

# Implementation of a Capstone Pharmacotherapeutics Course in the Entry-level Doctor of Pharmacy Program

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This project was to implement a “capstone” pharmacotherapeutics course to: (1) Develop students’ ability in assembling knowledge from previous courses; (2) Expose students to different aspects of pharmacy practice. The course consisted of 3-h lecture, 1-h recitation and 1-h group project per week. Topics covered include: patient management issues in ambulatory care, critical care, long term care and hospice care, and providing pharmaceutical consultation. Students were divided into groups and assigned projects to complete and present towards the end of the semester. Projects included developing drug formulary kits, medication utilization criteria, education symposiums and providing medical–legal and marketing consultation. Overall, students performed well in the course (class average 84%). Students provided neutral feedback to whether the course had achieved its objectives. More assessment in problem-solving skills and student feedback needs to be obtained in order to justify whether this course helps students to apply the growing body of pharmaceutical knowledge.

*Keywords:* Pharmacotherapeutics; Capstone course; Doctor of pharmacy program; Pharmaceutical care

## INTRODUCTION

In 1997, the American Council on Pharmaceutical Education (ACPE) recommended that entry-level Doctor of Pharmacy (Pharm.D.) curriculum provide students with a core of knowledge, skills, abilities, attitudes and values that are necessary for the provision of pharmaceutical care (American Council on Pharmaceutical Education, 1997). Pharmacotherapeutics courses and clinical clerkships have long been two crucial components of all pharmacy

curricula, where students apply principles of pharmacology, medicinal chemistry and other pharmaceutical sciences to the management of patients with different disease states. Pharmacotherapeutics courses accomplish this in a classroom setting and clinical clerkships achieve this goal with “real-life” scenarios. Traditionally, pharmacotherapeutics courses of most pharmacy curricula are organized by organ systems, where students learn disease states management in segregated components. However, in everyday clinical practice, it is unlikely that patients will have only one pharmaceutical problem. Multiple disease risk factors, actual diseases states, social, economical and psychological factors intertwine with each other. In certain circumstances, the most optimal textbook treatment may not be the most optimal therapy for a specific patient because of socioeconomic factors. To provide the most optimal pharmaceutical care, practicing pharmacists must understand the inter-relationships of these factors. Therefore, pharmacy students often feel lost on their first clinical clerkship, despite successfully completing all their didactic courses. This problem becomes more apparent as the body of health science knowledge continues to expand.

Therefore, as part of their accreditation standards, ACPE also recommended the use of new teaching strategies in order to nurture students’ problem-solving skills and critical thinking abilities. The goal is that students will be able to accommodate the rapidly growing volume of pharmaceutical knowledge and be better equipped to provide pharmaceutical care (American Council on Pharmaceutical Education, 1997). Strategies that have been incorporated by different pharmacy curricula include the

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use of small group recitations to re-enforce lecture materials, problem-based learning and combining pharmacology, medicinal chemistry and pharmacotherapeutics courses so that students can better visualize the connection of the basic science concepts and the application of pharmaceutical principles to patients (Strand *et al.*, 1987; Winslade, 1994; Nii and Chin, 1996; Herrier *et al.*, 1997; Ives *et al.*, 1998; Lubawy and Brandt, 1998; Shih *et al.*, 1999).

During the process of implementing an entry-level Pharm.D. curriculum at our college, one of the innovative strategies used to nurture students' problem-solving skills and critical thinking abilities, was the development of a pharmacotherapeutics capstone course (one of the last didactic courses that students complete before starting clinical clerkships). The objectives of this course were to:

1. Develop students' ability in combining and utilizing knowledge learned from different courses in the curriculum in providing pharmaceutical care for complicated patients with multiple medical problems.
2. Expose students to different aspects of clinical pharmacy practice.

The course was designed as a simulated clerkship in a classroom to help students prepare for their clinical clerkships. This manuscript presents the structure and the implementation of the course, as well as the first year experience of delivering the course.

## COURSE DESIGN

This was the last of a sequence of five pharmacotherapeutics courses. Each course lasted one semester starting from the spring semester of the first professional year (the third year of a six-year program). Previous pharmacotherapeutics courses dealt with treatment of different disease states. The course was offered during the spring semester of the third professional year (the fifth year of the six-year program) of the entry-level Pharm.D. curriculum, prior to students beginning clinical clerkships in their fourth professional year. Throughout the course, students used problem-based learning and case study discussions to apply knowledge acquired from previous pharmacotherapeutics, pharmacology, medicinal chemistry, pharmaceuticals and social administrative sciences courses. This is the only course in our curriculum that utilizes problem-based learning to deliver the majority of the materials. Other courses in our curriculum utilize problem-based learning to deliver only one or two selected topics within the course. This course

consisted of 3-h lecture, 1-h recitation and 1-h group project working time per week.

