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An Incremental Approach to Incorporating Case-based Learning into Pharmacy Curricula

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This novel course sequence utilizes an incremental approach to incorporate student-centered, case-based learning in a pharmacy curriculum. This 3-course sequence is horizontally integrated with an 11-course, integrated pharmacotherapeutics lecture sequence. The incremental design of this case-based course sequence follows an apprenticeship model of medical education of "see one, do one, teach one." The first course, "see one," introduces the entire class to pharmaceutical problem solving by examples from a faculty practitioner. The second course, "do one," utilizes a classical, small group (5–7 students) case-based learning model to develop students' knowledge and advance their approach to pharmaceutical problems. The final course in the sequence, "teach one," facilitates the development of students into self-reliant practitioners by having them complete and present cases individually. This incremental approach takes advantage of the positive attributes of case-based learning while minimizing the negative attributes.

Keywords: Curriculum; Case-based; Problem-based; ICare lab

INTRODUCTION

A goal of any school of pharmacy should be the development of students into self-directed, autonomous learners. This goal is borne out in the standard twelve outcome goals outlined by the American Association of Colleges of Pharmacy, Commission to Implement Change (1993) and subsequently adopted in 1997 in the Accreditation Standards and Guidelines for the Professional Program of Pharmacy leading to the Doctor of Pharmacy Degree of the American Council on Pharmaceutical Education (ACPE). The ACPE guidelines state that schools of pharmacy should provide "evidence that the educational process involves students as active, self-directed learners and shows a transition from dependent to independent learning as students progress through the curriculum." Considering the speed with which changes occur in the medical field, it is imperative that schools and colleges of health professions prepare today's learners to deal with problems that were not taught, yet need to be resolved.

It is incumbent upon academic programs to move students from learning the material to applying that knowledge in a meaningful way (Everwijn *et al.*, 1993). Many health professions programs, including medicine, pharmacy, dentistry, nursing and optometry are currently experimenting with variations of case-based learning to address this problem, and to prepare the learner for the unexpected (Yolton *et al.*, 2000; Marinho *et al.*, 2001; Demarco *et al.*, 2002; Pungente *et al.*, 2002; Tarnvik, 2002). Furthermore, case-based learning allows the learner to go beyond knowledge acquisition in the pedagogical process and proceed to the point of knowledge application.

The different means of teaching and learning have positive and negative attributes with respect to both faculty and learners. Some of the acknowledged challenges to faculty in using case-based learning strategies are the time necessary to conduct many small group sessions, allocating time and credits in a curriculum, securing cases, training faculty to facilitate learning and assigning grades fairly. Learners also face challenges, because they have been socialized for much of their education to be passive learners and recipients of information, and not active participants in the process. Therefore, time

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must be spent conducting "learner development" to prepare them to interact in a group, the challenges of group dynamics, and, most importantly, how this will benefit their education. According to Glasgow (1997), some medical schools found that it took as much as an entire semester to get medical students thinking and interacting within a case-based learning environment. Learners only wish to be engaged when they are prepared for the process; otherwise, they are content to continue their passive style of learning.

So how does a college or university design the curriculum to facilitate the development of students into self-directed, independent learners? This can be accomplished by weaving a case-based learning thread in the curriculum to teach problem solving over time, and to personally instill into each learner the importance of preparation for a changing world. Pharmacy programs need to provide students with a database of knowledge, teach them how to find and evaluate new information or knowledge, and, finally, to educate them to apply both of these to solve new problems and challenges. Case-based learning can serve this role within health professions' curricula. This article presents a novel approach for incorporating case-based learning within a school of pharmacy curriculum for the purpose of preparing doctor of pharmacy students for the rapidly changing healthcare environment.

The Integrated Pharmaceutical Care and Science Laboratories sequence includes Integrated Care and Science Laboratory I, II and III. These three courses are known within the school as "ICare lab," and for clarity will be referred to as ICare lab I, ICare lab II and ICare lab III, respectively. ICare labs I–III are each one-semester credit hour, case-based courses beginning in the second semester of the second professional year, and concluding in the second semester of the third professional year, of the Doctor of Pharmacy curriculum. The courses are horizontally integrated with the Integrated Pharmaceutical Care and Science (ICare) lecture series. This lecture series consists of 11 two- and three-credit semester hours lecture courses which comprise 26 semester credit hours of the 142-credit Doctor of Pharmacy curriculum. These ICare lecture courses meet 7–10 h per week for 4–6 weeks depending on the credit, and is an integration of pathophysiology, pharmacokinetics, pharmacology, toxicology, medicinal chemistry and pharmacotherapeutics. ICare lecture courses are also taught from the second semester of the second professional year through the entire third professional year. The 11 courses are: Cardiovascular; Gastrointestinal and Nutrition; Endocrine and Reproduction; Hematology and Oncology; Infectious Disease; Musculoskeletal; Neurosensory; Psychiatric; Renal; Respiratory and Special Populations.

