How do I find a point-of-care answer to my clinical question?

Andrew Worster, MD; R. Brian Haynes, MD

ABSTRACT

Emergency physicians often need point-of-care access to current, valid information to guide patient management. Most emergency physicians do not work in a hospital with a computerized decision support system that prompts and provides them with information to answer their clinical questions. Searching for answers to clinical questions online, especially those related to diagnosis and treatment, can be challenging, in part because determining the validity and clinical applicability of the results of individual studies is beyond the time constraints of most emergency physicians. This article describes currently available point-of-care sources of evidence-based information to answer clinical questions and provides the access information for each.

RÉSUMÉ

Les urgentologues ont souvent besoin d'avoir accès à de l'information fiable et à jour au point de service pour les guider dans la prise en charge. La plupart des urgentologues travaillent dans des hôpitaux non dotés de systèmes informatisés d'aide à la décision, qui facilitent l'accès à l'information et qui fournissent des réponses à leurs questions d'ordre clinique. La recherche en ligne de réponses à des questions d'ordre clinique, notamment à celles liées au diagnostic et au traitement, peut se révéler particulièrement ardue, en partie parce que la détermination de la validité et de l'application clinique des résultats relevés dans chacune des études dépasse le temps dont disposent la plupart des urgentologues. L'article décrit des sources d'information fondées sur des données probantes, actuellement disponibles au point de service, qui apportent des réponses à des questions d'ordre clinique et qui fournissent, pour chacune d'elles, des renseignements relatifs à l'accès.

Keywords: clinical information, evidence based, point-of-care

In an ideal world, emergency physicians would have all of the necessary current information at hand (or brain). Given the variety of problems we encounter and the rate at which new information is produced, this is not possible. The next best option would be an electronic record in which each patient's presenting complaint produces a list of potential diagnoses and the diagnostic criteria for each, with links to management information for each option. Is this option only a dream? Not necessarily. Much of the information already exists. It requires a computerized decision support system (CDSS) for emergency medicine (EM) to be built to support that information.[1,2] Clinical decisions are based on more evidence alone, and as their name implies, CDSSs are designed to support our decision-making process, not replace it. CDSSs already exist in other areas of medicine. As demonstrated in randomized controlled trials, although process of care has been improved in a little more than half of studies, the results for clinical outcomes have not been as strong.[2] To date, they cover a limited range of topics and are not yet ready for the emergency department.

While we are waiting for CDSSs to arrive, we could be doing more with available information sources. The information we seek (e.g., Which is the best test to rule in or rule out a condition? What is the best treatment for this patient's condition?) is considered "foreground" questions. "Background" questions, such as the pathophysiology or epidemiology of a disorder, are important for understanding the nature of disorders but are insufficient for dealing with individual patients. The answers to the background questions do not change as rapidly as do the answer for foreground

---

questions. Answers to background questions can often be found in traditional textbooks, whereas current answers to foreground questions may be found only in the most recent medical publications.

Other useful terms for efficient foreground information seeking are "prompt," "pull," and "push."[3] CDSSs provide a "prompt," that is, an automatic reminder to consider a variety of diagnoses based on an individual patient's chief complaints and clinical findings. "Pull" refers to accessing the most current and highest quality information for our decision making, usually stimulated by a patient problem we are trying to deal with right now. "Push" refers to automated information services that alert us to newly published evidence in our areas of interest but that are only coincidentally related to patients we are currently seeing. Prompt, pull, and push are complementary processes for providing best care, and as clinicians, we should be skilled in making optimal use of all three. The following case illustrates some of the options.

CLINICAL SCENARIO

A 33-year-old female presents with a 48-hour history of left facial weakness of unknown etiology and no preceding symptoms. The examination confirms isolated left facial weakness (including the forehead) without any evidence of rash. She has rapid upward movement of the globe as she tries to close the eye on the affected side.

INFORMATION SOURCES

This case generates several clinical questions from presentation to management and disposition. With a CDSS, entry of the chief complaint of facial weakness from our clinical case scenario into the hospital computer at triage would provide prompts for several possible diagnoses, including Bell palsy and stroke, and include links to more detailed information on the clinical findings, diagnosis, recommended treatment(s), and supporting evidence.

