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## DEVELOPMENTS

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### A Poster Exercise to Teach Skills of Information Retrieval and Presentation to First-Year Medical Students

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*We developed a poster exercise for 1st-year medical students to help prepare them to deal with an ever-expanding base of biomedical information using computer software available in a medical practice almost anywhere. Students use the Grateful Med software to search the National Library of Medicine MEDLINE databases to retrieve literature references from which they explore a topic in an area of neuroscience and subsequently prepare, present, and defend their findings in a poster at a meeting intended to simulate a Society for Neuroscience poster session. The exercise gives students an opportunity to work in small groups, to examine a specific topic in depth, and with the help of a faculty preceptor, to organize information, to discover resources needed to prepare a poster presentation, and to prepare the poster. In addition, the exercise offers a forum to teach critical appraisal of the literature and for the students to discover the nature and limits of scientific data, conclusions, and knowledge. Most students applauded this "fun and low pressure" exercise, and the faculty found it "a great way to teach students."*

A burgeoning base of biomedical information challenges students and physicians alike, who must be able to access information rapidly even when away from a major medical center library. Computer-based access to an up-to-date data base may be the only realistic method to keep abreast of current developments or to obtain information for use in treating patients, whether one works in a major medical center or alone in a private practice. Although medical schools often address this need by showing students how to use resources in their own libraries, rarely are students taught how to find literature effectively when they are no longer in school.<sup>1</sup>

Active physicians, beyond accessing already published information, will often want to share knowledge they themselves have acquired. As suggested by the Panel on the General Professional Education of the Physician,<sup>2</sup> modern curricula are beginning to include exercises designed to develop communication skills.

However, what has become a popular medium for exchange at professional meetings—the poster—is not addressed by any curriculum we know of.

As Pao<sup>3</sup> observed, "medical students ... learn these skills best when instruction is viewed as aiding in the resolution of a real information need." Therefore, we attempted to create a "real need" for information by assigning students a topic to research and asking them to present their findings as a poster in a simulated professional meeting we called Topics in Neuroscience. We include training with the Grateful Med<sup>®</sup> computer program for accessing the National Library of Medicine data bases plus help in preparing and constructing a poster. The exercise, now in its 4th year, has been well received by students and faculty alike.

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<sup>®</sup>Grateful Med is a registered trademark of the National Library of Medicine.

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We thank our colleagues for the help and advice in the development of this exercise. We thank the students for their positive attitudes and suggestions and for their enthusiastic responses to the questionnaires.

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## Description

This exercise was implemented in its present form as part of a 6-week neuroscience course that forms one phase of a new curriculum developed at the University of Nebraska College of Medicine. At the beginning of the course, students received a written description of what they were to do, with a recommended timetable. The exercise began in the 1st week of the course and was completed at the end of the 5th week.

The class was divided randomly into groups of four (occasionally three), with each group guided by a faculty preceptor. A group size of four allowed students to share the work yet was small enough to facilitate the close interactions between group members that we hoped would develop. Each preceptor guided three groups, though the exercise required so little faculty time, preceptors could easily have guided more than three groups.

A preceptor might assign a research topic or allow the students to select their own, which most preferred to do. The only requirement was that the topic address some area of neuroscience, either basic science or clinical, though preceptors were urged to guide students toward topics of current interest so they could find entries in the MEDLINE data base. Most groups selected topics with a clinical orientation. Groups were allowed to change their topics if they wished, provided enough time remained to research a new topic. We trusted common sense would prevail here, and it usually did.

At the outset, students received 2 hr of training with the Grateful Med computer program written by the National Library of Medicine for accessing its MEDLINE and other data bases. We chose Grateful Med because students found it easy to learn and use. In addition, Grateful Med will be available to the students at low cost after they leave the medical center. Our training was done by the staff of our medical library and involved instructing students how to use the computer and the software plus how to organize and implement searches using MeSH<sup>\*\*</sup> headings and delimiters. At the end of the training period, most students could conduct fairly sophisticated searches on their own. For those who wanted extra instruction, Grateful Med includes an on-line tutorial.

