

Development and Use of an Interactive Database Management System for Simulated Patient Care Experiences for Pharmacy Students¹

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A University of Wisconsin School of Pharmacy project to improve teaching of pharmaceutical care for ambulatory patients is described. A detailed account is given of the design and development of patient and prescription order databases and software which together provide a computerized database management system that is used to create course materials needed for constructing simulated patient care exercises for pharmacy students. The database system is described, and an example is given illustrating how it is employed to create prescription orders and patient medication profile sets which are used to provide students with structured experiences in drug utilization review and patient consultation. In creating the patient simulation exercises, activities of pharmaceutical care, as it relates to outpatient pharmacy services, were first analyzed, types of practice situations presenting drug-related problems were defined, therapeutic classes of drugs were selected, and model patient medication consults were written. Methods used to validate the clinical accuracy of these course materials and to evaluate the success of the teaching strategy are presented. A list of planned future improvements of the databases and database system are outlined.

INTRODUCTION

Pharmacists and their professional associations have promoted the concept of pharmaceutical care whereby the pharmacist acts as an advocate for the patient to ensure optimal drug therapy while minimizing adverse effects. In practical terms, this means that the pharmacist must be able to evaluate patients individually, assess their drug-related needs, determine if there are any existing or potential drug-related problems, and interact with the patient and his or her health-care providers to optimize the patient's drug therapy.

This type of patient service requires more than knowledge of drug facts. Pharmacists must be able to integrate: (i) technical data on drugs and their use including therapeutic indications and interactions and appropriate dosage regimens; (ii) knowledge of dosage forms, biopharmaceutics, and pharmacokinetics; (iii) an awareness of social and psychological aspects of patient behavior as these relate to compliance and quality of life issues for patients; and (iv) skill in communication. Schools of pharmacy have reviewed and revised their curricula to improve their teaching in these areas. More will be done in the future as the practice of pharmaceutical care is expanded and becomes more clearly defined through actual use in the profession, and as faculties learn new and better strategies to teach it.

BACKGROUND

Like many schools of pharmacy, ours has relied on a combination of didactic instruction in the basic pharmacy disciplines, and clerkships and externships to give students experience in using this knowledge for the benefit of real patients in actual practice situations. However, discussions with students, faculty, and preceptors have revealed that many students lack self-confidence when making the transition

from learning facts about drug therapy to using this information in practice. For example, learning that it is the pharmacist's responsibility to monitor compliance is different from actually monitoring a patient taking a medication as prescribed and finding the right words to use in talking with the patient about their use of the medication. It was felt that our students could gain skill and confidence in providing patient care in practice situations if they were first given structured, but realistic, laboratory experiences that required them to provide simulated patients with the elements of pharmaceutical care. We realized that to provide the appropriate exercises, we had to analyze pharmacy service for ambulatory patients as it related to pharmaceutical care, define the various activities that comprise this function, and then create materials that would enable us to efficiently construct exercises that would give our students experience in successfully performing these activities.

The simulated patient care exercises that we wanted to create were to be used in a lecture-laboratory course in contemporary pharmacy practice. This course is offered in the second semester of the second professional year of a five-year (2-3) BS or seven-year PharmD curriculum. The students have already completed courses in the basic pharmaceutical and social sciences, and are concurrently taking a six-credit course in therapeutics. At the beginning of the contemporary practice course, lecture time is devoted to discussing systematic patient medication profile review and elements of effective patient drug consultation. To enhance the lecture material, readings on these subjects from current pharmacy literature are assigned. Students are also encouraged to practice medication profile review using *Srnka and Self's* study guide, *Systematic Medication Profile Review*.

It was realized at the outset that the materials for the simulated patient care exercises would require constant revision and updates since drug therapy changes so rapidly, and that computer technology was required to address these

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changes efficiently. At the time we began this project, we were using a commercially available outpatient dispensing software package for student exercises in the contemporary practice laboratory. This system was designed for use by pharmacies and did not allow the manipulation of patient profile records, a capability we needed in order to be able to create the desired patient care scenarios. In the summer of 1990, commercial dispensing software vendors and schools of pharmacy were contacted to identify a dispensing software package that would meet our needs. When we were not able to find an acceptable system, we began the process of designing and writing our own. The system that has been developed has proven to have teaching applications beyond our initial expectations.