The cases in ICare lab are selected to complement the material the students have learned in the ICare lecture series and throughout the rest of the curriculum. The ICare lectures give students an introduction and foundation for the material that is then applied to a case study in ICare lab. ICare lab case studies require the students to further research certain topics, discuss and defend their ideas, and finally formulate and present their ideas in an organized manner. The incremental design of the ICare lab sequence is based on the time-honored apprenticeship model in medical education of "see one, do one, teach one." The first course, "see one," introduces the entire class to pharmaceutical problem solving by examples from a faculty practitioner. The second course, "do one," utilizes the classical, small group (5–7 students) case-based learning model to develop students' knowledge and advance their methodical approach to solving pharmaceutical problems. The final course in the sequence, "teach one," facilitates the development of students into self-reliant practitioners by having them complete and present cases individually. Both the requirements for student performance and the complexity of cases increase incrementally in the three semester ICare lab courses sequence.

The ICare lab sequence guides the student through the sequence from teacher-centered structured learning to student-centered learning over the course of the final three semesters of didactic coursework. This gradual transition allows the student time to develop both a self-directed approach to learning and problem solving, and the self-confidence to become an independent practitioner.

METHODS

Integrated Pharmaceutical Care and Science Laboratory I (ICare Lab I)

ICare lab I, "see one," is offered in the second semester of the second professional year. The students meet as a whole class for a single 2 h period each week. The course is horizontally integrated with the ICare lecture series, so the cases cover material recently presented in the concurrent ICare lecture course. This integration allows the student to immediately begin to apply content material that they are learning. The first 2 weeks of the course are devoted to student orientation to case-based learning. Thereafter, the course coordinator and a case facilitator guide the class through one case-per-week. The facilitator acts as a model for the students' desired performance. The students then attempt to emulate the facilitator's process, and evaluate differences between their performance and that of the facilitators.

Process

The students are introduced to case-based learning by the course coordinator during the first two class periods of ICare lab I. The first period is used to introduce and discuss case-based learning and the importance of the role of pharmacists in solving patient-related problems. This orientation includes the viewing and discussing of an approximately 30-min portion of a video describing an approach to case-based learning (Barrows and MacRae, 1992). The written documentation method, a six-column pharmacist care plan (Appendix I) that is used in the entire ICare lab sequence, is also presented. Written directions for completing the six-column pharmacist care plan are also given to the students at this time (Appendix II). During the second class period, an example case is presented, analyzed and documented in the six-column pharmacist care plan format by the course coordinator.

After the orientation, the course coordinator introduces a patient case, including a chief or presenting complaint, history of present illness, past medical history, medication history, review of body systems, objective laboratory data and physical exam results, and assessment of the patient. This presentation is made to the entire class at the beginning of each laboratory period. Students then divide into their assigned groups of approximately 5–7 members, have approximately 75 min to work through the patient case by formulating a problem list and plan, and then translate that information into the standard six-column pharmacist care plan format.

Students are encouraged to use any resources available to them, and to bring these references to class. Each group submits a completed six-column pharmacist care plan to the course coordinator at the end of the 75 min. At this time, a faculty facilitator assembles the entire class and presents a prototypical solution to the case in the six-column pharmacist care plan format over a 30 min period. This faculty member is typically the one who lectured on the core topic of the case in the corresponding ICare lecture course. Students are encouraged to ask questions of the case facilitator during this presentation to assist in their learning.

The average of the six-column pharmacist care plan scores comprises 25% of the course grade and student attendance comprises 75% of the course grade. The heavy weighting of attendance was purposefully selected to emphasize the importance of attendance in the "see one" portion of the ICare lab sequence.

Integrated Care and Science Laboratory II (ICare Lab II)

ICare lab II, "do one," is offered in the first semester of the third professional year. ICare lab II utilizes the classic case-based learning model using 12 faculty members to individually facilitate a group of 5–7 students for two sessions of one and one-half hours, usually 2 days apart, each week. In ICare lab I, students analyze and solve approximately a dozen clinical problems under the guidance of faculty practitioners; thus, in ICare lab II they are ready to apply the process to more complicated cases. The student should now be prepared to more closely emulate the previously modeled activity, and begin to develop more self-directed learning with further coaching and support from the facilitator.