## Lectures

A portion of the lecture hours was dedicated to cover selected topics that were considered essential for general pharmacy practice and not covered in previous pharmacotherapeutic courses. These included nutritional therapy (6 h), alternative medicine (9 h) and organ transplant (3 h). The rest of the lecture time was divided into modules based on different pharmacy practice settings. The role of pharmacists and specific patient management issues were discussed in each module. These lectures were delivered mostly using problem-based, case-oriented approach, which required knowledge learned from previous courses to be recalled in order to discuss these cases. New patient management issues that were pertinent specifically to these settings (e.g. sedating and paralyzing patients in critical care setting) were also discussed. These modules included: ambulatory care (9 h), critical care (6 h), long-term care (3 h), hospice care (3 h) and providing pharmacy consultation (e.g. medical writing, marketing/advertising/educational consulting) (3 h). The following are examples of how two of these practice setting-oriented lectures were delivered.

### *Providing Pharmaceutical Care in Ambulatory Care Setting (9 h)*

The ambulatory care lectures cover topics that are relevant to both the community practice and outpatient clinic setting. The students were introduced first to the issues involved in developing and implementing an ambulatory care practice. These included issues such as the type of service to choose, advertising and marketing, follow-up appointments, work atmosphere, documentation and reimbursement. An overview of the types of practices that are in place throughout the country helped students understand the various ways pharmaceutical care can be implemented. One example presented was the development of disease management programs within a community pharmacy (i.e. diabetes, asthma, hypertension, etc.), reimbursement for these services and their desired outcomes (i.e. reduced hospitalizations for asthmatics and decreased incidence of diabetic foot ulcers). Students were educated on the benefits and barriers of creating a disease management program. The students were also reminded of the medical-legal aspects of the pharmacist-patient relationship and the contractual agreement that exists when a pharmacist agrees to provide pharmaceutical care. Information on pharmacy certification was incorporated into this portion of

the lecture, including disease state management (DSM) examinations and board certification (Board Certification Pharmaceutical Specialist, BCPS). The goal was to provide students with information on how to continue their education and expand their knowledge base after completing their education. The community component of this course focused on the changing and evolving role of the community pharmacist and also included a 2-h discussion on smoking cessation. This is an area that was not addressed in previous pharmacotherapeutics courses and is applicable to a patient in any setting. Pharmacists play a vital role in providing smoking cessation to patients, specifically with the nonprescription nicotine products as well as non-pharmacological therapy, including behavior techniques and lifestyle modification. The remaining ambulatory care lectures focused on the methods used to monitor for drug efficacy or toxicity in an outpatient setting. Students have been conditioned to rely solely on laboratory values in monitoring patients' drug therapy. However, this information may not always be available; therefore, the goal was to have the students think about other ways to monitor a patient, for example, asking a patient on anticoagulation therapy about bleeding episodes or bruising when an International Normalized Ratio value is not readily available. Other topics in the ambulatory care series included preventative care and wellness (cancer screenings and vaccinations), medication adherence (medication regimen compliance in patients with human immunodeficiency virus was used for discussion) and the inappropriate versus appropriate use of polypharmacy. More cases were provided to the students during their recitation hour to review smoking cessation issues and the development of pharmaceutical care plans for ambulatory patients with several health problems.

#### *Providing Pharmaceutical Care in Critical Care Settings (6 h)*

The initial lecture first introduced students to the difference between a critical care unit and other medical units in a hospital and the role of the clinical pharmacist in a critical care unit. Literature on how critical care pharmacists might improve patient outcome were cited. The principles of pharmacokinetics and pharmacodynamics of medications used in critically ill patients were reviewed. Management of several commonly encountered pharmaceutical problems in a critical care unit was then discussed using a case based approach. A faculty member presented a patient case with the specific pharmaceutical problems to be discussed, and the management of these problems was discussed in detail to lead students to develop a pharmaceutical care plan for the patient.

