INSTRUCTIONAL DESIGN AND ASSESSMENT

Redesign and Evaluation of a Patient Assessment Course

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Objectives. To redesign a patient assessment course using a structured instructional design process and evaluate student learning.

Design. Course coordinators collaborated with an instructional design and development expert to incorporate new pedagogical approaches (eg, Web-based self-tests), create new learning activities (eg, peer collaboration on worksheets, SOAP note writing), and develop grading rubrics.

Assessment. Formative and summative surveys were administered for student self-assessment and course evaluation. Seventy-six students (78%) completed the summative survey. The mean course grade was $91.8\% \pm 3.6\%$, with more than 75% of students reporting achievement of primary course learning objectives. All of the additional learning activities helped students meet the learning objectives with the exception of the written drug information response.

Conclusion. The use of a structured instructional design process to redesign a patient assessment course was successful in creating a curriculum that succeeded in teaching students the specified learning objectives. Other colleges and schools are encouraged to collaborate with an instructional design and development expert to improve the pharmacy curriculum.

Keywords: curriculum design, patient assessment, physical assessment

INTRODUCTION

As pharmacists become more intimately involved in patient care, having the knowledge and skills necessary for patient assessment becomes increasingly important. Patient assessment has been defined as “the process through which the pharmacist evaluates patient information (both subjective and objective) that was gathered from the patient and other sources (eg, drug therapy profile, medical record) and makes decisions regarding: (1) the health status of the patient; (2) drug therapy needs and problems; (3) interventions that will resolve identified drug problems and prevent future problems; and (4) follow-up to ensure that patient outcomes are being met.”¹ In pharmacy practice, patient assessment skills are utilized to identify, resolve, and prevent medication-related problems.¹ Pharmacists may also be involved with physical assessment of patients including: inspecting skin abnormalities, and obtaining vital signs, peak flow readings, blood glucose levels, and cholesterol values.¹ For pharmacists who do not perform physical assessment, understanding the physical assessment process and the abil-

ity to interpret the documented physical findings of other healthcare professionals will be crucial to providing optimal patient care.¹ To properly train pharmacy students for these responsibilities, the Accreditation Council for Pharmacy Education (ACPE) standards mandate inclusion of a patient assessment laboratory in the clinical sciences curriculum.²

Introduction to Clinical Practice is a standalone, 2-credit-hour, required patient assessment course offered to 98 pharmacy students in the third year of the doctor of pharmacy (PharmD) program at the University of Connecticut School of Pharmacy. The course includes both a didactic and laboratory component. Traditionally, the course focused heavily on teaching students how to perform physical assessments using an approach similar to training in medical and nursing schools. Instruction in overall patient assessment was lacking and exposure to actual patient care settings where students could practice their skills was limited to advanced pharmacy practice experiences (APPEs). Previous student course evaluations reflected the students’ dissatisfaction with (1) the course design, (2) applicability of information to pharmacy practice, and (3) their achievement of course learning objectives. This article describes the redesign of a patient assessment course using a structured instructional design process and evaluation of student learning.

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DESIGN

At the University of Connecticut, the Institute for Teaching and Learning (ITL) provides pedagogical and technical support to faculty members and graduate and undergraduate students. Within ITL, the Instructional Design and Development (IDD) unit was established to introduce faculty members to instructional design and provide individual consultations as requested. Over a period of 5 months, course coordinators collaborated with the director of the IDD unit to redesign the patient assessment course. This individual served to guide coordinators through a structured instructional design process modeled on L. Dee Fink's *Creating Significant Learning Experiences*.³ A series of 5 steps are recommended to achieve successful course design and integration, and create significant learning experiences for students. Early in the process, situational factors that would influence course design and decisions, such as student and departmental expectations of the course, were assessed. Using the process outlined by Fink, course learning objectives were constructed and appropriate feedback and assessment tools were selected to adequately measure student learning. Teaching and learning activities were created that provided experiences in which students could practice skills needed to perform assessments successfully and demonstrate their achievement of learning objectives. The final step, integration, was used to assure all previous steps supported each other in achieving the overall goals of the course. The overall goal of the redesigned course was to introduce students to patient assessment skills necessary in the provision of pharmacist's care. Course objectives included:

- (1) Gather and analyze subjective and objective information relevant to patient cases.
- (2) Create a pharmacist's care plan based on findings from a patient case.
- (3) Document pharmacists' care activities using the SOAP note format.
- (4) Utilize appropriate medical terminology and medical abbreviations when documenting pharmacist's care.
- (5) Perform pertinent physical assessment techniques related to common disease states seen in pharmacy practice.
- (6) Interpret physical assessment findings documented in a medical record.
- (7) Formulate a written drug information response.