Three to five cases are covered over the course of the semester in ICare lab II, increasing in complexity over the semester. For example, in first semester of 2001, the first case presented was a Parkinson's disease patient, the second was a more complicated cystic fibrosis diagnosis and treatment in a baby, and the third a complex blend of diabetes, cardiovascular disease, physical injury, medication non-compliance, alcohol abuse and dysfunctional social relationships. One additional benefit of ICare lab II is that the group of 5–7 students to experience a close, direct interaction with a faculty member for 3 h weekly. This experience fosters professional trust and mentoring, or provides "educational care" in the words of Popovich (Popovich, 1991). We believe the "educational care" in ICare lab II is an integral part of our students' overall education.

Process

ICare lab II follows a classic, case-based learning model. The faculty facilitator has detailed information for the patient case in a paper booklet format. The detailed information for each patient case consists of

1. a transcript of interviews with the patient and/or a close relative of the patient
2. chronological patient assessment and progress summaries from the physician
3. actual physical examination and laboratory results and
4. suggested learning issues pertinent to the case.

These cases are also available as a searchable database which can be accessed over the internet. The sessions begin when the faculty facilitator presents a brief statement of a patient's presenting complaint. From this point forward, it is up to the students to determine what pertinent information they would like to ascertain from the patient. However, they cannot ask for information without justifying their requests for information in direct relation to the patient case. Similarly, students must provide correct explanations of the cause and effect of pathologic and physiologic events; they cannot assume or guess. The facilitator and students

identify the group's need for critical new or review information, "learning issues," that have arisen during the discussion, and the facilitator assigns these "learning issues" for the students to research before the next session. The faculty facilitator can also make the students wait for the results of certain clinical tests that cannot be performed quickly in a normal practice setting. For example, if the students justify a request for an upper gastrointestinal series, the facilitator may make them wait until the next session to review the results. In summary, the group process is designed for students to continually apply relevant existing and new information to identify, differentiate, accept and reject hypotheses about the patient case. The main duties of the faculty facilitator are to

1. keep the group focused on the problem
2. challenge unfounded assumptions and guesses
3. promote contributions by all group members and
4. lead the group to make sound hypotheses using the available objective and subjective information.

After each one and one-half hour group session, the faculty facilitator assigns each student a grade between one and nine, where nine is highest, based on each student's overall performance according to the criteria on a standardized ICare lab II grade sheet (Appendix III). When the faculty facilitator and student group concur that a particular case is completed, usually after 3–4 weeks of sessions, the students individually complete a six-column pharmacist care plan. Each column of the write-up form is allotted four points, and the average score on the three or four write-ups in the semester comprises 24% of the final grade. The average score of the student's standardized grades sheet from the weekly sessions comprises 76% of the final grade. The heavier weighting of daily activities of problem solving was purposefully designed to emphasize the importance of the *process* of solving problems in this "do one" course of the ICare lab sequence.

Integrated Pharmaceutical Care and Science Laboratory III (ICare Lab III)

ICare lab III, "teach one," is offered in the second semester of the third professional year. ICare lab III expands upon the central theme of ICare labs I and II in that students must demonstrate pharmaceutical care problem solving skills by examining patient cases and formulating a solution in the six-column pharmacist care plan format. Additionally, students are required to orally present their cases to a group of 12–15 classmates and a faculty facilitator. The presentations are designed to simulate the presentation of a patient to a health care team in a "grand rounds" environment. In order for the students to complete their problem solving skills set necessary to function as pharmacists, all work in this lab is accomplished on an individual basis. In addition to the objectives of ICare labs I and II, this course is designed to inculcate the basic skills and practical experience in formal patient presentation.

Process

Five faculty members are assigned to a group of 12–15 students each in the second semester of the third professional year. Each lab group receives case assignments 3 weeks before scheduled meeting times for presentations. Students work independently to develop a pharmaceutical care plan for the assigned patient case from the time the cases are assigned until the time the cases are presented. Instead of becoming incrementally more difficulty as the semester progresses, the cases are randomly assigned and involve patients with multiple disease states of varying degrees of difficulty. This random process of patient case assignment is used to simulate that which occurs in actual clinical practice.

During the dates designated for case presentations, each group of students meets with its assigned faculty facilitator for the oral case presentations. Presentations are delivered over a 2 week period during two meetings of one and one-half hours each per week. A standard format for the patient case presentation is demonstrated by a faculty facilitator during the orientation session during the first week of the course. A guide of necessary components of a patient presentation (Appendix IV) is given to the student to assist them in preparing for the presentation. This format is followed for all case presentations. In addition, the student summarizes the case in the six-column pharmacist care plan format, and includes a complete list of references, all of which is submitted to the faculty facilitator on the first class period designated for the current round of case presentations. Students are expected to utilize reliable sources of information, especially the primary literature when appropriate. The use of published consensus clinical practice guidelines is encouraged, and an evidenced-based approach in making recommendations is expected.

