

Practice Corner: Taking evidence in hand

Come with us while our clinical team makes rounds. As each patient is seen and discussed, we often find that we have gaps in our knowledge related to the clinical decisions we're making. In this Practice Corner, we'll illustrate how we meet some of those information needs rapidly by using resources stored in a personal digital assistant (PDA) (1), placing in brackets the time it takes us to retrieve the evidence. We'll provide contact information in a table for selected resources and readers can visit our Web site (2). Wherever possible, we use PDA resources that are evidence-based, meaning that their manufacturers are fully explicit about how they searched for evidence on clinical questions, critically appraised that evidence and rated its strength, and tied the strength of the evidence to the recommendations made (3).

Example 1

Our first patient is an older man admitted for pneumonia, in whom the medical student found a surprising abdominal pulsation. On examination we confirm that the aortic pulse contour is 3 cm wide. How accurate is this finding for detecting abdominal aortic aneurysm? On our Palm OS–based PDA, we tap the “Find” function, enter “AAA”, and then tap open a memo that tells us that the positive likelihood ratio of this clinical finding for abdominal aortic aneurysm is 12.0 [4 seconds]. In this memo we'd written a synopsis of the evidence, similar in structure to the larger Critically Appraised Topic (CAT) (3) but in a PDA-friendly format we call an eCAT (Table 1). Using the infra-red port, we can share this memo with team members who have Palm OS–based PDAs.

Table 1. eCATs: Elements and examples

Element	Example 1	Example 2																							
Short title:	Palpation for abdominal aortic aneurysm (AAA)	Ferritin for iron deficiency																							
Bottom line:	1. Abnormal aortic contour on palpation can raise probability of AAA greatly. 2. Normal palpation cannot accurately rule out AAA.	1. In suspected iron deficiency, serum ferritin is accurate and precise, dominating other tests, even with inflammatory disease.																							
Results:	<table border="1"> <thead> <tr> <th>Size of aneurysm</th> <th>+LR</th> <th>–LR</th> </tr> </thead> <tbody> <tr> <td>> 3 cm</td> <td>12.0</td> <td>0.72</td> </tr> <tr> <td>> 4 cm</td> <td>15.6</td> <td>0.51</td> </tr> </tbody> </table>	Size of aneurysm	+LR	–LR	> 3 cm	12.0	0.72	> 4 cm	15.6	0.51	<table border="1"> <thead> <tr> <th>Ferritin measurement (ng/mL)</th> <th>LR</th> </tr> </thead> <tbody> <tr> <td>< 15</td> <td>51.85</td> </tr> <tr> <td>> 15 to < 25</td> <td>8.83</td> </tr> <tr> <td>> 25 to < 35</td> <td>2.54</td> </tr> <tr> <td>> 35 to < 45</td> <td>1.83</td> </tr> <tr> <td>> 45 to < 100</td> <td>0.54</td> </tr> <tr> <td>> 100</td> <td>0.08</td> </tr> </tbody> </table>	Ferritin measurement (ng/mL)	LR	< 15	51.85	> 15 to < 25	8.83	> 25 to < 35	2.54	> 35 to < 45	1.83	> 45 to < 100	0.54	> 100	0.08
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Source:	Systematic review of studies of examination for AAA, involving 2955 patients	Systematic review of studies with marrow iron as standard, involving 2579 patients																							
Citation:	JAMA. 1999;281:77-82.	J Gen Intern Med. 1992;7:145-53.																							
eCAT date:	9 January 1999	10 August 1998																							

Example 2

An older woman has anemia. We suspect the cause is renal failure, but we want to exclude iron deficiency. Her serum ferritin value is 126 ng/mL, raising the question of whether this “negative” result is sufficiently powerful to rule out iron deficiency. We tap to another eCAT (Table 1) from which we learn that the likelihood ratio of this ferritin result is 0.08, small enough that the posttest probability for our patient is now below our test threshold [4 seconds].

When we summarize our evidence-based learning activities in the form of eCATs, we can be sure of our own methods for acquiring, appraising, and applying the evidence. Yet since our information needs are much greater than the time available to appraise evidence and write our own eCATs, how can we use our PDAs to carry summaries of evidence that others have prepared? Beyond swapping eCATs with our colleagues who share our clinical interests and methodological rigor, there are some software resources we can try, although they vary in how explicitly they use evidence.

Other Examples

In an older woman admitted for an acute febrile illness, the rapid test of a nasal swab confirms our suspicion of influenza A. To help us decide whether to start an antiviral drug, we open a PDA version of *Clinical Evidence* (Table 2), tapping through the menus to the evidence summary that oseltamivir is effective in reducing the duration of illness [13 seconds]. After discussing the potential benefits and harms, we decide to offer oseltamivir treatment to the patient, but first we tap open the ePocrates drug information software (Table 2) to obtain the proper dose and to check for drug–drug interactions with her other medications [11 seconds].

