

Teaching the Basics of Clinical Pharmaceutical Care: Innovative Pharmacy Workshops at the University of Wisconsin and the University of Nebraska

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Background: Safe and effective prescription writing, using drug formularies, and managing pharmaceutical care are skills medical students need to acquire. Spurred by the Undergraduate Medical Education for the 21st Century (UME-21) grants, the University of Wisconsin and the University of Nebraska independently developed educational workshops to address these competencies. **Methods:** The University of Wisconsin's workshop is presented to medical students at the start of their third year. They receive information from pharmacists on medication errors, prescription writing, and drug formularies. A "learners guide" summary is discussed by a physician, which brings into focus the clinical application of the didactic session. A small-group session follows with hands-on experience in writing prescriptions and using formularies for three patient case scenarios. The workshop at the University of Nebraska consists of three sessions during the third-year internal medicine clerkship. In the first session, pharmacists discuss formularies, the Pharmacy and Therapeutics (P&T) committee, and the preparation of a drug monograph. During the second session, students develop an evidence-based drug monograph on a product or herbal. In the final session, the class functions as a mock P&T committee, and after listening to the drug monographs, determines whether the product should be added to the formulary. We evaluated students' satisfaction with the workshops using Likert scales and assessed students' ability to correctly fill out a prescription form. **Results:** Both workshops were well received. The mean rating at University of Wisconsin was 1.7 on a scale of 1 (satisfied) to 7 (dissatisfied), and at University of Nebraska it was 3.8 with 5 (outstanding) to 1 (unacceptable). At the University of Wisconsin, on a year-end skills assessment involving 148 students, 100% of the students properly filled out a prescription. Ninety-four percent received an excellent grade, 6% a pass, and no marginal or failing grades were given out. **Conclusions:** The workshop on pharmaceutical prescribing was rated favorably by students. After participating in the workshop, students acquired skills in prescription writing.

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The tremendous growth in the number of pharmaceuticals has had a significant effect on patient care. Medications are integral to any patient care model, but with the ever-increasing complexity of the medication choices, problems have arisen. The problems include medication errors,¹⁻⁴ drug interactions, the cost of the medications, the presence of multiple conflicting drug formularies, and the coordination of care. Traditional medical school curricula have not addressed these problems, and there is scant literature regarding educating

medical students or physicians in managing pharmaceutical care.⁵

This paper discusses two Undergraduate Medical Education for the 21st Century (UME-21)-supported workshops. One was from the University of Wisconsin and the other from the University of Nebraska. The objectives of the workshops were similar, but each school emphasized different skills. The objectives are shown in Table 1.

Methods

Pharmacy Workshop at the University of Wisconsin

Prior to beginning clinical clerkships, all 140 third-year medical students participated in this 2-hour workshop. During the first hour, basic information on medi-

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cation errors, legal requirements of a prescription, and core elements of a safe prescription were reviewed by a pharmacist. The pharmacist also presented information on drug formularies, pharmacy and therapeutics committees, formulary decision-making, and what formularies mean to prescribers. To end the didactic component, a physician reviewed a learners guide (available from the authors) to writing prescriptions and using drug formularies. The learners guide gave pragmatic advice in key areas such as the format of the prescription, supply of medication, refills, critical information, samples, and drug information sources. The learners guide brought into focus the clinical application of the didactic session and was provided in a summary format the students could carry with them on clinical rotations.

The second hour of the module consisted of small-group breakout sessions to give students hands-on experience in writing prescriptions and using formularies. Three clinical case scenarios were given to the students—each involved reviewing a patient's medical problem, then writing a prescription using our local managed care formulary. The first case involved an ACE inhibitor prescription for a diabetic patient with nephropathy and hypertension, the second involved a prescription for a proton pump inhibitor requiring a prior authorization form, and the last case was of a pediatric patient requiring an antibiotic suspension calculation. The students were required to select a covered medication from the formulary, pick appropriate dosage strengths, and properly write out a prescription including authorization of refills. They were encouraged to minimize Latin abbreviations, to omit a trailing zero after a decimal point, and to include a leading zero before a decimal point. Physician and pharmacy facilitators led the small groups (10 small groups of 14 students each) and reviewed proper prescription writing techniques and formulary usage with the students at the conclusion of the small group.

Table 1

Objectives of Pharmaceutical Care Workshops

Objective	School	
	Wisconsin	Nebraska
• Introduce basic information on medication errors, drug formularies, pharmacy and therapeutic committees, economics, and what formularies mean to prescribers.	X	X
• Emphasize an interdisciplinary model	X	X
• Teach beginning third-year medical students safe and effective prescription writing.	X	
• Evidence-based medicine skills		X
• Practice leadership and team skills		X

Workshop at the University of Nebraska

Fifteen students participated in each workshop as a component of their third-year internal medicine clerkship. The workshop was repeated six times throughout the year. In the initial session, a staff pharmacist provided a lecture describing formularies, generic substitution, pharmaceutical information resources, cost-effective analysis, structure and function of the Pharmacy and Therapeutics (P&T) committee, and the creation of drug monographs for presentation to the P&T committee.

Following this session, the students were separated into three groups to develop an evidence-based monograph on a pharmaceutical product. The monographs addressed indications, pharmacology, clinical trials, adverse effects and interactions, dosing and administrations, economics, recommendation, and literature search/bibliography. Each group was assigned a specific pharmaceutical selected to illustrate a key concept that may influence formulary decision making. Concepts included "me too" drugs, novel products for niche indications, medications with rare but serious adverse reactions, therapeutic substitution strategies, and contemporary herbal products. The students queried the literature independently and then reconvened for the second session to assemble the monograph. A staff pharmacist facilitated this session.