The class met once weekly for 14 weeks for a 2-hour lecture delivered by a full-time faculty member, adjunct faculty member, or pharmacy practice resident or fellow. Small group discussions were included during some lec-

tures to encourage active student participation. A 2-hour laboratory also was held weekly for 10 sessions during the latter part of the semester. Students were divided into 5 laboratory groups (10-12 students per group), which were facilitated by a pharmacy resident or fellow. Boh's *Pharmacy Practice Manual: A Guide to the Clinical Experience* was chosen as the required text for the course as the content was consistent with course learning objectives and could serve as a resource for students regarding practical examples of pharmacy practice experiences they may be exposed to during APPEs.⁴

The first 7 weeks of the course were devoted to the processes involved in providing patient care and designing a pharmacist's care plan (Appendix 1). Key concepts included interview techniques, review of the medical record, identification of medication-related problems (MRPs), use of evidence-based medicine, designing a pharmacist's care plan (eg preventing and resolving DRPs, achieving therapeutic goals), documentation, and evaluation (monitoring for efficacy and toxicity).⁵ The last 7 weeks of the course were focused on patient assessment skills related to organ systems and special populations. Topics related to organ systems were chosen based on curricular needs and a review of topics covered in patient assessment courses at other schools of pharmacy.⁶ Unlike previous offerings of this course at our institution, the organ systems portion of the redesigned course was not heavily focused on physical assessment skills. Instead, students were taught how to interpret findings from a physical examination and laboratory results. Hands-on practice of physical assessment techniques was limited to skills deemed practical to pharmacy practice, as well as those commonly taught in other schools, including checking blood pressure, heart rate, respiratory rate, and breath sounds.⁶ For physical assessment techniques not formally taught, the *Bates' Visual Guide to Physical Examination* video was viewed at the discretion of the didactic lecturer or laboratory instructor to expose students to medical terms and techniques that they might perform or observe in practice.⁷

Several learning activities were incorporated in the redesigned course (Appendix 1) and contributed to the final course grade as follows: written drug information response (6% of the grade), SOAP (subjective, objective, assessment, and plan) notes (18%), laboratory worksheets (30%), vital signs practical (6%), self-tests (10%) and 2 comprehensive multiple-choice examinations (midterm and final, 15% each). A points system was used to calculate the value of individual activities and assignments in the final grade (eg, the written drug information response was worth 60 total points, which was equivalent to 6% of the final grade).

Written Drug Information Response

Although drug information skills were taught in another course in the pharmacy curriculum, students had few opportunities to practice these skills. In addition, drug information is considered only 1 aspect of the patient assessment process. Students were assigned 1 of 3 drug information requests based on real-life patient cases and instructed to (1) identify pertinent findings from the case as it related to the proposed question, (2) review available literature pertaining to the question, (3) apply findings from the literature to their patient case, and (4) create a formal response/recommendation. In addition, students were required to document their references using the *American Medical Association Manual of Style* so that course coordinators could ensure proper citation and use of appropriate and reliable sources of information. Written responses were assessed using a rubric developed for this course.

SOAP Notes

Pharmacists' documentation of patient care activities in the SOAP note format was taught using the concept of instructional scaffolding.⁸ Instructional scaffolding refers to the "process of controlling task elements that are beyond the learners' capabilities so that they can focus on and master those features of the task that they can grasp quickly."^{8,9} Elements included in a SOAP note were reviewed and a sample SOAP note was provided based on a patient case introduced earlier in the semester. Students completed their first SOAP note with a partner during a laboratory session. Students were provided with a SOAP note template with headings (eg, history of present illness, past medical history, medications, allergies, social history, family history) and considerations for writing the note (eg, is the condition controlled or uncontrolled?; what are the monitoring parameters for efficacy and toxicity?). Using the template allowed students to focus on the content of their notes. Students completed the subsequent 2 SOAP notes individually outside of class based on patient cases and were assessed using the grading rubric developed for this assignment.