Pharmaceutical problems discussed included: shock (septic, cardiogenic and hypovolemic), respiratory distress (severe asthma/chronic obstructive pulmonary diseases, pneumonia, pulmonary hypertension, adult respiratory distress syndrome), sedation, paralysis, stress ulcer prophylaxis, deep vein thrombosis prophylaxis and nutritional supplementation. Among these disease states, stress ulcer prophylaxis, deep vein thrombosis prophylaxis and nutritional supplementation had been taught prior to the critical care module. Students were expected to review this information and understand important highlights related to critically ill patients. More cases were provided to the students during their recitation hour to develop a pharmaceutical care plan for critically ill patients with multiple health problems.

#### **Recitation**

Recitation sessions were case study workshops designed to further develop students' ability to assess a patient case, select the appropriate therapy, determine reasonable alternatives for therapy and justify their choices utilizing their knowledge of common disorders. With most recitation, students were provided a patient case at least one week prior to the session. Students were expected to develop a pharmaceutical care plan for the patient prior to coming to recitations. Content of the pharmaceutical care plans included a list of pharmaceutical problems, pharmacotherapeutic goals, recommended therapy, specific endpoints, monitoring parameters and frequencies, and, if applicable, patient counseling information. These pharmaceutical care plans were collected at the recitation. During the session, students participated in active discussions with peers in groups of four to five and the facilitator about the patient case. Unlike recitation in previous pharmacotherapeutic courses, cases in this capstone course dealt with patients with multiple medical problems. These problems may or may not have been discussed in this course. For problems that students had not previously learned, they were expected to utilize problem-based learning approach to develop a treatment plan for that particular problem.

#### **Group Projects**

One of the special features of this course was the incorporation of student group projects. Students were divided into groups of four to five (same as their recitation groups) and were assigned projects to complete. The last three recitation sessions were dedicated for each group to present their projects. The goal of these projects were to expose students to other responsibilities of clinical pharmacists,

as well as to enhance their problem solving skills and ability to work as a team. Each group was randomly assigned, during the first recitation section, a project. No two groups have the exact same project. The projects, consisted of the following five categories: (1) Preparing a report for presentation to a Hospital Pharmacy and Therapeutics Committee, regarding whether a certain drug should be included in the hospital formulary; (2) developing a drug education program for a different audience, such as physicians, nurses, pharmacists, other health-care professionals or patients; (3) developing medication utilization evaluation criteria; (4) evaluating medical-legal cases; (5) developing a pharmacy consultation plan (e.g. marketing/launching plan of a new medications) or a pharmacist-directed clinic. Students worked on the projects for the entire semester. They were given 1 h per week as part of the scheduled class time to meet with their groups to work on the project. Each group presented their project during the last three recitations with 20 min for presentation and 5 min for questions and answers from audience. Students were encouraged to use different kinds of audiovisual aids to help them with their presentations (i.e. PowerPoint, transparencies, posters or handouts). The entire clinical faculty was available to provide guidance upon request by students. Specific assessment tools were developed for each type of project for student assessment. Peer evaluation was also performed. Appendix I is a list of group project topics.

### STUDENT ASSESSMENTS

The course had two multiple-choice examinations at midterm and end of the semester, each worth 25% of the total course grade. The examinations focused on factual materials presented in class. The recitation cases were worth 30% of the overall course grade. The group projects were worth 20% of the course grade. Specific grading criteria, including peer evaluation, for each type of project were developed (Appendix II).

### STUDENT FEEDBACK

Students completed a feedback survey (Appendix III) evaluating whether this course helped them to assemble information together and prepare for clerkships. The survey was administered one semester after the completion of the course. Only students who had completed at least one clinical clerkship during the time of survey administration were asked to complete the survey. Sixty-seven out of 145 students in the class returned their survey (46%).

TABLE I Student feedback

	Mean $\pm$ SD
The course helps me to gain an appreciation of clinical pharmacy practice in different settings.	3 $\pm$ 1.3
The course makes me feel more oriented on day 1 of my first clerkship.	3.3 $\pm$ 1.2
The course gives me a better understanding on how to approach assignments and projects during my rotation.	2.8 $\pm$ 1.3
The course helps me to relate didactic information that I have learned from other courses to real patients.	2.9 $\pm$ 1.2
The group projects enhance my skill in working with other people.	3 $\pm$ 1.3
The course enhances my problem-solving and critical thinking skills.	3 $\pm$ 1.1
The group projects enhance my presentation skills	2.9 $\pm$ 1.3
The concept of group projects should be incorporated into other Pharmacotherapeutics courses.	2.9 $\pm$ 1.3

1: Strongly AGREE; 5: Strongly DISAGREE.

