Affecting Residents' Literature Reading Attitudes, Behaviors, and Knowledge through a Journal Club Intervention

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Objective: *To investigate whether a limited teaching intervention, based on principles of adult education, could change residents' literature reading attitudes, behaviors, and knowledge.*

Design: *The educational intervention supplemented an ongoing bimonthly journal club. The effects on residents were studied prospectively before and four months following the intervention.*

Setting: *A community hospital internal medicine training program.*

Participants: *All 14 residents: six in the first year, and four each in the second and third years of training.*

Intervention: *A one-hour seminar incorporating principles of adult education, including the use of multiple teaching modalities. The content was based on the critical literature reading guidelines published by the McMaster group. Reinforcement of learning objectives was achieved by learner participation, written assignments, active feedback, and follow-up in subsequent journal clubs.*

Results: *Residents improved their performances on objective testing of critical appraisal knowledge by 60% ($p = 0.02$). They reported improved ability to appraise original research articles critically ($p = 0.01$) and reported spending more useful time reading. Unaffected were the total time spent reading journals, the reasons for reading them, and the perceived value of journals in "keeping up" with advances in medical knowledge.*

Conclusion: *Journal clubs are important to residents, and their effectiveness in teaching critical appraisal and promoting reading of the literature may be augmented by applying principles of adult education.*

Key words: *journal club; adult education; critical appraisal; residents; research articles.* J GEN INTERN MED 1991;6:330–334.

RESIDENCY is a time for accumulating knowledge and developing the skills and attitudes needed for practice. An important element of residency training, usually left to a journal club, is to foster desire in the trainees to keep their knowledge current, and to teach the skills required to accomplish this goal. Linzer[1] has documented the history of the journal club, noting the ubiquity of this forum in training programs and pointing out that its historical objectives (to "keep up" with the literature, to have an impact on clinical practice, and to teach critical reading skills) have persisted to the present. The biostatistical basis for critical appraisal of the medical literature has been well reviewed in two series of articles originating from McMaster University.[2-14]

Recently, Kitchens and Pfeifer[15] demonstrated that a weekly literature-based curriculum in critical appraisal can improve residents' knowledge of clinical epidemiology, but they did not assess whether this had influenced the residents' attitudes or reading behaviors. Linzer, DeLong, and Hupart[16] showed that altering a journal club's format can affect the perceived reading habits of the participants, and Linzer et al.[17] compared a journal club with a control lecture series on ambulatory issues. In the latter study, the journal club participants felt they had changed their reading habits. However, the amount of reading was unchanged, and their knowledge scores improved only slightly.

The internal medicine training program at New Hanover Memorial Hospital, Wilmington, North Carolina, is a typical small community hospital residency program with a total of 14 residents. A twice-monthly journal club has always been present and is similar to the historical journal club as described by Linzer.[1]

As part of an overall revision of the resident teaching conferences, we studied whether a limited teaching intervention based on principles of adult education[18-21] could change residents' literature reading attitudes, behaviors, and knowledge of basic principles of critical appraisal.

METHODS

Study Objectives

The objectives of the study were to determine whether a limited educational intervention could: 1) change residents' self-reported literature-reading behaviors, including time spent reading, specific journals read, and reasons for reading journals; 2) change residents' feelings of self-efficacy in their abilities to read the medical literature critically; and 3) improve residents' knowledge of basic principles of critical appraisal.

Subjects

Because of the small size of our training program, with a total of 14 residents, a randomized, controlled trial was not feasible. We therefore designed our study to evaluate all our residents' attitudes, behaviors, and knowledge twice, before and four months following the educational intervention. The demographic char-

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acteristics of our residents were diverse and representative of trainees in internal medicine nationwide. Six were in the first year of training, and eight were equally distributed between the second and third years of training. Four (all first-year) were foreign medical graduates; four were women. The average age of our residents was 31 years.

Educational Intervention

We based our teaching intervention on well-established principles of adult education,[18-21] recognizing that residents are adult learners who must perceive educational programs to be relevant to their immediate experiences and/or long-term goals. Adult learners desire to see theory tied to practice and learn best when provided with a variety of instructional formats, techniques, and stimulus materials. It is crucial to gain and keep their attention. Teaching objectives must be relevant to the learners and clearly presented. Learners' participation should be elicited on specific objective-related tasks, their performances must be assessed, and feedback must be given to and requested from the learners.

The major teaching session lasted approximately one hour and was held during the period normally devoted to journal club. The learners' attention was initially gained with an introduction presenting the reasons physicians give for reading the medical literature. The data attesting to the overwhelming size of this expanding body of knowledge were reviewed, and journal club was presented as the residents' forum: a place in which to learn, develop, and use the knowledge, attitudes, and skills needed to keep up with advances in medical knowledge through critical reading of the literature, and to learn and apply basic principles of clinical epidemiology and decision making.