Point-of-care access to an online computer or a portable Wi-Fi device will also allow access to information required to answer the clinical question. Confirming the signs and symptoms of Bell palsy, such as involvement versus sparing of the forehead muscles and whether the eye sign for this patient is Bell phenomenon and is a pathognomonic sign, is a

"background" question easily answered in a textbook or through the Internet using a search engine and the search term "Bell palsy." *Wikipedia* can often answer background questions such as these and provides references with links, although the information is only as reliable as the contributing source. A more reliable link would be *PubMed Health*, a consumer health website produced by the National Library of Medicine at the National Institutes of Health. Online medical texts such as *eMedicine*, *UpToDate*, *DynaMed*, or *PEPID* can also provide answers to these background questions.

Determining the best treatment is a "foreground" question, which may be more difficult to answer. Although all of the previously cited sources might recommend treatment, there is no way of knowing if that information is the most current or evidence based. The most current source of medical information is found in medical journals, although it may be difficult to judge the validity of the information without having a strong biostatistical background. Multiple EM-specific journals have emerged over the years to meet the knowledge needs of EM physicians. Although medical journals are the most current source of medical information, most report early or preliminary original research and very few of the articles are appropriate for direct clinical application.[4] McKibbon and colleagues coined the term "number needed to read" (NNR) to describe the ratio of preclinical studies to clinically applicable studies for any given journal.[5] The NNR for clinically relevant studies published in the EM journal *Annals of Emergency Medicine* is 26.7.[5]

EM-specific journals are not the only journals containing EM-related studies. Many articles clinically relevant to the practice of EM are published in general or other specialty medical journals, further increasing the NNR for EM physicians. The breadth of journals from which we could potentially "pull" the information requires skill and experience in such searches to find studies such as randomized controlled trials and systematic reviews to answer our foreground questions. Once these articles are identified, we must be able to critically appraise them for methodological rigour and clinical application. This is not something to be done at the point of care, even if we had the requisite skills.

Depending on the information sources used, searching for or "pulling" information can be a labour intensive and even nonproductive process. Efficient and productive searching requires selecting the most

appropriate information sources for the clinical question.[5] To that end, there are four criteria to follow when choosing a source of information. It should be 1) evidence based, 2) comprehensive yet provide specific coverage of the topic, 3) easy to use, and 4) readily available.[5] In short, to answer a foreground point-of-care question, an EM physician needs easily accessed, reliable, preappraised evidence containing sufficient detail.

Information resources that meet these criteria are best organized via the 6S hierarchal model of preappraised evidence along with the descriptions shown in Figure 1.[6,7] Table 1 lists the URL for each. When searching for high-quality evidence for clinical decision making, we should attempt to identify information from the highest quality before accepting a lower level of evidence. The highest level of preappraised evidence in the model (CDSS) is not available to most EM physicians. If it were, one would need look no further. Next in this system (5S) are "summaries," and these can be in the form of either evidence-based textbooks or clinical practice guidelines (that are based on systematic reviews of current best evidence). Four summaries that use explicit search and appraisal methods are best practice/point of care (which are based on *Clinical Evidence*), *DynaMed*, *UpToDate*, and *Physician Information and Education Resource* (*PIER*). None of these are EM specific, although they all have EM content. All require a subscription to access, which, it is hoped, has already been set up through your institution. An evidence-based textbook is now available to emergency physicians,

Evidence-Based Emergency Medicine,[8] that can also be used.

Guidelines, if evidence based, qualify as summaries. Their clinical value, however, depends on how current they are. The US Agency for Healthcare Research and Quality supports the National Guideline Clearinghouse. This database has an advanced search engine that allows for guideline searching by specialty, but this categorization is inexact. Our own research has shown that the EM physician interrater reliability on the applicability of the EM guidelines to EM is low at best, indicating that this resource fails to meet the "easy to use" criterion.[9] Other important and free clinical guideline sources that are specific to EM are from the EM professional organizations, specifically the Canadian Association of Emergency Physicians, the American College of Emergency Physicians, the United Kingdom's College of Emergency Medicine, and others. Although availability on a government- or professional organization–sponsored website does not guarantee that the guideline is current or of the highest quality, those from the latter sources should promote the current standard of care for EM.