The average score (mean  $\pm$  SD) of each question are represented in Table I. Using a Likert Scale of one (strongly agree) to five (strongly disagree), scores to all questions clustered around three, indicating students had neutral feeling regarding whether this course helped them to pull information together and prepare for clerkships. When asked what aspect of the course they liked most, two students stated that the course helped them to relate topics that they had previously learned, five students liked the selection of topics covered in the course, three students liked the abundant opportunities to make presentations, three students stated that they liked the group projects and two students stated that they liked the course in terms of helping them to develop critical thinking and problem solving skills. When asked what aspect of the course they like the least, two students said that they did not like the group projects, two did not like alternative medicine, three stated that too much of the course grade was dependent on group work and it was unfair as some students might still get a good grade even if they did not contribute to the group. One student stated that the didactic portion of the course was disorganized and difficult to follow. It is important to realize that the survey was administered when only 67 (out of 145 students) have completed at least one clinical clerkship (students who did not complete any clerkship during time of survey administration were told not to return their survey). It is possible that students may not have fully appreciated the benefit (if exist) of the course at this stage. A similar survey administer after students had completed all clerkship may reveal different results.

## COURSE GRADE DISTRIBUTION

This course was offered for the first time in the spring semester 2001. There were 145 students enrolled in the course. The overall class average was  $84 \pm 7\%$ . The average grade for group projects was  $88 \pm 14\%$  and the average grade for recitation was  $95 \pm 6\%$ . Twenty-four students (17%) earned an A, 38 (26%) earned a B+, 55 (38%) received B, 20 (14%) received C+, 5 (3%) received C, 2 (1%) received D and 1 (0.7%) student failed the course.

## DISCUSSION AND CONCLUSION

Pharmacotherapeutics knowledge continues to expand. Faculty at colleges and schools of pharmacy find it increasingly difficult to incorporate all the important material into confined class hours. It is, thus, important to develop innovative teaching methods and settings for students to develop strong problem-solving and critical thinking skills, in order to become life-long learners. Numerous pharmacy programs have incorporated the use of small group recitation, problem-based learning session and/or other methods to nurture students' ability to solve clinical problems (Strand *et al.*, 1987; Winslade, 1994; Nii and Chin, 1996; Herrier *et al.*, 1997; Ives *et al.*, 1998; Lubawy and Brandt, 1998; Shih *et al.*, 1999). This article describes an attempt to develop a capstone pharmacotherapeutics course, to nurture students' ability to apply information to complicated patient cases, in order to facilitate a smooth transition to clinical clerkships. The first time experience with the course was described. Overall, students felt neutral about the learning experience. At the time when the feedback survey was administered, only 67 out of 145 students had completed at least one clinical clerkship. There may be too few students to represent what they feel about the course. However, it is also possible that the students truly feel neutral about the course. They may not, at this stage, have the experience to recognize the benefit or the downfall of such a capstone course. In addition, this course was a new concept to both the faculty and the students; it may require adjustment from both parties. Therefore, the course may in fact, as indicated by some students in their feedback survey, appeared to be disorganized at time or the faculty may have incorporated too much materials into the course. At this point, the faculty has decided to continue offering this course. Based on the overall course average, students appeared to master the subjects taught in this class well. However, to truly evaluate whether students' critical thinking and problem solving ability has improved, objective measurement of outcomes needs to be implemented. The college of pharmacy has decided to implement

a structured group dynamic/problem solving assessment examination in the curriculum at the end of each academic year for all students, to allow evaluation of each professional year. This data may reveal a progression of improvement in problem solving and critical thinking skill from year to year. More student feedback will also need to be obtained over several years after the majority of them had completed clinical clerkships experience.

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## APPENDIX I

### List of Group Projects

#### *Preparing a Report for Presentation to Hospital Pharmacy and Therapeutics Committee*

Your hospital is reviewing the following classes of agent and have to make recommendations to the Pharmacy and Therapeutics Committee regarding which one (or two or three or all) to include on

the hospital formulary.

