Workshop:
Use of literature and evidence in PBL

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Experienced Tutors Conference
Clinical Reasoning Thread
Mission Statement (v. 3.01)

- Prepare students to make independent, balanced clinical decisions that contribute to optimal patient outcomes.
PBL and CR go together like….

PBL + Clinical Reasoning
Clinicians usually approach the literature in one of two modes:

– “Browse” mode: what’s new in my specialty this month?

– Problem-solving mode: what’s the best approach for this particular patient?

The CR Thread prepares students to approach the literature in problem-solving mode.
What is “Clinical Evidence”?  
Inclusive definition:

- All systematically collected knowledge relating to illness and its treatment
- “Evidence-based” medicine: care that reflects a good-faith effort to tie clinical decisions to current knowledge
- EBM: a method, and a movement
Clinical evidence comes from patient-centered clinical research which investigates the accuracy and precision of diagnostic tests, the efficacy and safety of therapeutic regimes, and the reliability of prognostic indicators.

“Evidence alone is never enough”

- Evidence-based Medicine (EBM) combines individual clinical expertise with the best available clinical evidence from systematic research in making decisions about the care of individual patients.

- Clinical expertise is the proficiency and judgment that individual clinicians acquire through knowledge, clinical experience, and practice.

Pyramid of evidence sources: Haynes

- **STUDIES**: Primary research (PubMed)
- **SYNTHETIC**: Cochrane reviews
- **SYNOPSSES**: ACP Journal Club, "Evidence-based" journal
- **SYSTEMS**: Computerized decision support (UTD, Clinical Evidence)
Some useful EBM sites to visit

Duke University EBM site

http://www.mclibrary.duke.edu/subject/ebm

Excellent portal to many other EBM resources

University of Alberta EBM Toolkit

http://www.med.ualberta.ca/ebm/ebm.htm

Contains worksheets for individual article appraisal
CR Thread current content:
5 New Basic Medical Sciences

1. Outcome Focus
   ➢ measurement and management

2. Clinical Question-framing

3. Literature searching, study designs

4. Critical appraisal of published evidence

5. Decision support
Seven New Basic Sciences

1. Outcomes

• Teach outcomes from Day 1 of Med School

• Define outcomes broadly:
  • Patient-centered, clinical, satisfaction, cost, safety
  • Individual and population outcomes

• Approach each organ system and condition from perspective of outcomes:
  • “Input” focus: “How do we perform surgery for cataract?”
  • Outcome focus: “What outcomes do patients with cataracts experience under different treatment approaches?”
Seven New Basic Sciences

2. Clinical Question-framing (a.k.a question “construction”)

- Borrowed from Guyatt and Sackett’s “Users Guides”
- Goal: an explicit, outcome-focused question that can help guide an online search for published evidence to support clinical decisions
- “PICO”: Patients, Intervention, Comparison, Outcome
- (practice)
A patient is hospitalized with a first episode of cholecystitis, which resolves with non-operative management. He is scheduled to return for elective cholecystectomy. At the time of discharge, the patient asks the team, “Do I really need to have this surgery to remove my gallbladder? What if I just change my diet, stay away from fatty foods and see how things go?”

Q: Formulate (“frame”) the question in a format that will help you conduct a focused online search of the medical literature to answer the patient’s question.

Real 2008 Student Answer: P I
In [patients with symptomatic cholelithiasis], is [cholecystectomy or conservative therapy] [superior in preventing recurrent pain]? C O
Seven New Basic Sciences

3. Literature searching

- Online search skills emphasized (but not to exclusion of print sources)
- Co-taught with Medical Librarians in 3 hour lab, Week 2 of medical school
- “Information Omnivore” approach, with broad selection from primary and summarized sources
- Emphasis on efficient, targeted PubMed searches
Medical literature: divide and conquer
Simple taxonomy using 3 “axes”

• Primary vs. secondary

• Observational vs. experimental

• “Background vs. foreground”
Two Types of Clinical Questions:

Foreground Questions:
Questions about the effects of tests and treatments in patient populations

Background Questions:
Questions about underlying mechanisms of human biology and disease
Two Types of Clinical Questions:

Foreground Questions:
How do corticosteroids affect hospitalization rates in children with asthma?