Laboratory Sessions

Laboratory sessions provided more active-learning opportunities and helped facilitate learning of patient assessment of select organ systems. Each session correlated with the concept/body system taught during the didactic lecture that week. During each session, students worked in groups to complete worksheets on activities such as evaluating realistic patient cases (later used for SOAP notes); interpreting physical examination findings; interpreting laboratory findings, medical terms, and abbreviations; and learning how to perform physical assessment

techniques (eg, blood pressure, heart rate, lung sounds) on a partner. One pharmacy resident or fellow worked with each group to provide guidance and additional explanations of important concepts.

Vital Signs Assessment

Each student was provided with a blood pressure cuff and stethoscope and step-by-step verbal instructions and physical demonstrations on how to measure blood pressure manually on a partner. Subsequently, students practiced this skill each week on a partner during the laboratory sessions. Faculty instructors, residents, and fellows observed students' manual blood pressure techniques and provided individual instruction as needed. Students' mastery of this skill was assessed during their vital signs practical at the end of the semester using a rubric developed for this activity (Table 1).

Self-tests

An online self-test to expose students to medical terminology and abbreviations was created using Blackboard Learning System 8.0.2 (Blackboard, Inc. Washington, DC). A bank of multiple-choice questions was created

Table 1. Content Areas and Point Distribution of Vital Signals Rubric

Content	Total Possible Points
General/introduction	18
<ul style="list-style-type: none"> ● Introduce self by name and position (pharmacist) ● Ask patient about consumption of caffeine, smoking, exercise within 30 min ● Ask patient about new/changes in RX and OTC medications 	
Blood pressure	30
<ul style="list-style-type: none"> ● Proper cuff size ● Proper patient positioning ● Ask that patient not speak during measurement ● Rest patient's arm at heart level ● Proper cuff placement ● Appropriate blood pressure technique ● Explain result to patient 	
Heart rate	12
<ul style="list-style-type: none"> ● Proper placement of fingers (index and middle) to palpate patient's radial pulse ● Measure rate for 30 seconds 	
Total	60

based on common terms and abbreviations relevant to the physical examination findings, symptomology, diagnostics tests, and medical procedures. The self-test could be completed an unlimited number of times, with each attempt creating a different combination of questions. The unlimited number of attempts was set to encourage students to repeat the self-test until they felt they had mastered the content. Correct answers and scores were visible to students after an attempt to complete a self-test was made. A minimum completion of 2 self-tests was required to earn full credit towards their final grade for this activity.

EVALUATION AND ASSESSMENT

Student evaluation of the course content and self-assessment of learning was performed using formative and summative surveys. The formative student survey was used to provide feedback to the coordinators 6 weeks into the semester so they could determine whether further changes to the course needed to be made. The summative student survey was designed to evaluate the students' self-rated achievement of course learning objectives, as well as opinion on the teaching and learning activities implemented in the course. This survey instrument was administered on the last day of class. To evaluate achievement of learning objectives, a Likert scale was used (1 = strongly disagree and 5 = strongly agree) to determine students' level of agreement with various statements. To evaluate student opinion of select learning activities, students were asked to "select all that apply" based on a range of possible responses including (1) helped meet the course learning objectives, (2) reinforced ideas from lecture, (3) allowed for hands on practice of important concepts, (4) has clear value for the class, (5) helped in the mastery of important concepts, and (6) I enjoyed this activity. Of the 98 enrolled students, 76 (78%) students completed the summative student survey instrument regarding self-rated achievement of learning objectives.

Students' grades and data collected from the summative surveys were used to evaluate student learning. The mean course grade was $91.8\% \pm 3.6\%$, with at least 75% of students reporting achievement of primary course learning objectives (Table 2). Students scored an average of $94.6\% \pm 4.6\%$ and $84.2\% \pm 11.0\%$ on the midterm and final examinations, respectively. The mean grade for the written drug information response was $92.7\% \pm 6.1\%$, with 49.3% of students stating this activity helped to meet course learning objectives (Table 3). The mean grades for the second and third SOAP notes were $85.8\% \pm 8.9\%$ and $93.2\% \pm 4.9\%$, respectively, with 61.8% of students stating this activity helped to meet course learning objectives. The mean grade for the vital signs assessment was

$97.5\% \pm 3.8\%$, with 63.2% of students stating this activity helped to meet course learning objectives. The mean grade for the 6 laboratory worksheets was $97.7\% \pm 1.8\%$ with 55.3% of students stating this activity helped to meet course learning objectives.

