Finding and Applying Evidence During Clinical Rounds

The "Evidence Cart"

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Context.—Physicians need easy access to evidence for clinical decisions while they care for patients but, to our knowledge, no investigators have assessed use of evidence during rounds with house staff.

Objective.—To determine if it was feasible to find and apply evidence during clinical rounds, using an "evidence cart" that contains multiple sources of evidence and the means for projecting and printing them.

Design.—Descriptive feasibility study of use of evidence during 1 month (April 1997) and anonymous questionnaire (May 1997).

Setting.—General medicine inpatient service.

Patients.—Medical students, house staff, fellows, and attending consultant.

Intervention.—Evidence cart that included 2 secondary sources developed by the department (critically appraised topics [CATs] and Redbook), *Best Evidence*, *JAMA* Rational Clinical Examination series, the Cochrane Library, MEDLINE, a physical examination textbook, a radiology anatomy textbook, and a Simulscope, which allows several people to listen simultaneously to the same signs on physical examination.

Main Outcome Measures.—Number of times sources were used, type of sources searched and success of searches, time needed to search, and whether the search affected patient care.

Results.—The evidence cart was used 98 times, but could not be taken on bedside rounds because of its bulk; hard copies of several sources were taken instead. When the evidence cart was used during team rounds and student rounds, some sources could be accessed quickly enough (10.2-25.4 seconds) to be practical on our service. Of 98 searches, 79 (81%) sought evidence that could affect diagnostic and/or treatment decisions. Seventy-one (90%) of 79 searches regarding patient management were successful, and when assessed from the perspective of the most junior team members responsible for each patient's evaluation and management, 37 (52%) of the 71 successful searches confirmed their current or tentative diagnostic or treatment plans, 18 (25%) led to a new diagnostic skill, an additional test, or a new management decision, and 16 (23%) corrected a previous clinical skill, diagnostic test, or treatment. When the cart was removed, the perceived need for evidence rose sharply, but a search for it was carried out only 12% of the time (5 searches performed out of the 41 times evidence was needed).

Conclusions.—Making evidence quickly available to clinicians on a busy medical inpatient service using an evidence cart increased the extent to which evidence was sought and incorporated into patient care decisions.

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EVIDENCE-BASED medicine calls for the integration of our clinical expertise with the best available external evidence and patients' values by translating our need for information into an answerable question and then tracking down the best information with which to answer that question.[1] Smith[2] has pointed out that although "most of the questions generated in consultations go unanswered, most of [them] can be answered, usually from electronic sources, but it is time consuming and expensive to do so" and concluded that "the ideal information source will be directly relevant, contain valid information, and be accessed with a minimum amount of work."

Given the service demands of busy clinical firms and recognizing the scant amount of time physicians can protect for reading around our patients,[3] many hospitals have made access to information quicker by placing computer terminals on or near the wards. These systems are too slow to search during rounds, and only a few team members can simultaneously view the same computer screen. We constructed an "evidence cart" that would both contain the evidence we thought might meet Smith's criteria and provide the means for accessing, projecting, and printing it and assessed whether it was feasible to use in clinical practice.

METHODS

Our evidence cart was a trolley (Supertrans Demtruck, Kentinental Engineering Limited, Sevenoaks, Kent, England) modified to house a number of resources including a notebook computer with CD-ROM drive (Toshiba Tecra 730XCDT, Hemel, Hempstead); a computer projector with a collapsing screen (Epson EMP-3300; Orbit Portable Projection Screen, Apollo Presentation Products, Leatherhead, Surrey, England); compact discs of MEDLINE, *Best Evidence*, *Radiological Anatomy*,[4] *Scientific American Medicine*,[5] and the Cochrane Library; reprints of the *JAMA* Rational Clinical Examination series[6]; a physical examination textbook[7]; and compilations of the best evidence found in response to clinical questions made by consultants (attending), house staff, and fellows, called critically appraised topics (CATs)[8] (51 topics) and the Redbook (98 topics), both of which were compiled on computer as document files and printed out as hard copies. A Simulscope (Cardionics, Houston, Tex) permitted several members of the team to listen simultaneously to the same stethoscope to examine evidence acquired during physical examination.

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Searches and Success of Searches as Defined by the Users for the Different Rounds*

Evidence Source	Posttake Rounds† (n = 8)		Team Rounds (n = 15)		Student Rounds (n = 8)		Total, No. (%) (n = 31)	
	Searches, No.	Successful Searches, No.	Searches, No.	Successful Searches, No.	Searches, No.	Successful Searches, No.	Searches	Successful Searches
Redbook	11	11	16	16	12	12	39 (40)	39
CATs	7	7	8	8	6	6	21 (21)	21
Best Evidence	. . .	. . .	5	2	4	4	9 (9)	6
MEDLINE (WinSPIRS)‡	. . .	. . .	14	8	3	2	17 (17)	10
Simulscope	. . .	. . .	4	4	5	5	9 (9)	9
Other	1 (*JAMA*[6])	1	0	0	2 (Sapira[7])	2	3 (3)	3
Total	**19**	**19**	**47**	**38**	**32**	**31**	**98**	**88**
Mean (SD) sources used per round	2.1 (1.1)		3.1 (1.5)		4.0 (2.8)		3.1 (1.1)	

*Success was defined as finding useful evidence in the time available for rounds. CATs indicate critically appraised topics. For the Simulscope, "searches" indicate number of uses and whether use was successful. Ellipses indicate data not applicable.
†Only a printout of the Redbook and the CAT was taken on posttake rounds, and some sources were not available until after the round.
‡WinSPIRS is the search engine for MEDLINE.