Presentations are a maximum of 15 min in length, and are followed by a 5 min question and answer session. Students are not permitted to exceed the 15 min time limit. Thus, any information not presented in the initial 15 min results in points being deducted from the overall score for the presentation. Evaluation of the patient case presentation is assessed by the course facilitator using a standardized assessment form (Appendix V). The assessment form includes a list of key points that must be included in the presentation.

Strong emphasis is placed on instilling a professional attitude, and creating a professional environment within the setting of this lab. Attendance, professional attire and lab coats are all required to simulate the clinical pharmacy practice setting to the closest extent possible. The final grade for ICare lab III is weighted with the presentation format being 25%, presentation content 50% and attendance 25% of the total. The heaviest weighting on the presentation was purposefully designed to emphasize the importance of the developing of these skills in this "teach one" course of the ICare lab sequence.

DISCUSSION

The incorporation of a cased-based learning sequence into a pharmacy curriculum can be accomplished utilizing various techniques depending on the resources available. The four major requirements for teaching courses similar to ICare labs I, III and III are

1. the availability of patient cases
2. training in student-centered, case-based learning
3. faculty time to facilitate the cases and
4. time within a curriculum.

Cases

The first requirement for a case-based learning sequence is the acquisition or development of effective cases. Many textbooks can be utilized for shorter cases that can be finished in one or two sessions. These include, but are not limited to: Waterman *et al.*, 1988; Shroeder *et al.*, 1996; Koda-Kimble and Young 2001; Swinghammer, 2002. Complete and ready to use cases can be also purchased, for example, at the *Journal of Clinical Problem-Based Learning* (*www.jclinpbl.org)*. Large cases are also available from Southern Illinois University School of Medicine, Department of Medical Education's Problem Based Learning Initiative (*www.pbli.org)*. We have utilized cases from both of these organizations with great success. Our faculty members have also created shorter cases, used in the ICare lab sequence, which are based on actual clinical scenarios encountered at their practice sites. This approach is more economical, but it can increase the faculty work load. Finally, senior or fourth professional year students on experiential rotations have also been employed to assist in case development which alleviates some of the responsibility from the faculty. The process of concisely taking pertinent information from a patient chart and developing it into a case format is also beneficial in the training of the fourth professional year, or senior, students.

Training

The second requirement for a case-based learning sequence is the training of faculty to be facilitators of student-centered learning. Faculty members are typically comfortable with a teacher-centered environment, and thus learning new techniques to become a facilitator in a student-centered model may prove challenging. Therefore, it is important to work with the faculty on a consistent basis, so they become comfortable facilitating within a case-based learning environment. Our approach to this challenge has been through faculty training sessions using materials also available from the Department of Medical Education's Problem Based Learning Initiative at the Southern Illinois University School of Medicine. This includes two video sets, one of which having an accompanying manual designed to prepare faculty to facilitate case-based learning groups. Many texts are also available to assist faculty in becoming effective facilitators of case-based learning including, but not limited to: Barrows and Tamblyn, 1980; Barrows, 1985; Alavi, 1995; Glasgow, 1997; Culter, 1998; Barrows, 2000.

It is equally important to prepare the students to function in this new learning environment, since most of them have been socialized into passive learning models during their academic careers. To this end, as previously described, the students should be introduced to case-based learning during the first few weeks of the course or course sequence.

Faculty Time and Loading

The third requirement for a case-based learning sequence is the time for the faculty to facilitate the cases. Classic case-based instruction and learning is time-intensive for the faculty, but when appropriately integrated into the curriculum it is pedagogically effective and enjoyable. The incremental approach to case-based learning is superior compared to classic case-based learning. In the strictly classic case-based learning model, there is a lag time in learning while students become accustomed to a student-centered learning approach, instead of only having to recognize or repeat facts learned in class (Barrows, 1985). The transition from large group to small group to individual learning activities does not burden the faculty and the curriculum with a large number of small-group activities, which can be very time-consuming and resource-intensive. The responsibilities for our ICare lab sequence are also carefully divided, so the time requirement for any one individual faculty member is not exceedingly heavy.

The required faculty time during ICare lab I can be distributed among the faculty members who concurrently participate in clinical pharmacy practice. Each week after the orientation class periods, it is typical for a faculty member who has lectured on a recent topic in the lecture course to lead the case for the week. Therefore, an undue burden is not placed on a single (or a few) faculty members. Depending on the size of the faculty, only one or two cases would have to be presented by any individual faculty member.