Following the introduction, the learners were informed of the objectives of the session and given a written copy of them. The objectives were: 1) to present the rationale for using the medical literature to remain current as compared with other techniques; 2) to present a practical approach for keeping up with the medical literature (based on the principles presented by the McMaster group[2-14]; 3) to help the residents assess their current skills in "critically appraising" the literature (judging the "value" of original research articles and selecting journals likely to be of value to them); 4) to teach critical appraisal principles; and 5) to provide a means for residents to test practically whether the skills taught are useful to them. These objectives were selected to illustrate the practical utilities of the skills to be taught.

Next, a pretest was given to initiate selective perception and to reinforce the objectives by focusing the learners' attention on their knowledge deficits. This pretest was collected and later scored, but the specific correct answers were not provided until after the second questionnaire and the posttest (see below) had been completed.

The 15-minute lecture that followed was designed to address clearly the questions on the pretest in order to provide immediate feedback. It was supplemented by a handout and reference list and covered all the topics listed in the objectives. During the lecture, the results of the initial survey regarding the residents' own reading behaviors were presented, thereby reinforcing learner interest.

Active learner participation was achieved through the use of a brief directed project in which the learners performed the initial steps in the critical appraisal of three sample journal articles, chosen to highlight the key points of the pretest and the objectives. This was followed by a facilitated group discussion of the results of this project.

At the conclusion of the session, the residents were given a written assignment to complete before the next journal club: to try out the skills taught on a minimum of four issues of any general medical journal and to come to the next session ready to report on their experiences and to hand in a journal reading checklist provided for this assignment.

In subsequent journal club sessions, we have continued to hand out additional journal reading checklists and require that residents present their critical appraisals, not only of the articles chosen to discuss, but of the journals reviewed as well.

Outcome Measurement

Prior to the educational intervention and four months afterward, all residents completed a questionnaire asking them to rate a variety of methods for keeping up with advances in medical knowledge and their reasons for reading the medical literature, both on six-point Likert scales from 1 (not at all important) to 6 (very important). They were also asked to report the average number of hours per week spent reading medical journals and to list, in rank order, the five journals they most frequently read. Last, they were asked to rate their own abilities to assess critically the worth of medical journals, original research articles, and other articles to meet their individual needs.

A posttest addressing the basic principles of critical reading stressed in the educational session was administered four months after the pretest. The contents of the two tests were nearly identical.

A course evaluation was completed at the end of the four-month follow-up period. Each teaching modality used (lectures, classroom exercises, written assignments, handouts, and references) was individually rated by the learners on how effective it had been in teaching critical appraisal, on a six-point Likert scale, from 1 (not at all effective) to 6 (very effective). The residents also rated, on a similar scale, how well the

TABLE 1

Average (SD) Ratings of the Importance* of the Five Most Important Modalities Reportedly Used by Study Residents to Keep Up with Medical Knowledge

	Before Teaching	After Teaching
Rounds	5.71 (0.47)	4.86 (1.10)
Textbooks	5.21 (0.80)	5.14 (1.10)
Curbside consultations	4.77 (0.83)	4.25 (1.05)
Noon conferences	4.38 (1.09)	4.33 (1.09)
Journals	3.77 (1.30)	3.75 (0.97)

*1 = not at all important; 6 = very important.

TABLE 2

Average Ratings of the Importance* of the Five Most Important Reasons Study Residents Gave for Reading Journals

To review clinical knowledge	5.25
To learn about new diagnostic tests	5.19
To review basic pathophysiology of disease	5.03
To learn about new therapies	4.88
To learn about "expert management" (e.g., CPCs†)	4.65

*1 = not at all important; 6 = very important.
†CPCs = clinicopathologic conferences.

original course objectives had been met. The residents were then asked to rate how much, as a result of the course, their abilities to critically read medical journals, original research articles, and other types of articles had changed. They were also asked how much they had changed the amount of time spent reading journals and the amount of useful time spent reading journals. These assessments of change were made on a Likert scale, from 1 (no change at all) to 6 (changed a lot).

Statistical Analysis

Paired resident responses to the questionnaire and pretest versus posttest responses were compared using a paired-sample t-test. Differences between residents and between average responses to specific questions were analyzed using Student's t-test.

RESULTS

Residents reported that they kept up with advances in medical knowledge through a wide variety of modalities. Table 1 presents the five modalities rated most important both before and after the teaching intervention. There was no significant difference between the results of the two surveys. Rounds and textbooks were felt by residents to be significantly more important in keeping up than were consultations, conferences, or medical journals.