1. HMG-CoA reductase inhibitors
2. Proton-pump inhibitors
3. ACE inhibitors
4. Angiotensin II receptor antagonists
5. Fluoroquinolones
6. Calcium channel blockers
7. Beta-blockers
8. Thrombolytics
9. Glycoprotein IIb/IIIa receptor antagonists
10. Low molecular weight heparin
11. Third generation cephalosporins
12. Second generation cephalosporins
13. COX-2 inhibitors
14. Oral and IV antifungal (do not include topical products)
15. Corticosteroids inhalers
16. Sulfonylurea

#### *Developing Drug Education Program for Different Audience*

1. Cardiac Safety and Antipsychotic Therapy: focus on QT prolongation: presented to pharmacists
2. Infertility patient support group: focus on discussion of medications that are used for infertility (including new drugs in the pipeline).
3. Use of prostaglandin and prostacyclin in the management of pulmonary hypertension: nursing in-service
4. Post-organ transplant patient support group: focus on discussion of medications used (including new drugs in the pipeline)
5. Poison Control Day: patient education regarding emergent management of poisoning.
6. Updates on the new ACLS guidelines: presented to physicians.
7. Important grapefruit juice-drug interactions: presented to pharmacists.
8. Multiple sclerosis patient support group: focus on discussion of medications that are used for multiple sclerosis.

#### *Developing Medication Utilization Evaluation Criteria (drug Utilization Guidelines)*

1. Glycoprotein IIb/IIIa receptor antagonists
2. Thrombolytics
3. Low molecular weight heparin
4. G-CSF
5. Erythropoietin
6. Stress ulcer prophylaxis

7. IV amiodarone
8. Liposomal amphotericin

#### *Evaluating Medical-Legal Cases*

##### CASE 1

According to the records, at the time of these occurrences on July 8, 1997, EJ a white male 29 years of age presented to his HMO for complaints associated with chigger (insect) bites on his ankles. His past medical history reveals no significant problems. His laboratory tests were WNL. He denied smoking and states he drinks one beer daily. The physician prescribed prednisone 280 mg to be taken over a period of ten days. EJ returned to his HMO complaining of joint pain in both knees, both hips and his lower back. Over the next 14 months, HMO physicians administered medications, physical therapy and epidural injections. Additionally, he received more corticosteroids in the form of Depo-Medrol 120 mg administered on both August 21 and 29, 1998. His pain worsened. An MRI was performed on September 4, 1998 and according to the records EJ was told that nothing could be done and he would have to "live with it" as it is a condition that would flare up and then go away, throughout his lifetime.

EJ changed employment with a different health plan, and new health provider. He was referred to a neurologist who ordered a MRI. The neurologist diagnosed that EJ was suffering from bilateral avascular necrosis and referred him to an orthopedic surgeon. The orthopedist indicated that the avascular necrosis was visible in the early stages on the January, 1999 films taken by his former HMO. As a result of the severe avascular necrosis EJ underwent two total hip replacements, one taking place on April 4, 1999 and the other on May 27, 1999.

1. Briefly discuss avascular necrosis including possible etiologies and their mechanism(s).
2. Based on standard algorithms, state your opinion concerning the relationship of the corticosteroids to EJ's avascular necrosis; take into consideration the dose of the corticosteroids
3. Provide your opinion concerning the adequacy of the package insert warnings concerning corticosteroid induced avascular necrosis
4. As the above is a large task, I am primarily interested in your search strategies including all drug information sources utilized and the exact reason(s) for the order of search.
5. Provide a bibliography of pertinent references utilized to arrive at your answers. No abstract

will be accepted or should be used as a source to answer the questions.

#### CASE 2

JR

DOB—January 14, 1974

Wt = 55 kg

According to the records, on November 10, 1994, JR suffered a grand mal seizure. Ten days later she experienced a second seizure and was prescribed Tegretol 200 mg 3 times daily. Several weeks later while on a vacation, outside of the U.S., she developed a rash that covered much of her body. A physician in the Bahamas advised her to stop Tegretol. Shortly thereafter she returned home and because of ill health she went straight to the hospital and was diagnosed with fulminant hepatitis with encephalopathy. On December 4, 1994 she underwent orthotopic liver transplantation. Her physicians diagnosed her end stage liver disease as resulting from Tegretol induced hepatitis. She again became acutely ill on December 20, 1994 and a liver biopsy revealed a second episode of fulminant hepatic necrosis. At that time she also exhibited hepatic encephalopathy. She underwent a second orthotopic liver transplant on Jan. 2, 1995. JR developed severe postoperative complications including CMV Colitis, which resulted in colectomy and ileostomy, respiratory distress with prolonged ventilation ultimately requiring a tracheostomy, and Stevens–Johnson Syndrome. JR continues to have numerous complications including severe infections, nephrotoxicity, pancreatitis, liver abscesses, recurrent pulmonary infiltrate with edema, severe anemia and depression.