Additional questions regarding newly employed learning activities provided insight into students' opinions of these activities (Table 3). Students felt all learning activities reinforced ideas from lectures with the exception of the written drug information response. In addition, the majority of students did not feel that laboratory worksheets provided hands-on practice of important concepts. The only activities students felt had clear value in the course were SOAP notes and vital signs assessment. The activity that students enjoyed most was the vital signs assessment. Fifty-nine percent of students reported that the online self-tests helped them prepare for examinations; however, only 35.5% felt the self-tests helped them learn the material and 50% of students completed self-tests just to gain points towards their final grade. Approximately 86% of students felt able to recognize medical terms and abbreviations, while 75% felt capable of appropriately utilizing them while gathering, analyzing, and documenting patient care activities.

DISCUSSION

According to Guideline 11.3 of the Accreditation Council for Pharmacy Education (ACPE) standards, experts in educational methodology and learning should be consulted to improve educational materials, the assessment processes, and learning activities and outcomes.² As a result, coordinators of this course collaborated with the director of IDD at the University of Connecticut. He was able to guide coordinators through the instructional design process, provide objective feedback to coordinators from a nonscientific perspective, and suggest ideas on innovative teaching and assessment strategies. The director of IDD's lack of a pharmacy background was viewed as a positive aspect of this collaboration as important features of course design which otherwise may have been overlooked were brought to our attention. The collaboration generated significantly more ideas and examples of effective teaching strategies and assessment tools than otherwise would have been considered. Coordinators feel better prepared to continue the redesign process independently.

The goal of this course is to link therapeutic knowledge with clinical activities and skills performed in clinical practice in preparation for APPEs. Although some skills such as patient case assessments were incorporated throughout the curriculum, the complete process of formulating a pharmacist's care plan, including documentation

Table 2. Pharmacy Students' Response Regarding Achievement of Course Learning Objectives, No. (%)

Survey Item	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Achieved Learning Objective ^b
I am able to gather and analyze information relevant to patient cases. ^a	15 (19.7)	53 (69.7)	8 (10.5)	0	0	68 (89.5)
I am able to create a pharmacist's care plan based on gathered information from a patient case. ^a	9 (11.8)	56 (73.7)	9 (11.8)	2 (2.6)	0	65 (85.6)
I am able to document the gathered information and pharmacist's care plan using the SOAP note format. ^a	31 (40.8)	42 (55.3)	3 (3.9)	0	0	73 (96.1)
I am able to utilize appropriate medical terminology and abbreviations while gathering and analyzing information, as well as formulating and documenting a pharmacist's care plan. ^a	14 (18.4)	43 (56.6)	17 (22.4)	2 (2.6)	0	57 (75.0)
I am able to perform general physical assessment in pharmacy practice.	8 (10.5)	36 (47.4)	23 (30.2)	9 (11.8)	0	44 (57.9)
I am able to interpret physical assessment findings documented in a patient's medical record.	9 (11.8)	54 (71.1)	11 (14.5)	2 (2.6)	0	63 (82.9)
I am able to formulate and research drug information questions that I may encounter in pharmacy practice.	18 (23.7)	44 (57.9)	12 (15.8)	1 (1.3)	1 (1.3)	62 (81.6)
I am able to create a patient's problem list based on subjective and objective information.	27 (35.5)	45 (59.2)	4 (5.2)	0	0	72 (94.7)
I am able to identify reliable resources of evidence-based medicine.	14 (18.4)	39 (51.3)	17 (22.4)	6 (7.9)	0	53 (69.7)
I am able to apply the process of using evidence-based medicine in formulating a patient care plan.	8 (10.5)	47 (61.8)	21 (27.6)	0	0	55 (72.4)
I am able to recognize and interpret lab values and diagnostic tests in relation to a patient case.	5 (6.6)	38 (50.0)	28 (36.8)	5 (6.6)	0	43 (56.6)
I am able to recognize common medical terms and abbreviations.	23 (30.3)	42 (55.3)	11 (14.5)	0	0	65 (85.5)

^a primary source learning objective

^b rating 4 or 5 on Likert scale

using SOAP notes, was formally introduced and practiced. Although not all students felt they achieved all learning objectives, more practice and experience with

these activities (eg, through APPEs) may help to establish the level of confidence required to use patient assessment skills in practice.