Residents indicated that many reasons for reading journals were important to them. Table 2 lists the five most important. These reasons were also unchanged by the intervention. There was no statistically significant difference between these ratings.

As a result of the educational intervention, residents significantly improved their performances in objective testing of critical appraisal knowledge. They scored an average of 42% correct on the pretest and 67% correct on the posttest ($p = 0.02$). This was associated with a significant increase in their self-reported abilities to critically appraise original research articles ($p = 0.01$) but not other types of articles, and a trend towards feeling more capable to critically appraise medical journals in general (Table 3).

Residents reported reading medical journals an average of 3.75 hours per week before the teaching intervention and 4.50 hours per week afterward ($p = 0.17$). They reported a modest feeling that they were reading more: an average change in behavior of 2.83 (on a scale of 1, no change at all, to 6, changed a lot); and a stronger feeling that they spent much more useful time reading: an average change of 4.08 on the same scale.

Residents were asked to list, in rank order, the five journals they most frequently read. The top seven are listed in Table 4. Our residents appeared to be reading an appropriate selection of journals. With the exception of a single resident, each respondent listed one of five general medicine journals as the one he or she most frequently read.

The learner evaluation of the various modalities employed in the teaching intervention is presented in Table 5. Clearly, all the methods used were well accepted. In addition, the learners uniformly felt that the intervention had effectively met its original teaching objectives.

DISCUSSION

Reading the medical literature to keep up with advances in medical knowledge is a time-honored tradition. Haynes et al.[2] have reviewed the literature regarding the self-reported reading patterns of American and Canadian physicians. They have pointed out the discrepancies between physicians' perceptions of their needs and their reported literature-reading practices.

Our residents already appeared to be developing the habits that Haynes et al.[2] report. Practicing physicians claimed to read journals between 1.5 and 3 hours per week. Our residents reported (initially) 3.75 hours. Practicing physicians were more likely to read peer-reviewed journals, as were our residents, but "throwaways" were frequently read by both groups as well. Where our residents differed from the practicing physicians surveyed was in their relatively low ranking of journals among the various means reportedly used to

keep up. This probably reflects the ready availability to residents of "experts" on rounds and for "curbside consults" and their recent dependence on teaching conferences and textbooks in medical school. An informal survey of our full-time teaching faculty revealed journals as their most important reported means of keeping up, in accordance with other surveys of practicing physicians.

Our residents read journals for many good reasons (Table 2). Their skills for critical appraisal, however, were poor, although their initial self-assessments of their abilities were unrealistically high. A recent study of a journal club manipulation, by Kitchens and Pfeifer,[15] focused primarily on the teaching of clinical epidemiology. A second, that of Linzer et al.,[17] used a standard historical type of journal club in comparison with a control, non-journal-club intervention. The latter study showed that journal club participants felt that their reading habits had changed as a result of the club, but their knowledge scores had improved only slightly, and their reported reading behaviors were unaffected.

We felt that a teaching intervention based on principles of adult education might facilitate the development of the appropriate attitudes, behaviors, and knowledge needed for critical reading of the literature. Our results support this hypothesis, in that our residents reported significant changes in their perceived abilities to critically appraise original research articles (the main focus of our intervention), but not other types of articles. They also scored significantly better on the posttest than on the pretest, indicating an objective increase in their knowledge of principles of critical appraisal. Although their time spent reading did not significantly increase, neither did it decrease as it did, over time, in the Linzer study.[17]

Our study is unique in its prospective application of an intervention designed to treat residents as adult learners. Our residents had a wide variety of backgrounds, prior experiences, and ages. The fact that they responded as uniformly as they did indicates that such a teaching intervention might be effective in improving the literature-reading attitudes, behaviors, and knowledge of other groups of residents and of practicing physicians. Our study was limited by its small size and, therefore, by its lack of a control group. However, the ability to pair resident responses obtained four months apart and the statistical and practical significance of the results obtained serve to extend the findings of prior studies of the role of journal clubs. Furthermore, our study suggests that the use of principles of adult learning behavior can be particularly effective in this setting.

TABLE 3

Average Self-reported Abilities* of Residents to Critically Assess the Worth of the Medical Literature to Meet Their Needs

	Before Intervention	After Intervention
Original research articles	3.29	4.14†
Other types of articles	4.00	4.07
Medical journals (in general)	3.86	4.36

* 1 = not at all; 6 = very able.
†p = 0.01 (paired sample t-test).

TABLE 4

Average Rankings* of Medical Journals by Residents

N Engl J Med	3.14
JAMA	2.14
Ann Intern Med	2.14
Arch Intern Med	1.00
Am J Med	1.00
Postgrad Med J	0.79
Hosp Pract	0.64

*5 = listed as most frequently read; 0 = not listed as read at all.