1. Fully describe the various forms of hepatotoxic reactions associated with carbamazepine including possible mechanism(s).
2. Based on standard algorithms, state your opinion concerning the relationship of carbamazepine to the events described.
3. Provide your opinion concerning the adequacy of the 1994 package insert concerning carbamazepine hepatotoxicity.
4. Fully discuss your search strategies.
5. Provide a bibliography of pertinent articles on the subject of carbamazepine hepatotoxicity as related to this matter.

#### CASE 3

CW

DOB—May 15, 1938

Wt = 65 kg

According to the records, CW is an oriental male with a history of left nephrectomy for a benign tumor

one-year prior. On May 28, 1991 he underwent an angiogram (bilateral vertebral and paracervical and subclavian injections performed via femoral route) to determine if a spinal lesion noted on CT and MRI was a vascular tumor. The angiography indicated that the patient had a lytic C6 lesion, which was avascular. Thus, the patient did not have a spinal tumor. At 9:30 a.m., on May 28, the patient received 100 mg of phenobarbital prior to angiography. During the procedure he received at 11 a.m. Fentanyl 25 mcg with Inapsine 1.25 mg both given I.V. The Fentanyl/Inapsine was repeated at 12:10 p.m. and 1:50 p.m. as the procedure was over a long period of time. Over the next several hours CW exhibited lethargy, myoclonus, a positive Babinski's, mild aphasia and dysarthria. His physicians attributed these symptoms to the medications i.e. PB and Fentanyl/Inapsine. Over the next several hours his physical condition deteriorated in that CW developed right-sided weakness and worsening aphasia. Approximately, an hour later he developed right-sided hemiparesis. CW was diagnosed with a brain stem CVA. The MRI demonstrated an ischemic lesion. The neurologist concluded that the CVA was secondary to the angiography that CW underwent.

1. Discuss whether the symptoms of lethargy, myoclonus, dysphasia, positive Babinski's sign, mild aphasia are known side effects of the PB, Fentanyl/Inapsine.
2. If any or all of the above symptoms were drug induced was there any way of ruling this in or out?
3. CW did not receive any treatment during his stroke in evolution. Would Heparin therapy be warranted? Fully discuss this and support with adequate documentation if this was a deviation from good medical practice in 1991?
4. If this situation occurred in 1997 fully describe the role of thrombolytic therapy for CW's stroke in evolution. Discuss the pros and cons.
5. Fully discuss your search strategies including all the drug information sources utilized and the exact reason(s) for the order of the search.
6. Provide a bibliography of pertinent references utilized to arrive at your answers. No abstracts will be accepted or should have been used as a source to answer this question.

#### CASE 4

According to the records, at the time of these occurrences on November 20, 1997 the mother took her sick, 3-week-old (born full term) infant to see her M.D. The infant appeared somewhat congested and was crying softly, but was afebrile. The infant weighed 8 lb, 12 oz. The physician diagnosed an upper respiratory infection and gas. He prescribed

Triaminic drops, four drops, four times daily by mouth as a decongestant and Mylicon drops, 1.0 cc, three times daily by mouth for gas.

According to the information provided, the prescription was taken to XYZ Pharmacy. The prescription was filled by FP a registered pharmacist. The pharmacist filled the prescription with TRI-P ORAL INFANT DROPS. The parents according to the directions on November 20 and 21, 1997 administered the prescription. At 5:30 a.m. on November 22, 1997 the mother noted that the infant was unresponsive. She called the police. Resuscitation was unsuccessful and the infant was pronounced dead. The autopsy report listed the cause of death as acute intoxication due to pheniramine and phenylpropranolamine. The pheniramine blood level was 1100 ng/ml (by GC & GC/MS) and the phenylpropranolamine blood level was 710 ng/ml (by GC & GC/MS). The liver pheniramine level was 6400 ng/g (by GC).

1. Fully discuss based on your search of the literature the adverse effects and toxicity of the components of Triaminic Oral Infant Decongestant Drops and Tri-P Oral Infant Drops.
2. Discuss the pharmacokinetics of the ingredients in a newborn infant.
3. Specifically discuss the levels found at autopsy and significance of it.
4. Based on the literature discuss fully the appropriateness of prescribing either of the above medications to a 3-week infant including the dose of ingredients that the decedent would receive from either product.
5. Compare the labeling of Tri-P Oral Infant Drops (a generic form of Triaminic Rx Pediatric Oral Solution) to Triaminic Rx Pediatric Oral Solution.
6. Comment on appropriateness of how the prescription was written "Triaminic Drops" and whether the pharmacist acted appropriately.
7. As the above is a large task, I am primarily interested in your search strategies including all drug information sources utilized and the exact reason(s) for the order of search.
8. Provide a bibliography of pertinent references utilized to arrive at your answers. No abstract will be accepted or should be used as a source to answer the questions.