The required faculty time during ICare lab II can be distributed among the entire faculty. Since this course uses the classic small group, case-based learning approach, it has the greatest faculty time requirements. Each faculty member facilitates a group of 5–7 students for 3 h-per-week. For a typical class size of approximately 70 students, this course requires 12 faculty members to facilitate the small group sessions during the semester. However, this approach is only used one semester to minimize the increased faculty work load, while still effectively incorporating case-based learning into the curriculum.

Finally, faculty time during to facilitate ICare lab III is divided among only five faculty members who concurrently participate in clinical pharmacy practice. These faculty members meet with a group of 12–15 students for 3 h per week for 2 week periods, three times during the semester for the oral presentations. Each of these faculty members contributes a total of approximately eighteen contact hours during the semester, not including their time required to grade the six-column pharmacist care plans for their group of students.

Time in the Curriculum

The fourth requirement is assigning necessary time and credit within a curriculum to incorporate student-centered, case-based learning. This requirement was not a challenge at our school because the curriculum was developed *de novo* in 1996. However, this requirement may actually be a more significant barrier at established institutions. For example, it would require either reallocating credit from other course(s) or increasing the curriculum.

Implementing incrementally more challenging and independent case-based learning into a pharmacy curriculum does not require a three course sequence. The sequence of ICare lab I, II and III courses described here is one of many options to integrate an incremental approach to case-based learning into a curriculum. Initially, one or two 1 h course(s) using the principles of this learning approach could be utilized, followed by comparisons of its costs and benefits. Again, we believe the use of the incremental approach to case-based learning is a better approach than the classic case-based learning model by minimizing the lag time in learning associated with classic case-based learning (Barrows, 1985). Using the format of one or two 1 h course(s), the first third of facilitation could be devoted to faculty presenting their approach to cases based on current lecture material. The second third could utilize a classical approach to case-based learning. The final third could require students to apply what they have learned on an individual basis. Unfortunately, students would not get as much experience at each of the incremental levels as they would with the three ICare lab courses described here. Nonetheless, when curricular time is more limited, we believe this approach is even more beneficial. In contrast, our incremental approach facilitates the expedient transition to case-based learning by first using faculty members as models of the desired outcome, and then transitioning the student to independent learners after ICare lab II.

CONCLUSIONS

An incremental approach to incorporating student-centered, case-based learning into pharmacy curricula is a novel strategy that can be generally employed at schools and colleges of pharmacy. This incremental, case-based approach minimizes many of the problems associated with classical case-based learning, and improves upon the advantages of classical case-based learning. The initial lag in knowledge acquisition is eliminated, faculty work loads compared to a classical approach are lighter, and grading parameters are clearly defined and weighted based on their importance. All of these combined advantages should enhance faculty acceptance of the model of case-based learning for the benefit of their students. Additionally, none of the primary requirements (obtaining cases, faculty and student training in student-centered learning, faculty time to facilitate the cases, and allocating time within the curriculum) for teaching a case-based course or course sequence are insurmountable at any institution. If the benefits of incorporating student-centered learning into a curriculum can be realized by the faculty of an institution, the first and largest barrier to incorporating the case-based learning has been overcome.

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APPENDIX I. SIX-COLUMN PHARMACIST CARE PLAN

Health Care Needs (*Prioritized problems list*)	Findings (*S/O*)	Therapeutic Goals	Recommendations /Interventions	Monitoring Parameter	Monitoring End-point

APPENDIX II. PHARMACIST CARE PLAN DIRECTIONS

The Pharmacist Care Plan consists of the following six areas. The combination of all areas comprises the action plan for each health related problem identified for the patient.

1. *Health Care Need*: This section is a prioritized list of the patient's health care problems/needs. Identify all of the patient's problems whether they are or are not related to the chief complaint. One should include all problems identified even if the problem is stable and does not require any immediate action.
2. *Findings*: This section is the subjective (S) and objective (O) evidence of the identified medical or drug related problem. Subjective evidence should be listed before objective evidence. Subjective evidence is typically items that the patient and/or caregiver report, while objective findings are established through a practitioner's physical exam, diagnostic procedures and/or laboratory findings.
3. *Therapeutic Goals*: These are broad statements that give the rationale for why specific recommendations for treating the patient's health care needs are being made. Therapeutic goals should be realistic, appropriate and patient specific. For example, in a patient with atrial fibrillation having Warfarin therapy initiated, the therapeutic goal would be "to prevent pulmonary embolus and/or stroke".
4. *Recommendations*: Make a definite recommendation, both pharmacological and non-pharmacological, for treating each of the patient's health care needs. Do not list several options for therapy or dosing ranges. The recommendation should include specific drug(s), dose, route of administration, frequency of administration and duration of treatment when appropriate. Remember no treatment necessary may be a valid therapeutic intervention. When appropriate include teaching/counseling points which may be important for the patient's care.
5. *Monitoring Parameters*: List the monitoring parameters that you feel are necessary to determine the success or failure of the recommended treatment and how often you would monitor these parameters (e.g. every week, every month, every clinic visit). Monitoring parameters include both elements from the disease state (e.g. BP, heart rate) and adverse effects of the recommended therapy. Be specific regarding the monitoring parameter. Simply stating that you would monitor the Chem-7 is not sufficient. A better monitoring parameter would be monitoring the serum creatinine, BUN, etc. In addition, do not get over zealous with your monitoring; daily labs are not always necessary and can be expensive.
6. *Desired endpoints*: State the desired outcome of the recommended intervention. These should be practical, specific, and measurable. Often outcomes are confused with statements of action rather than the desired outcome. For example, in a patient with hypercholesterolemia, the desired outcome is to lower the LDL cholesterol below 130 mg/dl. The outcome is NOT to initiate fluvastatin therapy with a low fat diet; this is the action to achieve the desired outcome.