TABLE 5

Average Learner Evaluations* of Effectiveness of Teaching Modalities in Teaching Critical Appraisal

Lecture	4.50
Practice in class	4.10
Written assignment	4.40
Handouts	4.58
References	3.17
Prior knowledge	3.50

* 1 = not at all effective; 6 = very effective.

REFERENCES

1. Linzer M. The journal club and medical education: over one hundred years of unrecorded history. Postgrad Med J. 1987;634:475-8.
2. Haynes RB, McKibbon KA, Fitzgerald D, et al. How to keep up with the medical literature: I. Why to try and how to get started. Ann Intern Med. 1986;105:149-53.
3. Haynes RB, McKibbon KA, Fitzgerald D, et al. How to keep up with the medical literature: II. Deciding which journals to read regularly. Ann Intern Med. 1986;105:309-12.
4. Haynes RB, McKibbon KA, Fitzgerald D, et al. How to keep up with the medical literature: III. Expanding the number of journals you read regularly. Ann Intern Med. 1986;105:474-8.
5. Haynes RB, McKibbon KA, Fitzgerald D, et al. How to keep up with the medical literature: IV. Using the literature to solve clinical problems. Ann Intern Med. 1986;105:636-40.
6. Haynes RB, McKibbon KA, Fitzgerald D, et al. How to keep up with the medical literature: V. Access by personal computer to the medical literature. Ann Intern Med. 1986;105:810-24.
7. Haynes RB, McKibbon KA, Fitzgerald D, et al. How to keep up with the medical literature: VI. How to store and retrieve articles worth keeping. Ann Intern Med. 1986;105:978-84.
8. Department of Clinical Epidemiology and Biostatistics, McMaster University Health Sciences Centre. How to read clinical journals: I. Why to read them and how to start reading them critically. Can Med Assoc J. 1981;124:555-8.
9. Department of Clinical Epidemiology and Biostatistics, McMas-

ter University Health Sciences Centre. How to read clinical journals: II. To learn about a diagnostic test. Can Med Assoc J. 1981:124:703-10.
10. Department of Clinical Epidemiology and Biostatistics, McMaster University Health Sciences Centre. How to read clinical journals: III. To learn the clinical course and prognosis of disease. Can Med Assoc J. 1981:124:869-72.
11. Department of Clinical Epidemiology and Biostatistics, McMaster University Health Sciences Centre. How to read clinical journals: IV. To determine etiology or causation. Can Med Assoc J. 1981:124:895-990.
12. Department of Clinical Epidemiology and Biostatistics, McMaster University Health Sciences Centre. How to read clinical journals: V. To distinguish useful from useless or even harmful therapy. Can Med Assoc J. 1981:124:1156-62.
13. Department of Clinical Epidemiology and Biostatistics, McMaster University Health Sciences Centre. How to read clinical journals: VI. To learn about the quality of clinical care. Can Med Assoc J. 1984:130:377-82.
14. Oxman AD, Guyall GH. Guidelines for reading literature reviews. Can Med Assoc J. 1988;138:697-703.
15. Kitchens JM, Pfeifer MP. Teaching residents to read the medical literature: a controlled trial of a curriculum in critical appraisal/clinical epidemiology. J Gen Intern Med. 1989;4:384-7.
16. Linzer M, DeLong ER, Hupart KH. A comparison of two formats for teaching critical reading skills. J Med Educ. 1987;62:690-2.
17. Linzer M, Brown JT, Frazier LM, et al. Impact of a medical journal club on house-staff reading habits, knowledge, and critical appraisal skills. JAMA. 1988;260:2537-41.
18. Gagne RM, Briggs LJ. Principles of instructional design. 2nd ed. New York: Holt, Rineholt and Winston, 1979.
19. Apps JW. The adult learner on campus. Chicago: Follett Publishing Co, 1981.
20. Stritter FJ. Personal communication, 1990.
21. Knowles M. The modern practice of adult education: andragogy versus pedagogy. New York: Associated Press, 1974.

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REFLECTIONS

Overdose by Ingestion

The slender body measured toe to crown
is sixty inches long. The hair is brown
but light in front. A ponytail is wound
with soft cloth loops.

The eyes are closed. The mouth is open just
enough to see the teeth remain in place,
in fair repair. The ears are pierced
five times each.

The trachea is midline to the chest
which is without deformity. The breasts
are large in size, symmetrical except
for two paddle burns.

The abdomen is silent, soft and flat.
External genitalia: adult,
of female type. Extremities intact,
with nails cut short.

Between the feet, transparent plastic sacks
reveal the blouse and shoes. A pair of slacks
with flowered print is stuffed into a bag
and tangled with itself.

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