Each group was then given a password for Grateful Med and access to computers that contained the program. Students sometimes reverted to using data base retrieval systems offered by our library, systems with which they were already familiar. We had no objection to this, provided they did at least some of their searches with Grateful Med. We stressed the value of Grateful

Med after they graduated, in that it would make the National Library of Medicine available to them from almost any telephone at low cost, provided they had a computer with a modem (a common combination these days). After the groups had located and read articles of interest, they selected an aspect of their topic they wished to present in a poster. Some groups worked independently throughout, whereas others sought help from preceptors.

Each group was given a copy of a paper by John Woolsey<sup>4</sup> on how to design and construct posters. A videotape of a lecture by Woolsey was also available for viewing. With the aid of the paper, students constructed remarkably attractive and effective posters.

Materials (e.g., poster board, glue, adhesives, banner paper), computer software (e.g., banner software, word processors, graphics software), and work space needed to construct the posters were made available at no cost to the students. We urged students not to procrastinate in constructing their posters or there would likely be frustrating delays if too many waited until the last minute to use the facilities. The recommended timetable we provided helped somewhat; some groups started early, but unsurprisingly, some waited until the very end. Nonetheless, we encountered few problems.

At the end of the 5th week, the students presented their posters in a 4-hr session that sought to emulate a minimeeting of the Society for Neuroscience. Deans, department chairpersons, faculty, and students' families were invited to attend the session, which was well publicized. Preceptors circulated among the posters as judges to question and discuss the material with the students. Each preceptor assigned a numerical score from 1 to 10 to each poster they judged, and all students in a group were given that same score unless we had evidence that a student had not participated (which has occurred only twice in 3 years). Judges' scores were averaged, and the averaged scores counted as 10% of the students' course grades. We discovered early that it was necessary to explain to students that a major function of the poster was to stimulate discussion. We had neglected to say this in our first exercise, and several students felt chagrined that people asked questions about material they thought was adequately covered in their poster. After our explanation, this problem disappeared.

## Evaluation

Subsequent to the poster session, questionnaires were distributed to both students and preceptors, soliciting opinions and suggestions about the exercise. Responses were received from 9 of 11 faculty preceptors (the remaining 2 preceptors are authors of this article) and from 91 of 120 students. Questions for students asked

<sup>\*\*</sup>MeSH is a registered trademark of the National Library of Medicine.

how many hours they used Grateful Med; whether they found the Grateful Med training helpful; when and how their preceptors helped them; and whether they enjoyed the exercise, thought it was a useful learning experience, and whether they might use the skills again. Questions for preceptors asked how often their groups sought help, whether they thought the exercise was useful and taught students skills they were likely to need in the future, and whether they as preceptors enjoyed the experience and would participate again.

## Results

**Faculty perceptions.** Of the judges, 90% rated the posters excellent (one judge rated them good), and several remarked that the student posters were as good as the best they had seen at professional meetings. One faculty member noted that posters shown in the hallways around the medical center were not always as good. When asked to select a best poster for a prize, one third of the judges said that the posters were so uniformly good they could not distinguish a best, and when judges did select a best poster, there was no agreement among the choices. Attendees expressed considerable surprise at the high quality of the posters. Several faculty members suggested posters be displayed in the halls where all could see them, and one individual requested posters he could display on his departmental bulletin board.

Nearly 80% of the preceptors thought the poster exercise was an important learning experience and should be continued. The few who disagreed usually said students' "time was better spent studying." All preceptors agreed that concepts, skills, and perspectives on research embodied in the poster exercise are found nowhere else in the curriculum, and that students would probably have occasion to use these skills later. Preceptors identified the following items as particularly valuable lessons students learned from the exercise: organizing information for presentation, working in small groups (teamwork), using computers to search the literature, learning about the nature of scientific and medical research, the rules of evidence, and the nature of scientific evidence.

Preceptors all said they enjoyed the exercise and would participate again. Comments included "great exercise"; "the idea of poster preparation and presentation is excellent"; "a great way to teach students how to research and organize a topic as well as introducing a way of presenting findings formally"; "really enjoyed doing this"; and "a truly effective teaching method."