#### *Developing a pharmacy-marketing Plan for the Following Drugs*

1. Gatifloxacin
2. Omapatrilat
3. Rabeprazole
4. Tenecteplase

5. Dofetilide
6. Tinzaparin
7. Levalbuterol
8. Risedronate

## APPENDIX II

### Group Project Evaluation

#### *Preparing a Report for Presentation to Hospital Pharmacy and Therapeutics Committee*

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Check if the following information were presented (%)

Preparation (10%)—Grading based on the following criteria  
Group has materials ready for presentation. (from facilitator)

Score for this section (out of 10%)

Content of presentation (60%)—Grading based on the following criteria

- Drug names (generic and brand) to be compared.
- Dosage forms availability
- FDA indications
- Clinical pharmacology
- Pharmacokinetics
- Clinical efficacy (data available for each agent and comparative data among agents if available. If comparative data no available, students should state that)
- Adverse reactions
- Contraindications and precautions
- Drug interactions
- Dosage and administration
- Cost comparison between agents
- Recommendations and justification
- Provide appropriate references and scientific data
- Understand the subject matter adequately to answer audience questions

Score of this session (out of 60%)

Presentation Skills (20%)—Grading based on the following criteria

- Information presented in logical, organized and concise manner
- Confident and does not read verbatim
- Appropriate, understandable language
- Appropriate use of audiovisual (e.g. Overhead, handout)

Score of this section (out of 20%)

Peer evaluation (from peer evaluation form) (out of 10%)

Total: add up the four subtotal (out of 100%)

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### Group Project Evaluation

#### *Developing Drug Education Program for Different Audience*

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Check if the following information were presented (%)

Preparation (10%)—Grading based on the following criteria  
Group has materials ready for presentation. (from facilitator)



TABLE I – continued

Check if the following information were presented (%)

Score for this section (out of 10%)

Content of presentation (60%)—Grading based on the following criteria

- Goals and objectives of the education program are stated.
- Level of depth of the program is appropriate for the audience specified.
- Content of program is consistent with the goals and objectives stated.

- All information presented is accurate.
- Students' knowledge of subject matter.
- Post-test questions are appropriate in evaluating if the goals and objectives of the program have been achieved.
- Provide appropriate references and scientific data.
- Understand the subject matter adequately to answer audience questions.

Score for this section (out of 60%)

Presentation Skills (20%)—Grading based on the following criteria

- Information presented in logical, organized and concise manner
- Confident and does not read verbatim
- Appropriate, understandable language
- Appropriate use of audiovisual (e.g. Overhead, handout)

Score for this section (out of 20%)

Peer Evaluation (from peer evaluation form) (out of 10%)

Total: add up the four subtotal (out of 100%)

### Group Project Evaluation

#### *Developing Medication Utilization Evaluation Criteria (drug Utilization Guidelines)*

Check if the following information were presented (%)

Preparation (10%)—Grading based on the following criteria  
Group has materials ready for presentation. (from facilitator)

Score for this section (our of 10%)

Content of presentation (60%)—Grading based on the following criteria

- Students justify why the medication selected is appropriate and necessary for medication utilization evaluation.
- Criteria/guidelines of use of medications are appropriate
- Establish appropriate outcome indicators for efficacy
- Establish appropriate outcome indicators for side effects
- Identify potential plans/corrective actions to improve medication use.
- Provide appropriate references and scientific data.
- Understand the subject matter adequately to answer audience questions.

Score for this section (out of 60%)

Presentation Skills (20%)—Grading based on the following criteria  
Information presented in logical, organized and concise manner

- Confident and does not read verbatim
- Appropriate, understandable language
- Appropriate use of audiovisual (e.g. Overhead, handout)

Score for this section (out of 20%)

Peer evaluation (from peer evaluation form) (out of 10%)

Total: add up the four subtotal (out of 100%)

### Group Project Evaluation

#### *Developing a Pharmacy Consultation Service/clinic*

Check if the following information were presented (%)

Preparation (10%)—Grading based on the following criteria  
Group has materials ready for presentation. (from facilitator)

Score for this section (out of 10%)