Process for Completing Pharmacist Care Plan

All identified problems, whether stable or unstable, should be included in the pharmacist care plan. Each problem should be placed in its own row with the most important (critical) problem listed first and the other problems listed in subsequent priority. The care plan should be achievable and specific for the patient. It should be developed so that any health care professional (even one who may not be familiar with the patient) could understand the care plan and carry it out in your absence.

Assessing Drug Therapy

In the provision of pharmaceutical care the pharmacist needs to make an accurate assessment of a patient's current drug therapy prior to making recommendations for further actions. The patient's current drug therapy may include prescription, non-prescription and non-conventional therapies, such as herbal products. Drug therapy assessments may be made after taking a thorough medication history directly from the patient or caregiver, or based on a history found in a patient's medical record. Once an accurate assessment of a patient's current drug therapy is made, then a plan of action or Pharmacist Care Plan can be developed.

Components

Drug Therapy Assessment consists of 10 components. All of these areas need to be evaluated for each patient, but not all areas will apply to each patient. An explanation of each component follows below:

1. *Correlation between drug therapy and medical problems*: Each prescription and non-prescription medication that the patient is taking should be identified and matched with a medical

indication. Each medication should be listed with its indication for use. In addition, you should identify if the patient has any medical problems that require drug treatment and is not receiving it.

2. *Therapeutic duplication*: Therapeutic duplications should be identified. However, you must remember that many disease states are treated with combination therapy and would not represent therapeutic duplications. Therapeutic duplication usually implies more than one drug from the same drug class or has the same or similar mechanisms of action.
3. *Non-conventional therapies*: An increasing number of persons are using non-conventional therapies which may either enhance the efficacy of conventional drugs or cause clinically significant interactions with conventional therapy. A thorough history of herbal, non-herbal or other non-conventional modalities should be obtained. This should also include the indication for which the person is using the therapy. By obtaining this information previously unidentified medical problems may be found.
4. *Drug regimen*: A complete evaluation of the patient's drug regimen needs to be completed. Is the drug dose, schedule, route of administration, etc. appropriate for the patient? Have doses been adjusted for renal and hepatic function? In this assessment, for example, you may identify problems with swallowing tablets or capsules. Therefore, an alternative dosage formulation would be appropriate.
5. *Drug allergy or Intolerance*: This area will document the patient's known or recently experienced drug allergies. In addition, the allergy should have a description of the reaction (e.g. anaphylactic or rash). One should also document drug intolerance, such as upset stomach or agitation, etc.
6. *Interactions*: This section is an important assessment area. Potential drug interactions should be identified and the interaction's clinical relevance assessed. There are many drug interactions listed in the standard reference books that are not clinically relevant. Also look for interactions between conventional and non-conventional therapies.
7. *Social or recreational drug use*: This section will document the patient's use of tobacco, alcohol or illicit drugs. The type of product (e.g. cigarettes, beer, heroin) and amount should be noted. Simply putting "social drinking" is not acceptable. Different people have different definitions of what may be socially acceptable.
8. *Failure to receive therapy*: It is important to determine if the patient actually received the drug therapy prescribed. There are many reasons why a patient may not be taking prescribed medications, such as not having had prescription filled, waiting for prescription to arrive from mail-order/online pharmacy, or the pharmacy had to order the product. In this section an assessment of the patient's compliance should also be done. If the patient is noncompliant, make a determination as to why.
9. *Financial impact of therapy*: Has a cost-effective regimen been chosen for the patient? Remember that the least expensive medication is not always the most cost effective. In addition, is the cost of therapy prohibitive for the patient? If so, what alternatives are available? This may include alternative drugs or identification of patient assistance programs.
10. *Patient knowledge of drug therapy*: Make an assessment of the degree of understanding that the patient has regarding his/her drug therapy regimen. Identify if patient education tools, such as written pamphlets or wallet cards would be beneficial.