A middle-aged woman was admitted for her first-ever seizure. Our evaluation so far has not found a toxic, metabolic, or structural cause. To help us decide whether to begin antiepileptic treatment, we open *Clinical Evidence* again, where we learn that drug therapy lowers the recurrence rate of seizures by about half, although the long-term benefit is uncertain [12 seconds].

Table 2. Some evidence resources for PDAs

Resource	Platform	Web site
Clinical Evidence	Palm, Pocket PC	www.bmj.com/handhelds
UpToDate	Pocket PC	www.uptodate.com
ePocrates	Palm	www.epocrates.com
GOLD guidelines	Palm	www.goldcopd.com
EBMCalc	Palm	www.cebm.utoronto.ca/palm/ebmcalc
JournalToGo	Palm, Pocket PC	www.journaltogo.com

A middle-aged man was admitted for an exacerbation of chronic obstructive airway disease. He's quite sick and not yet responding to initial therapy, so we discuss contingency plans, including when he might need intensive care. To inform this discussion, we open the Palm OS summary of the Global Initiative for Chronic Obstructive Lung Disease (GOLD) practice guidelines, focusing on the indications for admission to intensive care [9 seconds].

As we travel between hospital floors, we talk about an article from the most recent issue of the *Annals of Internal Medicine* that will be reviewed at our departmental journal club the next day. While we wait for another team member to answer a page, one of us taps open JournalToGo (Table 2), with which we had already downloaded (at last synchronization of PDA with computer) the latest abstracts from this and many other journals, and finds the citation's abstract for us to review [11 seconds].

A middle-aged woman was just found to have stage IV renal cell carcinoma. To prepare ourselves to discuss the future with her, we turn on a Pocket PC-based PDA, open UpToDate (Table 2), and find that patients with her stage at diagnosis have a median survival of about 10 months and an average 5-year survival less than 10% [75 seconds].

Another middle-aged woman was admitted for dyspnea. We suspect heart failure but want to exclude pulmonary embolism. Her D-dimer test result is negative, so we open another eCAT to learn that the sensitivity of the D-dimer test is about 98% and the specificity is 45% [5 seconds]. We then open the Palm OS-based calculator program EBMCalc (Table 2), select "Diagnostic Tests", enter the values and tap "Calculate", yielding not only the respective likelihood ratios and confidence intervals but also a graphical display of how the posttest probability varies with pretest probability and these test results (Figure) [20 seconds, with lots of "Ooohs"].

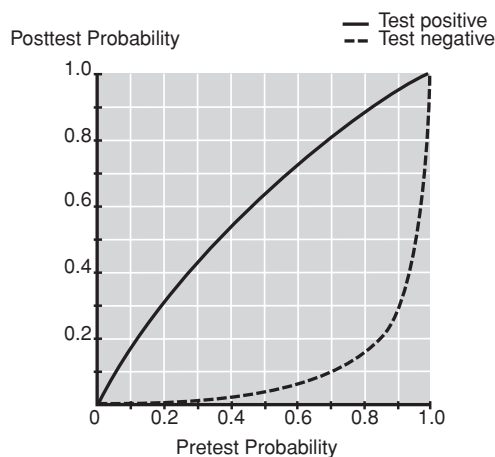


Figure. Graph of posttest probability if sensitivity = 98% and specificity = 45%, similar to graphic produced by EBMCalc.

Alright—what about when there's no relevant evidence stored on our PDAs?

Our last patient is an older man referred for profound weight loss. We suspect major depression is the underlying disorder. One member of the team asks how frequently involuntary weight loss is the main presenting problem in patients with depression. We decide to find evidence about this question later to report back to the group, so we open our To Do list, tap open our list of Educational Prescriptions, and capture the question before it fades from memory [15 seconds] (3).

As anticipated by others (1, 4), these rounds illustrate the tremendous potential of the PDA to enhance evidence-based clinical practice by delivering synopses of evidence to the bedside rapidly enough to actually inform clinical decisions. As the technology improves further, not only will more resources be able to be stored on PDAs, but wireless access to networks and the World Wide Web will put even more resources at our fingertips. Because synopses don't tell the full story, we have to be just as careful when applying evidence from our PDA as we would be when using other evidence summaries. At present, no single PDA resource meets all of our evidence needs, so we'll continue to use a combination of our own eCATs and resources made by others.

W. Scott Richardson, MD
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References

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