 patients had blood on CT. Of the other 58 patients, 2 had positive LP's. Overall sensitivity for CT = 95% (CI=94-96.8%)</td>
<td>Not all patients had an LP. If the gold standard is LP findings than some of the CT cases may represent false positives</td>
</tr>
</tbody>
</table>
| Sames TA et al, 1996, USA | 161 patients with SAH confirmed by LP, angiography, surgery or autopsy who had a CT prior to definitive diagnosis Only 3rd generation scanners included | Retrospective chart review    | Overall sensitivity | 91.2% (CI=87-95%) | Retrospective design
There were 349 patients meeting entry criteria, but 94 sets of cases were unavailable for review |
| Sidman R et al,           | 140 patients with a diagnosis of non-traumatic SAH                            | Retrospective chart review    | Overall sensitivity | 11/140 (82.1% sensitivity) of patients had normal CT | Retrospective design |
Comment(s)
Emergency physicians need to know if CT is sensitive enough to rule out the diagnosis of subarachnoid bleeding in patients presenting with severe headache. SAH is an important diagnosis to make, the risk of re-bleeding is high if the initial bleed is missed and it is a condition for which treatment is possible. We must therefore err on the side of caution and seek investigations with a very high sensitivity to rule out the diagnosis. The use of LP as a gold standard in many of these studies can be questioned as it too has a false negative rate, particularly when performed soon after a bleed. The diagnosis of SAH is so important that sensitivity must approach 100% for CT to obviate the need for LP. The current trials found reveal 2 interesting facts. 1. That CT has a high sensitivity (91-98%) for detecting SAH, though this is not high enough to satisfactorily exclude SAH. 2. That the sensitivity of CT for SAH decreases with time.

The sensitivity given in the more recent trials is approximately 95%. This is not high enough to rule out subarachnoid hemorrhage. It is more sensitive the earlier it is performed, this is the converse of LP. The advantage of CT is that it is quick and easy to perform, may be positive in the early stages of SAH and it may give information on the cause or size of the bleed. It may also exclude a space occupying lesion.

Clinical bottom line
Patients with lone acute severe headache should have urgent CT; if this is negative then a lumbar puncture should be performed.

References
A virtuous circle

CLINICAL COMMITMENT

FORMALISED REPORTING

LEARNING FOR ALL

CHANGE EFFECTED

CLINICAL CONUNDRUMS

“There’s a BET in that!”

A virtuous circle

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“There’s a BET in that!”
Welcome to BestBETs

Physicians need rapid access to the best current evidence on a wide range of clinical topics. But where to find it? Textbooks are frequently out-of-date, and we don’t have the time to perform literature reviews while the patient is waiting.

BETs were developed in the Emergency Department of Manchester Royal Infirmary, UK, to provide rapid evidence-based answers to real-life clinical questions, using a systematic approach to reviewing the literature. BETs take into account the shortcomings of much current evidence, allowing physicians to make the best of what there is. Although BETs initially had an emergency medicine focus, there are a significant number of BETs covering cardiology, nursing, primary care, and pediatrics.

Tell your colleagues about this site - it could save your department a lot of time!

Place your BETs!

Why not write a BET of your own, and have it published here, for the benefit of patients everywhere? We’re keen to receive Best Evidence Topic reviews from colleagues all over the world. Use the submission form in the database.
Towards evidence based emergency medicine: best BETs from the Manchester Royal Infirmary

Editors: S. Meredith-Jones

Best evidence topic reports (BETs) summarize the evidence regarding a key question. They are not mandatory, nor does the whole team for two simple, high-evidence questions that can be practically obtained by best practise medicine. The results emerging from these best evidence topic reports will be essential to the future practice of emergency medicine.

Best evidence topic reports (BETs) have been published in the Emergency Medicine Journal. The Manchester Royal Infirmary in Manchester has undertaken BETs within the Emergency Department in order to improve the quality of care and to reduce variation in best practice. The Manchester BETs have been designed to address two high-evidence questions: Gas and abdominal pain in children and Head CT in children with mild head injury.

Gas and abdominal pain in children

**Question 1:** Is the Manchester Royal Infirmary using the CRASH-2 trial interpretation system to manage children with major trauma? A high-risk group is defined as having at least one of the following: Age < 12, weight < 15 kg, Glasgow Coma Scale < 12, altered mental status, or the presence of an injury to the head, chest, or abdomen.

**BET:** A best evidence topic report on the management of children with major trauma using the CRASH-2 trial interpretation system has been published. The report details the evidence supporting the use of this system to manage children with major trauma. It includes a summary of the evidence, a discussion of the implications for clinical practice, and a recommendation for future research.

**Recommendation:** The Manchester Royal Infirmary should use the CRASH-2 trial interpretation system to manage children with major trauma. This system provides a structured approach to decision-making that is evidence-based and can improve the quality of care for these patients.