APPENDIX III. ICARE LAB II GRADE SHEET

Group _____ Facilitator _____ Date ____ / ____ / ____

Participant A _____ Total _____ Participant B _____ Total _____

Participant C _____ Total _____ Participant D _____ Total _____

Participant E _____ Total _____ Participant F _____ Total _____

Participant G _____ Total _____ Participant H _____ Total _____

Problem Identification	Jumps in without determining whether a solvable problem exists	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Identifies problems, constraints, criteria for evaluation, prioritizes, sees situation from many perspectives
Getting the Facts	Makes assumptions, avoids learning, gives up when facts are not known	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Identifies unknowns, suggests resources, gathers the fact from resources available given limited time
Generating Hypotheses	No hypotheses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Generates several hypotheses and criteria for their assessment
Using Evidence	No evidence provided for ideas and answers	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Seeks and provides evidence for ideas, decisions, refers to literature
Committing to a Solution	Unsure, no solutions, goes along with the crowd	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Commits to a solution with confidence
Self Sufficiency	Helpless, premature closure, influenced in the wrong direction, seeks direction for everything	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Purposeful, searches broadly for information and ideas, critical, not influenced unless good evidence is provided, begins things
Carefulness	Rushes, ignores details, jumping from one task to another, illogical, incomplete	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Careful, checks, is systematic, examines logic and ethics, sufficiently complete given the time frame allowed
Attention to Task	Gets on tangents, ignores time limits	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Sustained attention, curiosity, keeps group focused on task, tangents explored only as long as they seem to assist in the task, watches time
Social Behavior	Acts in a way that hinders group cohesion, sarcasm, hostility, etc.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Helps, gets others involved with friendly, empathetic behavior, takes turn, judges ideas not people
Participation in Thought Process	Withdraws, leaves tasks, decisions, etc. to others, without questioning or contributing	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Thinks for the group, makes decisions, synthesizes, summarizes and assesses for the group

APPENDIX IV. GUIDE FOR CASE PRESENTATIONS

1. *Identifying data*—Name, age, race, sex
2. *Chief complaint (CC)*—What is bothering the patient most? (may quote his/her own words).
3. *History of Present Illness (HPI)*—Duration of present symptoms, pertinent parts of review of systems, symptom analysis (PQRST) of chief complaint, medications currently used, including OTC for chief complaint. The following is the symptom analysis:
   a. **P**—*Precipitating factors*: what brings on the symptom? What is the patient doing at the time of symptom onset?
   b. **Q**—*Quality*: What does the symptom feel like? What descriptors does the patient use to describe the characteristics of the symptom?
   c. **R**—*Relief factors*: what makes the symptom go away? What has been tried to relieve symptom? Did it work? *Radiation:* Does the symptom radiate or go anywhere?
   d. **S**—*Site (Location)*: Where is the symptom located? *Severity*: how bad is the symptom from the patient's perspective? Scale of 1–10 may be used.
   e. **T**—*Temporal factors*: How frequent is the symptom? When did symptom start (should be included in chief complaint)? Does the patient have the symptom right now? How long does each episode last, continuous or intermittent? Has the duration of the episodes changed? What time of day does the symptom occur?
   f. **A**—*Associated symptoms*: What else does the patient feel at the time of the symptom?
4. *Past medical history (PMH)*—Prior hospitalizations/operations—dates, cause, length of stay; history of measles, mumps, chicken pox, rheumatic fever, influenza, tuberculosis, hepatitis, etc.; history of hypertension, heart disease, diabetes mellitus, lipid or other endocrine disorders, emotional/psychiatric disorders, neurological disorders, gout, arthritis, blood dyscrasias, cancer, etc.; Foreign travel-malaria, cholera, or diarrheal illness; STDs; vaccination history.
5. *Medication history*—prescription and nonprescription drug use (current and recent past, dose duration, effectiveness); non-conventional therapy use; allergies; adverse drug reactions or side effects; compliance with therapies.
6. *Family history (FH)*—Parents and siblings—ages, health, and/or cause of death; family history of hypertension, heart disease, diabetes mellitus, cancer, blood dyscrasias, lipid or other endocrine disorders, migraine headaches, seizures, mental illness, neurologic or muscular disorders, alcoholism, genetic defects, gout or arthritis, etc.
7. *Social History (SH)*—use of tobacco, alcohol, and caffeine (quantity and duration), drugs of abuse; diet, exercise; employment/insurance include prescription coverage; marital status; sleeping patterns; activities of daily living.
8. *Review of Symptoms*—This includes the patient's impressions of the following elements. The practitioner's findings of the same things are found in the physical exam.
   a. *General*—chills, fever, night sweats, fatigue, heat or cold intolerance, polyuria, polydipsia or polyphagia. Recent weight gain or loss. Current weight, weight one year ago.
   b. *Head*—trauma, headaches, dizziness, syncope, memory loss, hair loss.
   c. *Eyes*—diplopia, blurred or double vision, change in visual acuity or color vision, inflammation, puffiness, need for glasses, last eye exam.
   d. *Ears*—pain, tinnitus, discharge or deafness.
   e. *Nose/throat*—rhinitis, epistaxis, nasal discharge, snoring. Bleeding gums, last visit to dentist, dental caries. Soreness, growth in mouth, hoarseness, or change in taste or smell.
   f. *Breasts*—discharge, masses or pain.
   g. *Respiratory*—cough, sputum production (color, quantity, viscosity), hemoptysis, wheezing or pain on respiration, last chest X-ray.
   h. *Cardiac*—dyspnea, orthopnea, chest pain or pressure, edema, fatigue, palpitations, last EKG.
   i. *Gastrointestinal*—dysphagia, nausea, vomiting hematemesis, jaundice, abdominal pain. Recent weight loss or gain, ascites, belching, heartburn. Change in bowel habits, stool size or color, blood and/or mucus in stool, melena, hemorrhoids, constipation, and diarrhea.
   j. *Genitourinary*—dysuria, pyuria, oliguria, nocturia, frequency or hesitancy, urgency, hematuria, discharge, history of renal stones, history of urinary tract infections.
   k. *GYN*—menarche, cycle, duration, amenorrhoea, dysmenorrhea, intermenstrual bleeding or pain on coitus. Last menstrual period, vaginal discharge, number or pregnancies, miscarriages, abortions (spontaneous or induced), complications or pregnancies and deliveries.
   l. *Extremities*—pain on walking or at rest, leg cramps, ulcers, cyanosis, edema, history or phlebitis, varicose veins.
   m. *Hematological*—bleeding, easy bruising.
   n. *Skin*—scaling, dryness, change in color, new lesions.