Table 3. Pharmacy Students' Response Regarding Learning Activities, No. (%)

Survey Item	Helped meet the learning objectives of PHRM 211	Reinforced ideas from class	Allowed for hands on practice of important concepts	Has clear value for the class	Helped in the mastery of important PHRM 211 concepts	I enjoyed the activity
Graded SOAP note assignments	47 (61.8)	57 (75.0)	56 (73.7)	47 (61.8)	43 (56.6)	20 (26.3)
Laboratory worksheets	42 (55.3)	53 (69.7)	37 (48.7)	28 (36.8)	28 (36.8)	14 (18.4)
Graded vital sign assessment	48 (63.2)	44 (57.9)	61 (80.3)	42 (55.3)	46 (50.5)	39 (51.3)
Graded drug information assessment ^a	36 (49.3)	35 (37.9)	40 (54.8)	32 (43.8)	26 (35.6)	8 (10.9)

^a This question appeared on the formative survey due to the position of the activity early in the semester. The percent is calculated out of a total of 73 respondents.

Despite performing well on the vital signs assessment and rating this activity enjoyable, a lower than anticipated number of students felt they could perform general physical assessment in pharmacy practice. Rather, more students felt they could interpret findings from a medical record. This may be due to the limited number of physical assessment techniques students were taught to perform versus those they were taught to interpret. In the future, students will be taught how to perform additional physical assessment skills of the head, eyes, ears, nose, throat (HEENT) and cardiovascular system (eg, snellen eye chart screening, visual field testing, assessment of extra-ocular muscle function and visual reflexes, listening to heart sounds, evaluation of an echocardiogram, and physical assessment findings). Additionally, course coordinators explored the use of patient-simulated mannequins and have purchased blood pressure arm simulators as an initial approach to improve student learning of these skills.^{6,10} Pending the impact of the blood pressure arm simulators, additional simulators to demonstrate heart and lung sounds may be purchased.

Although students did not enjoy writing SOAP notes, they felt the activity helped to meet learning objectives. Additionally, the scaffolding technique used to teach this concept appeared successful as the mean SOAP note grades improved over time and a large majority of the students felt they achieved the corresponding learning objective. The coordinators will continue to employ the scaffolding technique in teaching SOAP notes; however, a peer-review process and completing the assignment in pairs may be employed to better allow students to recognize strengths and weaknesses within their own notes and lessen the grading workload for coordinators.

The laboratory worksheets served their original intention of reinforcing ideas from lectures; however, the majority of students felt this activity did not help them master

course content. In the future, laboratory activities will be focused more on hands-on learning and practice of physical assessment techniques. Laboratory worksheets will still be used to provide practice assessing patient cases and familiarizing students with medical terms and abbreviations.

Although only half of students felt the written drug information response helped to meet the course learning objectives, the mean score on this activity was favorable and greater than 80% of students stated they achieved this learning objective. Therefore, the activity is successful in helping students learn, although this learning activity will be moved to an alternate course in the curriculum that places more emphasis on drug information skills as it was determined to be more appropriate.

The effectiveness of online self-tests to teach medical terms and abbreviations are questionable. Students felt they were able to recognize and appropriately use medical terms and abbreviations; however the majority of students did not feel self-tests helped them to learn the material. In addition, many students completed self-tests only to gain points. Frequent use of medical terms and abbreviations during other teaching and learning strategies may explain some of the discrepancy between the majority of students meeting this course objective despite not viewing this as an effective learning tool. For these reasons, self-tests will not continue to be used in this course. If this activity is incorporated by other colleges/schools, the authors recommend either grading the self-test instead of providing points based on completion, or giving a low weight to this activity in calculating the final grade.

Course design and evaluation should be thought of as a continuum. Therefore, coordinators plan to utilize the structured instructional design process to further revise this course and gather student feedback regarding teaching and learning activities and their impact on student-rated achievement of course-learning objectives.