At the 4S level are "synopses of syntheses" (4S). Syntheses refer to systematic reviews. Some systematic review articles are in excess of 50 pages with multiple forest plots and are too cumbersome to review at the bedside—or even at home! Synopses are brief, structured statements of the objectives, methods, and findings. The author's own presentation and interpretation of the results may not be unbiased. The *Database of Abstracts of Reviews of Effects* (*DARE*) sponsored by the UK National
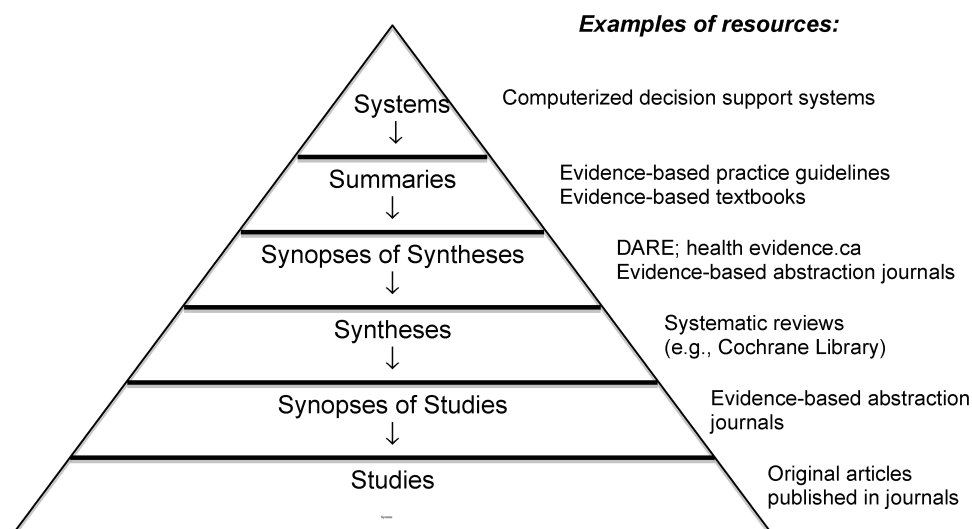

Examples of resources:

Systems → Computerized decision support systems

Summaries → Evidence-based practice guidelines / Evidence-based textbooks

Synopses of Syntheses → DARE; health evidence.ca / Evidence-based abstraction journals

Syntheses → Systematic reviews (e.g., Cochrane Library)

Synopses of Studies → Evidence-based abstraction journals

Studies → Original articles published in journals

Figure 1. The 6S model of decision-making clinical information. Reproduced with permission from DiCenso A et al.[7]

Table 1. Sources of decision-making clinical information for emergency physicians

Level of evidence	Information source	URL
5S	*Clinical Evidence*	http://clinicalevidence.bmj.com/ceweb/index.jsp
		Accessed 25/10/11
	DynaMed	http://www.ebscohost.com/dynamed/
		Accessed 25/10/11
	UpToDate	http://www.uptodate.com/index
	Physicians' Information and Education Resource	http://pier.acponline.org/index.html
		Accessed 25/10/11
	Agency for Healthcare Research and Quality	http://www.ahrq.gov/
		Accessed 25/10/11
	Canadian Association of Emergency Physicians	http://caep.ca/resources/position-statements-and-guidelines
		Accessed 25/10/11
	American College of Emergency Physicians	http://www.acep.org/clinicalpolicies/
		Accessed 25/10/11
	College of Emergency Medicine (UK)	http://www.collemergencymed.ac.uk/Shop-Floor/Clinical%20Guidelines/default.asp
		Accessed 25/10/11
4S	*Database of Abstracts of Reviews of Effects*	http://www.york.ac.uk/inst/crd/
		Accessed 25/10/11
3S	*Cochrane Library*	http://www.thecochranelibrary.com/view/0/index.html
	EvidenceUpdates	http://plus.mcmaster.ca/EvidenceUpdates/
		Accessed 25/10/11
2S and above	*Turning Research into Practice* (*TRIP*)	http://www.tripdatabase.com
		Accessed 25/10/11
	SUMSearch	http://sumsearch.org/index.aspx
		Accessed 25/10/11

Institute for Health Research contains unbiased critical synopses of systematic reviews based on explicit criteria. *ACP Journal Club* provides synopses, most easily pulled from *ACPJC+* (an electronic compendium that covers internal medicine and EM), which at present is a membership benefit of the American College of Physicians. The downside of syntheses and their synopses is that some of these might not contain the latest original trials because it takes considerable time to complete the systematic review and then the synopsis.

At the 3S level are the previously mentioned "syntheses" (systematic reviews) of studies addressing a specific clinical question. These are published in many journals, although the largest and best single source of these is the *Cochrane Database of Systematic Reviews* (*CDSR*). Although access to the *CDSR* review abstracts is free, access to the full article requires a subscription. Abstracts of reviews from over 120 journals, including all Cochrane reviews, are available for free from *BMJ*'s *Evidence Updates* or as a membership benefit from the American College of Physicians (*ACPJC+*).