Content of presentation (60%)—Grading based on the following criteria

- Drug name and FDA indications
- Clinical pharmacology
- Pharmacokinetics
- Clinical efficacy (data available for each agent and comparative data among agents if available. If comparative data no available, students should state that)
- Adverse reactions
- Students define the role of the new agents as compared to other similar products on the market. (Describe the potential pros and cons of the new product as compared to what is available)
- Students identify the appropriate marketing target audience
- Students identify appropriate marketing strategies to position the products
- Provide appropriate references and scientific data.
- Understand the subject matter adequately to answer audience questions

Score of this section (out of 60%)

Presentation Skills (20%)—Grading based on the following criteria  
Information presented in logical, organized and concise manner

- Confident and does not read verbatim
- Appropriate, understandable language
- Appropriate use of audiovisual (e.g. Overhead, handout)

Score of this section (out of 20%)

Peer evaluation (from peer evaluation form) (out of 10%)

Total: add up the four subtotal (out of 100%)

### Group Project Evaluation

#### *Evaluating Medical—Legal Cases*

Check if the following information were presented (%)

Preparation (10%)—Grading based on the following criteria  
Group has materials ready for presentation. (from facilitator)

Score of this section (out of 10%)

Content of presentation (60%)—Grading based on the following criteria

- Each individual legal case comes with a set of questions. Students should be graded based on their answer to those questions, each question carry equal weight. All questions add up to a 100%. Then the percentage will be used to multiply by 0.6

TABLE I – *continued*

Check if the following information were presented (%)
Score of this section (out of 60%)
Presentation Skills (20%)—Grading based on the following criteria
Information presented in logical, organized and concise manner
Confident and does not read verbatim
Appropriate, understandable language
Appropriate use of audiovisual (e.g. Overhead, handout)
Score of this section (out of 20%)
Peer evaluation (from peer evaluation form) (out of 10%)
Total: add up the four subtotal(out of 100%)

**Student Peer Evaluation**

During this semester, you have an opportunity to work with several of your colleagues closely, not only during recitation, but also weekly on a group project. The success of the group project heavily depends on the cooperation and participation of each group members. Each member of the group has an equally important role to ensure that everyone put in their best efforts into the project.

However, in order to recognize individual students who make particular significant contribution to the group and to protect students from being affected (in terms of grade) by group members who participate minimally or are disruptive to group dynamics, you are given an opportunity to evaluate your team-mates based on the following criteria.

Please evaluate EACH of the your team-mates (one table per person). It is important that you evaluate each member. Your evaluation grades will contribute to 10% of your fellow teammates' group project grades. Your recitation facilitator will evaluate the other 90%.

Name of group member:

**APPENDIX III**

**PH413 Pharmacotherapeutics V Feedback**

Last semester, you have completed the last course in the Pharmacotherapeutics series (PH413). As you know, the nature of PH413 Pharmacotherapeutics V is different from the rest of the Pharmacotherapeutics courses. The purpose of the course is to try to help students to tied information that they have learned from previous Pharmacotherapeutics courses, apply them (with some new knowledge) to different practice settings (like a simulated clerkship in classroom).

Now that most of you have begun (and some completed 1–2 rotations) your clerks hips, we want to see if the course has actually achieved its purpose.

Please complete this short survey. This is EXTREMELY important for the faculty to make sure they continue to modify this course to better achieve its goals.

Have you completed at least ONE clinical clerkship (please circle)? Yes No

(If No, you can stop here and do not have to hand in your survey.)

The course helps me to gain an appreciation of clinical pharmacy practice in different settings	1	2	3	4	5
The course makes me feel more oriented on Day 1 of my first clerkship	1	2	3	4	5
The course gives me a better understanding on how to approach assignments and projects during my rotation	1	2	3	4	5
The course helps me to relate didactic information that I have learned from other courses to real patients	1	2	3	4	5
The group projects enhance my skill in working with other people	1	2	3	4	5
The course enhances my problem-solving and critical thinking skills	1	2	3	4	5
The group projects enhance my presentation skills	1	2	3	4	5
The concept of group projects should be incorporated into other Pharmacotherapeutics courses	1	2	3	4	5

1: Strongly AGREE 5: Strongly DISAGREE.

Name one thing that you like the MOST about the course?

Name one thing that you like the LEAST about the course?

Other comments?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Always show up to group meetings well prepared.					
Make consistent contribution to the group.					
Willing to accept responsibility.					
Able to work with other group members.					
Did not demonstrate any negative behavior such as over-dominating, distracting, unfairness, ..., etc.					