o. *CNS*—inability to move extremities, difficulty with gait or coordination, speech difficulties or muscle weakness. Seizures, urinary or fecal incontinence. Fainting, dizziness, tremors, loss of sensations, tingling, weakness.
p. *Psychiatric*—nervousness, anxiety, mood, fearfulness, memory, orientation to person, place, and time. Ability to perform simple math.

9. *Physical Exam*—This is the practitioner's findings upon examination of the patient. It will include objective data such as vital signs, observations and physical finding.
10. *Laboratory*—all laboratory data that has been obtained on the patient. Remember that not all labs will be pertinent to why the patient is seeking medical care.
11. *Diagnostic tests*—any diagnostic tests such as EKG, X-rays, etc.
12. *Assessment/Impressions*—This is the health care practitioner's working problem list. It is listed in order of priority of the patient's problems and includes etiology, severity, etc. It may include medications, diagnostic tests, consults, and realistic and patient-specific recommendations.
    a. Pharmacotherapeutic goals identified and appropriate.
    b. Identifying monitoring parameters and appropriate frequency.
    c. Reasonable endpoints for individual patient.
    d. Complete, appropriate, and accurate plan.
    e. A complete bibliography, from the primary literature when appropriate, should be attached and support your care plan.

APPENDIX V. CASE PRESENTATION GRADE FORM

Criteria	**Score**
Case Data Base	
Demographics & Chief Complaint identified and presented	
History of Present Illness adequately presented	
Past Medical History presented	
Family and Social History presented	
Pertinent Laboratory Findings presented	
Assessment	
Identification of problem(s)	
Description of problem(s)	
Pharmaceutical Care Plan	
Plan is patient-specific and disease-specific	
Pharmacotherapeutic goals identified and appropriate	
Recommendations are realistic and patient-specific	
Monitoring parameters and frequency are appropriate	
Methods to obtain data are practical	
Endpoints are reasonable and appropriate for the patient	
Plan is complete, appropriate, and accurate	
Presentation	
Presented in a professional manner	
Organization (logic, flow, concise)	
Clarity of the speaker (volume, pronunciation, terminology)	
Timing and pace of presentation	
Non-verbal communication (eye contact, mannerisms)	
Response to questions	
TOTAL	

Presenter's Name _____

Case Title _____

Comments: _____

Scoring		
	Excellent	5
	Good	4
	Adequate	3
	Less than Adequate	2
	Poor	1

Evaluator's Name _____

Date _____ Time Start _____ Time End_____

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