The Redbook summaries were peer-reviewed, 1- to 3-page summaries of critically appraised evidence created by the consultant or fellows and were available in Redbook summaries updated the month prior to service. The CATs also were created by the consultant, fellows, or house staff and were updated annually or more often if needed.[8] These summaries addressed clinical examination and diagnostic tests, prognostic markers, or treatments. *Best Evidence* contains the cumulated contents of 2 journals of secondary publication, *ACP Journal Club* and *Evidence-Based Medicine*.

Our clinical team comprised 9 first-year clinical medical students, 2 house officers, 1 full-time and 2 part-time senior house officers, 2 registrars, a research fellow, and a consultant. The study took place in April (month of use) and May 1997 (questionnaire). The cart could be used on 3 different types of rounds. First, "posttake rounds" included bedside assessment of all patients admitted to the general medicine service during the previous 8 to 16 hours and were attended by all team members who admitted patients. Second, "team rounds" included the review of each patient on our service, including bedside evaluation if necessary. Third, "student teaching rounds" were attended by the students, research fellow, and consultant, and the students presented individual patients in the team meeting room and at the bedside.

Cart use was usually precipitated by senior or junior staff asking 1 of 2 questions: "What's our/your evidence for that statement/diagnosis/treatment?" or "Is there any other diagnosis/treatment that we should be considering for this patient?"

Initial searches scanned sources of previously critically appraised evidence in the Redbook and CATs. If these sources were insufficient, *Best Evidence* was searched next. MEDLINE (with a WinSPIRS search engine) and Cochrane Library searching were used only when the former sources were insufficient.

Each use of the cart was logged by the research fellow or consultant, who recorded the source used and determined the reason for the search, whether the search was successful, and whether it affected patient care. All team members completed exit questionnaires at the end of the month and those who remained on service the following month completed a follow-up questionnaire after a weekend on-call period.

To determine the extent to which material addressed in the Redbook or CATs was available from other sources, the consultant and fellow determined the degree of overlap between these sources and *Best Evidence*, MEDLINE, *JAMA* Rational Clinical Examination series,[6] and the physical examination textbook.[7] "Time trials" were conducted in which the consultant and research fellow logged the time elapsed for a search that began in the team meeting room and searched by random allocation of order and site (either on the cart or on a reserved computer in the hospital library 4 floors away) for evidence on 5 clinical questions selected randomly from the questions that had been successfully answered during the month.

RESULTS

We cared for 166 inpatients during the month (and evaluated 30 more who were not admitted), with approximately 21 admissions during each of our 8 "takes." The evidence cart was used 98 times during rounds.

Bedside Rounds

After a single attempt to wheel the cart along the ward corridors, we kept it in the team meeting room for rounds. Hard copies of the CATs and Redbook and the Simulscope were taken on posttake rounds and to the bedside.

Examples of questions included the following: In a patient with stroke, can the clinical examination reveal the prognosis? In a patient with syncope, what diagnostic evaluation is necessary? In a patient with congestive heart failure who cannot tolerate angiotensin-converting enzyme inhibitors, will digoxin and nitrates decrease morbidity and mortality? In patients who are depressed following a stroke, do antidepressants decrease morbidity and mortality? In a patient with chronic obstructive pulmonary disease, do antibiotics reduce morbidity and mortality? Most consultations (16 of 18 times) of the CATs and Redbook were brief (<30 seconds) and were made to confirm, initiate, or change a clinical decision. Copies of the relevant evidence was distributed to team members after the round.

Team Rounds

The Redbook was used most frequently (Table) on team rounds. Although MEDLINE was also used frequently and was successful at answering 8 (57%) of 14 questions, it was so slow (minimum searching time, 90 seconds) that most searches were completed outside rounds. Mean searching times for the Redbook (39 searches) and CATs (21 searches) were similar (10.2 seconds [SD, 3.0] and 11.7 seconds [SD, 2.3], respectively). *Best Evidence* (9 searches; mean searching time, 25.5 seconds [SD, 4.2]) was usually consulted for evidence about therapy. A total of 16.4 clinical questions could be answered on the ward, using the cart, in the time it took for a round-trip to the library to answer only 1 of them.

Resource Information Overlap

Best Evidence could be used to answer the same clinical question that was answered by 7 (19%) of the 39 Redbook entries and 9 (44%) of the 21 CATs. The Cochrane Library answered 4 (10%) of the 39 questions that were answered by the Redbook and 5 (22%) of the 21 answered by CATs. Virtually all the con-

tents of the Redbook and CATs could be found using MEDLINE. Of the clinical questions addressed by the *JAMA* Rational Clinical Examination series[6] or the physical examination textbook,[7] 33% were addressed by the Redbook.