Background Questions:
How do corticosteroids affect airway inflammation in asthma?
Q: If you were assigned to answer the patient’s question (cholecystectomy vs. diet change) for the team, describe the best online search strategy to use, e.g., What type of information sources would be best for answering this question? (practice – write 3 online search steps)

Real student answer:
I would first go to Pub Med, “clinical queries,” and run a “therapy” query on “cholelithiasis and diet.” I would hope to find a number of clinical trials that randomized patients with similar characteristics to mine (adult, male, with symptomatic gallstones) to either low-fat diet or laparoscopic cholecystectomy. In the ideal study, the primary outcome would measure whether patients remained pain-free and didn’t need to go back to the hospital or doctor for further treatments (patient-centered outcome). I would also hope to find either a meta-analysis or a review article that examined the collection of RCTs out there and commented on whether the outcomes generally agreed with each other and whether there was a preponderance of evidence on the merits of low-fat diet as a treatment for gallstones.
Seven New Basic Sciences

4. Critical appraisal of published evidence

- Interpret the study: 3 questions
  - Are the results valid? (randomization, blinding, etc)
  - What are the results? (calculate RD, NNT)
  - How do the results apply to my patient?

- Worksheet approach to evaluate primary articles

  (practice: Chang et al, vertigo RCT)
Q: Here are two abstracts on treatment of pneumothorax. Read the complete articles. Do the results of each study apply to Ms. Stewart’s case? Why or why not?

Real student answer: The results of this study do apply to Ms. Stewart’s case. Like the patients in the study, Ms. Stewart is experiencing her first episode of primary spontaneous pneumothorax. Consistent with the exclusion criteria of the study, Ms. Stewart has no underlying lung disease or history of pneumothorax, nor does she present with a condition suggestive of tension pneumothorax. However, it should be taken into account that the study population was largely male. Nonetheless, I do not think that this gender difference is sufficient to warrant dismissal of the evidence presented in this paper.
Q: Here are two abstracts on treatment of pneumothorax. Read the complete articles. Do the results of each study apply to Ms. Stewart’s case? Why or why not?

Real student answer: In my opinion, the results of this study also apply to Ms. Stewart’s case. This study performed a meta-analysis of 3 randomized controlled trials that each compared simple aspiration vs. chest tubes, and included patients like Ms. Stewart, with presumably first episode of primary spontaneous pneumothorax (PSP). …. However, there are some weakness in this study which are relatively small sample sizes, different primary outcomes, designs, and lack of concealment of allocation and blinding, the “pooled statistic for ‘success at 1 week or more’ showed no significant statistical difference between simple aspiration and chest tube insertion,” RR 0.86 (95% CI 0.67-1.11).
Welcome

BestBETs
EVIDENCE TOPICS

Evidence-based medicine at its best

NEW! Sign-up HERE to receive the BestBETs newsletter!

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 cardiothoracics, nursing, primary care and paediatrics.

BROWSE or SEARCH the database of BETs. New topics are being added all the time, so come back often.

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 - we aim to start giving a prize for the best one each year.
BETs and CAs in this category

You are in: All categories > Specialty > Medicine

Show key to symbols

Medicine > Cardiology

• **Bypass is better than external rewarming after hypothermic cardiac arrest**
• **Fluid resuscitation in acute abdominal aortic aneurysm**
• **In patients with dysrhythmias following tricyclic overdose patients treatment should include alkalisation to a pH of 7.55**
• **Should warfarin therapy be commenced alongside low molecular weight heparin on diagnosis of a deep vein thrombosis?**
• **Belching as a recognised symptom of myocardial ischaemia**
• **The first ECG has a low sensitivity for myocardial infarction in patients with chest pain**
• **Troponin T does not rule out myocardial damage until 12 hours after the onset of chest pain**
• **Oral or intravenous beta-blockers in acute myocardial infarction**
• **Nitrates as first line treatment for acute left ventricular failure**
• **Intravenous adenosine can be used in asthmatics**
• **GI/IIIB inhibitors in addition to LMWH unproven in unstable angina**
• **Troponin for 30 day risk stratification in chest pain patients with ischaemic ECG.**
• **Syncope and a normal ECG - the likelihood of a cardiac arrhythmia**
• **Active treatment of pulmonary embolus**
• **High or low dose adenosine for narrow complex tachycardia**
• **Propylthiouracil magnesium is not indicated in myocardial infarction**
• **Monophasic versus Biphasic defibrillation**
• **CPAP in acute left ventricular failure**
• **Antihypertensives in hypertensive emergencies**
• **Aspirin administration should be administered as quickly as practicable in acute...**
The first ECG has a low sensitivity for myocardial infarction in patients with chest pain

Three part question
In [patients presenting to the ED with cardiac-sounding chest pain] what is the [sensitivity] of the [initial 12 lead ECG]?