EvidenceUpdates (*EU*) provides synopses of single studies (2S). The studies for which the synopses are provided must meet specific quality criteria and be clinically relevant. As with synopses of syntheses, synopses of original studies appear in *ACP Journal Club* (a monthly section within *Annals of Internal Medicine*) and *ACPJC+*. For this level, commentary is brief and independent. Access requires registration (free for *EU*, membership benefit for *ACPJC+*), but the added advantage is the "push" feature that notifies subscribers of recent articles related to their own specialty interests.

Synopses of original articles usually are not available because the article of interest is too recent or fails to meet clinical relevance and quality criteria. However, an abstract of articles that meet the basic criteria for quality and clinical relevance can be found in *EU* and *ACPJC+* very soon after the time of publication.

If you still are unable to obtain valid evidence, the next stop is *MEDLINE*, the US National Library of Medicine's premier bibliographic database for all health care fields. This database is at the bottom of

the 6S model and, of importance, requires the user to sort through many off-topic articles and then critically appraise the articles that appear to be on target. The best way to find an answer to a clinical question from *MEDLINE* is via *PubMed Clinical Queries*, a free search engine that provides easy to use, evidence-based search methods to find higher quality original studies and syntheses.

As we have demonstrated, there are multiple resources for each of the levels of evidence, many of which require a subscription. *Turning Research into Practice* (*TRIP*) and *SUMsearch* (*SS*) are two additional services that meet all four of the information criteria and can be of great value to EM physicians. Both search engines provide evidence from a multitude of databases covering the levels of information from 2S to 5S, and both are free to search (but the full-text articles retrieved may not be). If you are affiliated with a university or institution, consult with your librarian about how you can optimize your access to licensed resources such as electronic texts and full-text journals.

SUMMARY

Quickly finding a point-of-care answer to a clinical question takes practice but has substantial benefits for you and your patients. The 6S model provides an organized and efficient approach to searching for high-quality information. Many of the resources are free and accessible via mobile Wi-Fi devices, thereby making it possible for any EM physician to find a point-of-care answer to a clinical question.

REFERENCES

1. Garg AX, Adhikari N, McDonald H, et al. Effects of computerized clinical decision support systems on practitioner performance and patient outcomes: a systematic review. *JAMA* 2005;293:1323-38, doi:10.1001/jama.293.10.1223.

2. Sahota N, Lloyd R, Ramakrishna A, et al. Computerised clinical decision support systems for acute care management: a decision-maker-researcher partnership systematic review of effects on process of care and patient outcomes. *Implementation Sci* 2011;6:91.

3. Haynes RB. How to find current best evidence and have current best evidence find us. In: Straus S, Richardson SR, Glasziou P, Haynes RB, editors. *Evidence-based medicine: how to practice and teach EBM*. 4th ed. London: Elsevier; 2011. p. 29-63.

4. Haynes RB, Cotoi C, Holland J, et al. McMaster Premium Literature Service (PLUS) Project. Second-order peer review of the medical literature for clinical practitioners. *JAMA* 2006; 295:1801-8, doi:10.1001/jama.295.15.1801.

5. McKibbon A, Wyer P, Jaeschke R, et al. Finding the evidence. In: Guyatt G, Rennie D, Meade MO, et al, editors. *Users' guide to the medical literature: a manual for evidence-based clinical practice*. 2nd ed. New York: McGraw-Hill Medical; 2002. p. 29-58.

6. McKibbon KA, Wilczynski NL, Haynes RB. What do evidence-based secondary journals tell us about the publication of clinically important articles in primary healthcare journals? *BMC Med* 2004;2:33, doi:10.1186/1741-7015-2-33.

7. DiCenso A, Bayley L, Haynes RB. ACP Journal Club. Editorial: Accessing preappraised evidence: fine-tuning the 5S model into a 6S model. *Ann Intern Med* 2009;151:JC3-2, JC3-3.

8. Rowe BH, Lang E, Brown M, et al, editors. *Evidence-based emergency medicine*. London: Wye Blackwell-BMJ Books; 2009.

9. Hoogenes J, Worster A, Upadhye S, et al. *Utility of clinical practice guidelines in emergency medicine*, [PhD independent study oral defense]. Presented at: McMaster University; 2011 May 28; Hamilton, ON.