**Evidence:** The CRASH-2 trial interpretation system has been shown to improve the accuracy of diagnosis and treatment in children with major trauma. It is based on a structured, evidence-based approach that can be applied consistently across different settings.

**Conclusion:** The Manchester Royal Infirmary should adopt the CRASH-2 trial interpretation system to improve the quality of care for children with major trauma. This system provides a structured approach to decision-making that is evidence-based and can improve the accuracy of diagnosis and treatment.

**References:**


**Appendix:**

**Table 1:** Summary of evidence supporting the use of the CRASH-2 trial interpretation system

<table>
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<th>Evidence</th>
<th>Implications</th>
<th>Recommendation</th>
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<td>CRASH-2 trial interpretation system improves the accuracy of diagnosis and treatment in children with major trauma</td>
<td>Consistent evidence supporting the use of this system</td>
<td>Adopt the CRASH-2 trial interpretation system</td>
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**Further reading:**


**Comment:** The CRASH-2 trial interpretation system provides a structured approach to decision-making that can improve the quality of care for children with major trauma. The Manchester Royal Infirmary should adopt this system to improve the accuracy of diagnosis and treatment.

**Funding:** This work was supported by the Manchester Royal Infirmary Foundation Trust.

**Acknowledgements:** We would like to thank the staff at the Manchester Royal Infirmary for their support and contributions to this project.

**Conflicts of interest:** None.

**Keywords:** CRASH-2 trial interpretation system, major trauma, children, evidence-based medicine.
Towards evidence based medicine for paediatricians

Edited by Bob Popham

In order to give the best care to patients and families, paediatricians need to engage the highest quality evidence to guide clinical practice. Archimedes aims to assist practicing doctors in finding and using evidence to inform their practice. The journal's mission is to deliver the best evidence for the best possible treatment of children.

A world of change. These best evidence summary articles (SEOs) are the cornerstone of Archimedes, offering a clear and concise overview of the current evidence, enabling doctors to make informed decisions about patient care.

A commentary provides the opportunity to publish an overview of the evidence in the context of clinical practice, highlighting the gaps in our knowledge and the areas where further research is needed. It also encourages discussion and debate about the implications of the evidence for practice.

A case study illustrates how the evidence can be applied in real-world situations, providing practical examples of how doctors can use the information to improve patient outcomes.

A search of the literature for other relevant evidence is conducted, ensuring comprehensive coverage of the topic. The SEO also includes a discussion of the limitations of the evidence, highlighting the need for further research.

Finally, an action plan is proposed, outlining steps that can be taken to improve patient outcomes based on the evidence presented in the SEO.

Archimedes is a unique journal that provides a comprehensive overview of the best evidence available, helping doctors to make informed decisions about patient care.
CAROLI LINNAEI

SYSTEMA

NATURÆ

TVM

REGNA TRIA NATURE, 

CLASSES, ORDINES, GENERA, RACIES, 

CHARACTERES, DIFFERENTIAE, SYMPTOMATIS, LOCIS

TOMUS I.

HOLMIE, 

Linnæivius DAZLE, LAURENTIII SALVI, 

1735.
$R^2 = 0.9943$
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<td>Other words</td>
<td>100134</td>
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</tr>
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</table>
The Engine
Major perceived barrier was lack of time

Most appropriate way to move towards EBP was by using evidence based guidelines or proposals developed by colleagues

McColl A et al 1998
• Accumulator BETs
Patient with pleuritic chest pain or possible pulmonary embolus

D-Dimer

Interpret VQ with clinical risk assessment

Clinical Risk Assessment

Low

Complete CDU/021 overleaf

Admit

Anticoagulate

BB 610

Moderate / High

Complete CDU/021 overleaf

D-Dimer

Normal

Raised

Complete CDU/021 overleaf

CXR

CT pulmonary angiography

VQ scan

Other diagnosis requiring admission

Admit for treatment

BB 106

BB 271

BB 611

BB 307

BB 490

BB 463

BB 486

BB 594

BB 178

BB 421
• Consultants

• Specialty trainees

• Medical students
Diabetic foot Guideline
Constipation Guideline
Acute Porphyria Guideline
Research and education
• CPAU
• MIOPED
• CHALICE
• ECG PRIME
• MMR
• MSHR
• MACS
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Special Comments
Chest pain and shortness of breath
Fran is non-plussed by the normal D-Dimer. She quickly crosses out the LMWH and cancels the CTPA.

Andrew Martin, the duty consultant, happens to be passing. She discusses the case with him. He asks what clinical risk score she uses and the usual "Educational Prescription" follows when she admits that she isn't using one at all.

They discuss the rational further investigation and treatment.
Summary

- Poor practice
- Unrealistic expectations
- Realistic expectations
- Change in culture and behaviour
- Unconscious incompetence
- Conscious incompetence
- Conscious competence
- Mastery
BETting on the Evidence in Emergency Medicine

Kevin Mackway-Jones
Manchester
The life so short, the craft so long to learn

Hippocrates Aphorisms I