DESCRIPTION OF THE TEACHING INNOVATION

Format of Laboratory Exercises

The patient care exercises in the contemporary pharmacy practice laboratory have the following basic format: In each of twelve lab periods, each student:

1. receives two prescription orders for a patient from a physician (a teaching assistant or pharmacist plays the role of physician);
2. enters the patient's name into a lab computer and retrieves a medication record for that patient;
3. reviews the patient's medication record and the new prescription orders, notes any drug-related problems, and, if necessary, calls the physician for a clarification or change;
4. completes a product report and a patient consultation sheet for each prescription order;
5. prepares the two prescriptions, including selecting the appropriate drug products, and packaging and labeling the prescriptions according to current professional and legal standards;
6. prints an updated patient medication record; and
7. gives a patient consultation on both prescription orders to the patient (a teaching assistant or pharmacist acts as the patient).

To use these experiences constructively in teaching pharmaceutical care, it was necessary to create situations that would give our students experience with a wide variety of therapeutic agents and an assortment of problems typically encountered in pharmacy practice. We wanted situations involving:

- patients of all age groups;
- patients currently taking no other medications;
- patients on multiple drug therapy;
- patients who overuse drugs;
- patients who are non-compliant in taking their medications;
- patients with no complications;
- patients who have the potential for allergic or adverse drug reactions, or drug-drug or drug-disease interactions;
- medications from a majority of the therapeutic drug classes most commonly used in ambulatory care;
- a variety of dosage forms;

Development of Course Materials

In developing the course materials and exercises, we did the following:

1. Selected twenty-four classes of therapeutic types or dosage forms for the students to experience. The selection of therapeutic class or dosage form was based on the relative importance and/or uniqueness of the medication class or dosage form to patient therapy and the frequency with which it is prescribed in practice. Therefore, our list includes drug products from many of the therapeutic classes found on listings of the most widely prescribed drugs, but it also contains some unique dosage forms which require special consultation on method of administration. Some very important drug classes are not on the list. This is due to time restrictions imposed by the length of our semester.
2. Identified the elements of an appropriate patient consultation and made a template (Appendix A) for the students to use in formulating their patient consultation.
3. Wrote model consultations for each of the 24 drug classes. The model consults were written using the templates designed for the student consults. They are used as guides by the teaching assistants and pharmacists who are acting as patients during the simulated patient consultations. This aid allows these instructors to give the students immediate feedback on their consultations. The models also serve as guides for grading the content of the students' consults. Since we wanted the model consults to concentrate on information that is important clinically, members of our clinical faculty were asked to review the model consults and validate the information given on these guides for clinical significance. Appendix B shows a sample model consult.
4. Identified common drug-related problems pharmacists are expected to uncover in performing prospective and retrospective drug utilization reviews (DUR) (Appendix C). The review elements we chose to include are an amalgamation of various lists that appear in the pharmacy literature.
5. Designed a lab schedule (Appendix D) that would give all students one dispensing experience per semester with each of the twenty-four therapeutic classes and one experience per semester with each of the identified DUR elements. The schedule is coordinated, when possible, with the corresponding lectures in the therapeutics course, so the students have current information on therapy for the medication class they are considering. The lab exercises also serve as reinforcement for the didactic instruction the students receive in the therapeutics course. The lab schedule is written with a scatter pattern so that the students in a given lab period do not all have the same DUR element to identify and resolve.
6. Created a patient database containing a pool of 2400 simulated patients.
7. Developed a computerized drug database to use in creating patient medication profiles and new prescription orders.
8. Designed software to efficiently use the patient and drug databases to create the needed prescription order-medication profile sets.

Design of Software and Databases

The database management system was created using the commercially available software, Foxpro, since it serves as an easy-to-use standard programmable database management system. We wanted a system that we could easily use and manipulate, but we also hoped other schools of

pharmacy or continuing education programs might find it adaptable for creating their own educational materials. It was our intent to create a very flexible system with databases that could be used as written, added to, linked, sorted, printed, and manipulated in many ways. We wanted programs that would run on any IBM or IBM-compatible personal computer and, with minor changes, on Apple computers. Manipulation of the databases for creating prescription orders and patient medication profiles is done completely through menus. A mouse is required to move around the various screens to make appropriate selections. The interactive portions of the program, which the students use for processing prescription orders, is also menu driven, but requires only a keyboard. The twelve student stations in the laboratory and the two instructor stations are linked together through the school's computer network system.