In a final session, the class functioned as a P&T committee. A representative from each group presented their monograph to the class. Following discussion, the class voted to add the drug to the formulary, reject the drug, or add the drug with restrictions to its use. For the herbal products, the students developed a consensus statement on the use of the product that included critiquing available evidence on safety and efficacy. A physician facilitator summarized the session by stressing the importance of making decisions using an evidence-based approach, stewardship of health care resources, working with other members of the health care team, documenting and reporting adverse drug reactions, relevance of formularies, and strategies for keeping current with pharmaceuticals. In total, the workshop required 3 hours of student time and 4 hours of faculty time per 6-week rotation.

Results

University of Wisconsin

At the University of Wisconsin, the workshop was highly rated by students. Ratings were based on a scale of 1 (satisfied) to 7 (dissatisfied), and data were collected from 135 students. Overall satisfaction was rated at 1.7 (SD=.9). Individual item ratings included effectiveness of the large-group presentations (mean=2), small-group sessions (mean=1.47), and teaching activities consistent with stated objectives (mean=1.6). Individual student comments focused in particular on the

usefulness of the small-group hands-on experience combined with clinically useful material given in the large-group session. Some students felt the information was completely new, not covered elsewhere in the curriculum, and they asked for more information and a bit slower pace. Other comments found the formulary material to be less useful, and some were disappointed that Latin abbreviations were not reviewed and were discouraged.

At the end of the third year, all students were evaluated by a year-end professional skills assessment (YEPSA). The testing station required the students to prescribe an antibiotic for a young woman with community-acquired pneumonia. They were given a drug monograph on erythromycin and had to write a prescription including the patient name, date, drug name, strength, directions, and quantity of medication. Of the 148 students tested, 94% received an excellent grade (all seven elements correct), 6% a pass (one element not correct). There were no marginal (two elements incorrect) or failing grades.

University of Nebraska

The workshop at the University of Nebraska was successful in producing quality drug monographs, literature reviews, and presentations based on the consensus judgment of the faculty. In addition, the workshop led to productive discussions and required the students to work within a team framework. After critically reviewing the monographs and literature during their role-play as members of the P&T committee, the students often voted to reject the product or place the product on the formulary with restrictions.

Student acceptance of the workshop was generally good but suffered when compared with other components of the internal medicine clerkship. Using the scale of 5 (outstanding) to 1 (unacceptable), 323 students evaluated the workshop immediately afterward and then subsequently at the end of the clerkship. For the workshop overall, the mean for the immediate evaluation was 3.8, but the mean for the subsequent evaluation fell to 2.5. Subjective comments ranged from: "excellent way to learn" to "not as bad as I thought" to "too time consuming" (and other less favorable comments) but were probably best summarized by the comment "good idea, wrong time." The final wrap-up session routinely was evaluated as the most valuable portion of the workshop (4.2) and the initial didactic session the least (3.6).

Discussion

Even though the content of the two pharmacy workshops was different, common themes emerged from both schools' experience.

The first theme was timing. Timing of the workshop was very important to the students' acceptance. The

University of Wisconsin's workshop occurred immediately prior to the students beginning their clinical clerkships and provided "just in time" training for useful skills—basic prescription writing and using drug formularies. The University of Nebraska's workshop occurred during the clinical clerkship. The students at the University of Nebraska viewed the workshop as an intrusion into clinical medicine and resulted in the University of Nebraska subsequently moving the workshop to occur in a time slot similar to the University of Wisconsin's workshop.

The second theme was relevance. Keeping the workshops clinically relevant was imperative to the students' acceptance. Both schools emphasized that medication errors are responsible for many untoward events. The University of Wisconsin used examples of the results of poor prescription writing. The University of Nebraska highlighted adverse drug events in patients and stressed the mechanism and the importance of reporting them. Both schools used local commercial formularies and real-world clinical scenarios. Drug bulletins, pharmacy report cards from local insurance companies, and requests from managed pharmaceutical plans helped reinforce the relevance of the workshops.

The third theme was physician leadership, which was critical at both schools to gaining student acceptance of the workshops. It was important to have a physician model the value of bringing pharmacists into discussions of patient care. The pharmacists proved to be effective teachers and facilitators. A success of the workshops was the medical students' appreciation of pharmacists as potential future partners in patient care. It was key to have a physician conclude the final session by relating the issues directly to patient care.

The fourth theme was the students' preference for interactive sessions. The P&T committee at the University of Nebraska provided a forum to cover specific topics. The reading of monographs required the students to critically review the supporting literature using evidence-based medicine skills. The importance of financial stewardship was addressed in the formulary discussions. Once the data had been presented, the students were not hesitant, based on either the evidence or cost information, to limit a formulary or restrict and recommend close monitoring of a given product. An example was the students' unwillingness to place sibutramine on the formulary despite the FDA approval of the product. Regarding the herbals (St John's Wart, glucosamine, etc), most of the consensus statements developed by the small groups were neutral, primarily due to the discussions of inconsistency in the manufacturing of the product and lack of a proven benefit versus risk. The students enjoyed the review of the "battles worth fighting," ie, the discussion of when is it appropriate for a physician to reject or accept a request from a managed pharmaceutical plan.

Conclusions

The results/analysis of the workshops included student surveys at both schools as well as performance data on a year-end skills assessment at the University of Wisconsin. As new teaching modules, the student surveys were initially helpful for formative evaluation and making constructive changes to the modules. The excellent grades on the YEPSA prescription-writing station validated the course content and showed retention of the material. The students received the educational module at the beginning of the year, and the testing was done at year-end. During the third year, the students received further exposure to prescription writing, but the experiences varied greatly, and the module was the only standardized and consistent instruction students received.

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