CONCLUSION

Our patient assessment course focused on teaching additional skills necessary for a practicing clinical pharmacist. The collaboration with an instructional design expert and use of a structured instructional design process was successful in developing an integrated course which met specified learning objectives, although individual learning activities will be revised based on the results. Based on this positive experience, we encourage other faculty members to collaborate with an instructional design and development expert.

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Appendix 1. Course Map

Learning Objective	Lecture/Activity	Assessment
1. Gather and analyze subjective and objective information relevant to patient cases.	<p>Lectures:</p> <ul style="list-style-type: none"> • The patient/pharmacist encounter • The medical record • Interpreting common labs and diagnostic data • Inpatient/outpatient nutrition assessment • General patient assessment/vital signs • Dermatology assessment • Cardiovascular assessment • Pulmonary assessment • Pediatric assessment • Pain assessment • Mental health assessment <p>Activity</p> <ul style="list-style-type: none"> • Small group discussions • Simulated medical record • Patient cases • Laboratory worksheets • Vital signs assessment • Mental status exam • SOAP notes • Written drug information response • Bates' Visual Guide to Physical Examination 	<ul style="list-style-type: none"> • Multiple choice exam • Vital signs practical (rubric) • SOAP note rubric • Drug information response rubric • Graded worksheet
2. Create a pharmacist's care plan based on findings from a patient case.	<p>Lecture</p> <ul style="list-style-type: none"> • Designing a pharmacist's care plan • Implementing and assessing a pharmacist's care plan <p>Activity</p> <ul style="list-style-type: none"> • Small group discussion • Patient cases • Laboratory worksheets • SOAP notes 	<ul style="list-style-type: none"> • Multiple choice exam • SOAP note rubric • Graded worksheet
3. Document pharmacists' care activities using the SOAP note format.	<p>Lecture</p> <ul style="list-style-type: none"> • How to write a SOAP note <p>Activity</p> <ul style="list-style-type: none"> • Patient cases • Write 3 SOAP notes 	<ul style="list-style-type: none"> • Multiple choice exam • SOAP note rubric
4. Utilize appropriate medical terminology and medical abbreviations when documenting pharmacist's care.	<p>Lecture</p> <ul style="list-style-type: none"> • The medical record • Interpreting common labs and diagnostic data • Inpatient/outpatient nutrition assessment • General patient assessment/vital signs • Dermatology assessment • Cardiovascular assessment • Pulmonary assessment • Pediatric assessment • Pain assessment • Mental health assessment 	<ul style="list-style-type: none"> • Multiple choice exam • Graded worksheet • SOAP note rubric

Appendix 1 Continues

Learning Objective	Lecture/Activity	Assessment
5. Perform pertinent physical assessment techniques related to common disease states seen in pharmacy practice.	Activity <ul style="list-style-type: none"> • Simulated medical record • Patient cases • Laboratory worksheets • SOAP notes • Online self-tests 	
	Lecture <ul style="list-style-type: none"> • General patient assessment/vital signs • Dermatology assessment • Pulmonary assessment • Mental health assessment 	<ul style="list-style-type: none"> • Multiple choice exam • Vital signs practical (rubric) • Graded worksheet
6. Interpret physical assessment findings documented in a medical record.	Activity <ul style="list-style-type: none"> • Bates' Visual Guide to Physical Examination • Vital signs assessment • Skin rashes • Lung sounds 	
	Lecture <ul style="list-style-type: none"> • The medical record • Interpreting common labs and diagnostic data • General patient assessment/vital signs • Inpatient/outpatient nutrition assessment • Dermatology assessment • Cardiovascular assessment • Pediatric assessment • Pain assessment • Pulmonary assessment • Mental health assessment 	<ul style="list-style-type: none"> • Multiple choice exam • Graded worksheet
7. Formulate a written drug information response.	Activity <ul style="list-style-type: none"> • Simulated medical record • Patient cases • Laboratory worksheets • SOAP notes • Skin rashes • Heart sounds • Lung sounds 	
	Lecture <ul style="list-style-type: none"> • Drug Information and applying evidence-based medicine to patient care 	<ul style="list-style-type: none"> • Multiple choice exam • DI rubric
	Activity <ul style="list-style-type: none"> • Patient cases • Written drug information response 	