**Students' perceptions.** More than 85% of the students said they enjoyed the exercise and saw it as an important experience that should be continued. Negative comments included "too much time for too little

gain" and "kept me from learning a broader range of information on lecture topics." When students were asked to compare the poster exercise with other learning methods, more than 40% said the exercise was equally effective as or more effective than lectures, and nearly the same percentage found the exercise equally effective as or more effective than problem-based learning or small-group discussions. Although the definition of "effective" was left to the students, however they defined the word, the poster exercise rated favorably against other methods of instruction.

When asked to rate their enjoyment of the exercise versus other instruction methods, students rated posters equal to or higher than lectures (75%), problem-based learning (55%), and small-group discussions (45%). When asked if they might use the skills again, more than 70% said yes. Comments by student about the most valuable lessons they learned matched those stated by the faculty with this added comment: "the final product was something to be proud of."

**Time requirements.** The faculty estimated this exercise required on average 5.1 hr (with ranges of 1–3 to 7–10 hr), not including the 4-hr presentation session. Students said they needed on average 14.5 hr, with 14% reporting fewer than 5 hr and only 2% reporting more than 31 hr (not counting the presentation session). We made no attempt to track actual time spent by anyone. If each student in a group invested an equal amount of time in this exercise, then groups spent on the average 58 person-hours searching the literature, reading published reports, and preparing their posters. Students said they spent on average 15% of this time actually constructing the poster, with some spending less (low: <5%) and some more time (high: >50%). Students were told in advance that a good poster need not be a work of art, but the emphasis should be on content, clear exposition, and composition.

## Discussion

We have described an exercise for medical and other health professional students that tutors them in the art of researching a topic and presenting their findings in a poster at a professional meeting. This exercise teaches skills that are not normally taught elsewhere, at least not in our curriculum. The exercise requires little faculty time, on average about 5 hr per individual, and about 14 hr on average of each student's time. The exercise was well received; almost everyone involved was enthusiastic and thought their time was well spent. All faculty members were pleasantly surprised at the high quality of the posters and the competence shown by the students when describing and defending their work.

One might argue that a contrived exercise in research like that we used is not real research, but we disagree.

Students approached the task as though it were the real thing, and judging by their responses to questions and challenges, they truly entered into the spirit of the exercise. A number of students even went beyond the literature to consult local experts and occasionally to contact individuals at other universities. We were especially pleased when a number of 2nd- and 3rd-year students returned to use our facilities to prepare posters to present the results of their summer research projects.

This exercise would be easily adaptable for students other than those in the health professions. For example, it works well with graduate students. It also works well for a variety of subjects—we used it for both general physiology and neuroscience. Faculty preceptors must be familiar with the general subject of the posters so they can advise students effectively. This means that not every faculty member can serve as a preceptor, as has been claimed for problem-based learning exercises. In addition, faculty members must be familiar with the principles of good research design and with evaluating, summarizing, and presenting research results in a poster.

We encountered few problems with the exercise. The cost was low, about \$800, which included materials for 130 students and refreshments during the poster session. This amount did not include password fees for Grateful Med or the software, which were provided by the National Library of Medicine through its branch in the Leon McGoogan Library. For first-time users, the Grateful Med software, which includes a generous amount of search time, is very reasonably priced. The cost also would, of course, be greater if computers with modems were not already available.

Scheduling space for the poster presentation was our largest headache. We found a 30 ft by 40 ft room

adequate to display the 33 posters we had. At one time, we tried dividing the class in half and scheduling presentations on two different days, but both students and faculty found that unnecessarily time consuming and not to their liking. Our current approach is to have one 4-hr presentation session. This is not sufficient time for preceptors to judge all 33 posters, so each judge grades only half the posters. To allow students to view the other posters, we schedule their time so that all four members of a group are at their poster for 2 hr for judging (the times are staggered for different groups), and for the remaining 2 hr, only one member need be present to answer questions. We also suggest judges work in teams of three or four; we have found the team approach facilitates spirited discussions and uses time more efficiently.

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