Clinical scenario
A 55-year-old man with cardiac-sounding chest pain presents to the emergency department. The first ECG is normal. Just before you discharge him you stop to wonder what the sensitivity of the initial 12 lead ECG is in predicting acute myocardial infarction.

Search strategy
Medline 1966-09/00 using the OVID interface.
**Search strategy**

Medline 1966-09/00 using the OVID interface.

[exp myocardial infarction OR myocardial infarction.mp OR AMI.mp OR MI.mp) AND (exp electrocardiography OR electrocardiogram.mp OR ECG.mp OR EKG.mp) AND (initial.mp OR first.mp OR single.mp OR premier.mp)] AND maximally sensitive diagnostic study filter LIMIT to human and English.

**Search outcome**

543 papers were found, out of which 533 were irrelevant or of insufficient quality. The remaining 10 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>Mc Guinness JB et al, 1976, Scotland</td>
<td>698 patients admitted to CCU, 400 with AMI.</td>
<td>Prospective diagnostic cohort</td>
<td>Sensitivity of initial ECG</td>
<td>51%</td>
<td></td>
</tr>
<tr>
<td>Stark ME and Vasel JL, 1997, USA</td>
<td>221 ED chest pain patients, 39 with AMI.</td>
<td>Prospective diagnostic cohort</td>
<td>Sensitivity of initial ECG</td>
<td>62%</td>
<td>Air force hospital, possible selection bias; No raw cardiac enzyme data confirming how AMI was diagnosed</td>
</tr>
<tr>
<td>Sharkey GW et al, 1999, USA</td>
<td>54 patients admitted to CCU, 34 with AMI.</td>
<td>Prospective diagnostic cohort</td>
<td>Sensitivity of initial ECG</td>
<td>61%</td>
<td>CCU population not ED; Small population size</td>
</tr>
<tr>
<td>Rouan GW, et al, 1989, USA</td>
<td>910 ED chest pain patients, 811 with AMI.</td>
<td>Prospective diagnostic cohort</td>
<td>Sensitivity of initial ECG</td>
<td>13%</td>
<td>Interrater agreement of ECG interpretation not measured from separate participating ED; Inclusion of AMI and ischaemic ECG changes</td>
</tr>
<tr>
<td>Fesmire FM et al, 1999, USA</td>
<td>440 ED chest pain patients, 100 with AMI.</td>
<td>Prospective diagnostic cohort</td>
<td>Sensitivity of initial ECG</td>
<td>47%</td>
<td>No evidence of timing of the initial ECG</td>
</tr>
<tr>
<td>Giller WB et al, 1992, USA</td>
<td>616 ED chest pain patients, 108 with AMI.</td>
<td>Prospective diagnostic cohort</td>
<td>Sensitivity of initial ECG</td>
<td>36%</td>
<td>Recruitment criteria unclear; Unclear if series or selection of patients recruited</td>
</tr>
<tr>
<td>Zelenski RJ et al, 1993, USA</td>
<td>149 ED chest pain patients, 34 with AMI.</td>
<td>Prospective diagnostic cohort</td>
<td>Sensitivity of initial ECG</td>
<td>47.1%</td>
<td>Small population</td>
</tr>
<tr>
<td>Young GP and Green TP,</td>
<td>222 ED chest pain patients, 48 with AMI.</td>
<td>Retrospective survey</td>
<td>Sensitivity of initial ECG</td>
<td>20%</td>
<td>Retrospective study</td>
</tr>
</tbody>
</table>
Comment(s)
At presentation history, clinical findings and ECG are all that are available to aid clinicians in the diagnosis of AMI. These studies have shown that the first ECG is between 13-59% sensitive for AMI.

Clinical bottom line
The first ECG is not sensitive enough to rule out AMI in the Emergency Department.

References
What is known about the information “feeding habits” of our students and residents?

• They like to eat fast: maximum info in minimum time

• They grew up online: great Googlers

• Preference for “prepared” foods: love calorie-rich sources like UpToDate

• Willing to read and use primary research literature if taught and encouraged
“Dr. Stevens’ Amazing Clinical Evidence Diet Revolution”
Opportunities to build Clinical Reasoning Skills in PBL: Summary

- Reinforce a focus on patient outcomes

- Encourage students to practice basic skills:
  - question framing, focused searching, critical appraisal

- Article Worksheets – Alberta or others available on www

- BestBETs, CATs etc

- Reinforce and reward healthy information feeding habits, discourage “cut and paste” of UpToDate content