Ten percent of searches (10 of 98 searches) were unsuccessful in finding useful evidence in the time available on rounds. These searches formed the basis for "educational prescriptions"[1] to search, appraise, and prepare new CATs. Redbook and CATs had particularly high rates of successful searching because their contents were well-known by the research fellow and consultant. Seventy-nine (81%) of the 98 searches carried out were for evidence that could affect diagnostic and/or treatment decisions, and 71 (90%) of those were successful. After the evidence was found, team members (house officer, senior house officer, or registrar) were asked what impact the evidence had on patient care. Of the 71 successful searches, 37 (52%) confirmed their current or tentative diagnostic or treatment plans, 18 (25%) led to a new diagnostic skill, an additional test, or a new management decision, and 16 (23%) corrected a previous clinical skill, diagnostic test selection, or treatment decision.

Questionnaire

Of the 18 team members, 15 (83%) completed and returned the first anonymous questionnaire. All respondents reported using the Redbook, CATs, and *Best Evidence* and found them useful and easy to use. MEDLINE was the only resource considered not easy to use, with 4 (27%) of the 15 team members finding it not easy to use (split equally between medical students and house staff). Thirteen (87%) of 15 team members used the Simulscope, 11 (73%) used the *JAMA* Rational Clinical Examination series and 6 (40%) used the physical examination text. All the individuals who reported using these sources found they were easy to use and useful.

All of the 12 team members who remained on the service in the month after the cart was assessed, after the cart had been removed, returned the second questionnaire. The questionnaire was administered immediately after a 2-day postcall period, and they reported needing evidence on 41 occasions (10 occasions were observed during a similar period when the cart was available) but carried out searches only 5 times (12%).

COMMENT

We found that evidence made available within seconds during rounds altered the clinical approach of at least 1 team member 48% of the time, but when the evidence was not readily available, the clinicians rarely searched for it.

This feasibility study has several limitations. First, the clinical service has a strong evidence-based medicine orientation.[9] Whether other services with other orientations would achieve these same results is unknown. Second, the effect of evidence-based medicine on patient outcomes was not determined. However, studies suggest that our results are generalizable and that improved patient outcomes may result from this evidence-based approach. A cohort of 448 US physicians was invited to request evidence from local libraries about one of their patients.[10] Half participated, and 80% of the physicians reported that they changed the care of their patients as a result of the evidence, by reducing mortality risks in 19% of patients, changing their choices of diagnostic tests (51%) or drugs (45%), avoiding hospitalization (12%), additional tests (49%), or surgery (21%), and reducing their patients' length of hospital stay (19%). When Haynes et al[11] provided brief instruction and free search time to trainees and attending staff at a Canadian hospital, the rates with which that evidence, when pertinent to clinical decisions, confirmed (70%), initiated (18%), or changed (13%) clinical decisions were in the same range as those documented in this report. Finally, a similar rate of change (18%) in patient management, following successful searches, was reported by physicians and medical students who were provided ready access and training in the use of MEDLINE in an emergency department.[12]

The third limitation of this study is that the study is a during-after design, not a randomized trial. We do not know the extent to which other services were seeking and using evidence during these same periods. It is uncertain how the low rate of searching that occurred after the cart was removed was affected by the opposing forces of a greater recognition of the need for evidence vs the realization of the time it would take to search for it. Our descriptive observations are supported by a Canadian randomized trial[13] of "clinical librarians" joining rounds in which clinicians in the experimental group were much more likely to use the library for direct patient care (their searching frequency was 14 times that of control clinicians) and rated the librarian and library resources more highly as sources of information.

Fourth, it is not known whether clinical services busier than ours could afford the time required to find and discuss evidence in this fashion, although most searching in the Redbook or among CATs could be completed in less than 15 seconds and in *Best Evidence* in less than 30 seconds. Its feasibility would depend on a variety of factors including the number of patients and house staff.

Fifth, 2 of the major sources used in the study, the CATs and Redbook, were developed by our clinical teams for this purpose, and their contents were well-known to our faculty. However, such customized clinical information is being developed in a number of centers. Our experience, added to the prior studies, suggests that clinicians will both seek and respond to relevant evidence about their patients when the time required to access that evidence is within the bounds of feasibility on a busy clinical service. This conclusion, if it continues to be borne out, is both a cause for optimism and a call for increasingly quicker access to valid, useful evidence at the bedside and in the examining room.

The other members of Firm A of the Nuffield Department of Medicine were David Lalloo, MD, Alain Townsend, MD, Eric Valezquez, MD, Clair Thomas, Chris Turner, MB, George Ioannou, MB, James Bursell, Hsien Chew, Margaret Findley, Andreas Fox, Sarah Green, Hari Jayaram, Steven Kane-Toddhall, Clair Lloyd, and Ash Cloke, MB.

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