Patient Database. The patient database contains patients of both sexes and of ages from three months to 90 years. At the time the initial patient pool was created, an address, telephone number, and physician was assigned to each patient by the computer. When a patient is chosen for use, allergies and medical history may be added to that patient's file. Patient information, including date of birth, may be changed at any time, if desired. Patients can be retrieved individually by name, but listings of patients can also be requested alphabetically by patient last name, by age and sex, or by lab section number. Usually, when creating patient medication profiles, the patient is chosen by age. That is, if we want to create new profiles for patients with congestive heart failure, we may ask for a listing of patients over the age of 50 who have blank medication profiles. If we want to make a profile for a patient who is to be given an oral contraceptive, a listing of available females of child-bearing age is requested. Our patients remain the same age forever because each January we set all dates ahead by one year.

Drug Database. The drug database or Rx File is structured using a numbering system that allows the drug products to be organized and sorted alphabetically by name, by entry number, or by therapeutic class. Our therapeutic class system follows the basic organization of *Drug Facts and Comparisons* with a flexible numbering structure like that used by *AHFS Drug Information*. To illustrate, Appendix E shows the major therapeutic groups of the Rx File. Appendix F shows several groups in the Rx File from the therapeutic group respiratory drugs, and Appendix G gives the first few lines of the current Rx File sorted alphabetically by drug name. Organized in this way, therapeutic classes and drug products can easily be monitored, added, deleted, changed and used for creating prescription orders and patient medication profiles. Each Rx File entry contains a unique three-digit number (labeled RxNum) plus all information that would be needed for writing prescription orders, such as trade name and/or generic name of the drug product, dosage form, strength, quantity prescribed, directions for use, and number of refills. Each RxNum file entry also contains certain other information that is used by the computer in creating profiles, such as number of days between refills.

The software which links our patient and drug databases allows us to easily generate large numbers of new prescription orders and patient medication profiles so that we can create unique patient-medication scenarios for each of our students every week of class. In our contemporary

practice course we have five sections with 24 students in each section. A master set of prescription order-medication profile sets was written for each of the 24 students in lab section #1 for twelve weeks of the semester (288 sets). The computer software was then used to generate new and different sets from the master set for each student in each of the other four sections (1,152 sets).

Creating Prescription Order-Medication Profile Sets—An Example

Consider the following example which traces the process of creating a patient medication profile and prescription orders for the student in Section #1, Desk #7 for the seventh week of class. Notice on the master schedule (Appendix D) that in Week #7, students at Desk #7 (these students are in Group A) are to receive new prescription orders for an antiulcer agent and digoxin. Also note that in Week #7 students in Group A are scheduled to experience DUR element #7, a potential undesirable drug-drug interaction.

Before a patient profile can be written, we must decide how we wish to achieve an intended drug-related experience, such as a drug-drug interaction. The new prescription orders for Week #7 are an antiulcer drug and digoxin. Obviously there are many possibilities that could be chosen for these drugs. For this example it was decided that the drug-drug interaction will be the well-documented interaction between the antiulcer drug, cimetidine, and the bronchodilator, theophylline. To accomplish this, a patient medication profile containing theophylline must be created to go with the new prescription order for cimetidine.

When creating a new patient medication profile, the computer program asks how you wish the patient list to be ordered. In this case the sex of the patient may be either male or female. For this example the list of female patients with blank profiles was requested. Since one of the new prescriptions for this patient is digoxin, a patient over the age of 50 years was desired. A female patient of age 52 was requested. Helen Mueller, a female patient of age 60, was chosen as the patient. The week number, section number, and desk number are entered and Helen is given a medical history of asthma and an aspirin allergy. While the computer's program allows prescription orders to be added, deleted, or edited on a patient's profile, Helen was chosen from a list of patients with blank profiles, so a totally new patient medication profile must be created for her. The computer program asks for the RxNum of the first drug to be added. A theophylline prescription order is desired, so the Rx File is consulted for possible choices. The prescription orders in the therapeutic class 05.01.03 (Respiratory Products. Bronchodilators.Xanthine Derivatives, Adult) are shown in Appendix F. RxNum 848 (Slo-bid[®] 200 mg) was selected and entered. The computer program asks the number of times it should appear on the profile (2 was selected), the number of days between refills (30 was entered), and the date of the last refill (02/20/94 was chosen). The computer then calculates the appropriate dispensing dates and enters the Slo-bid[®] prescription orders seen on Helen's profile (Appendix H). This same procedure is repeated for any other prescription orders desired on the profile. In this case, cephalixin capsules, Lortab[®] tablets, triamcinolone cream, Ilotycin[®] Ophthalmic Ointment, and Ventolin[®] Inhaler were also added to Helen's profile. Care must be exercised in the selection of prescription orders to avoid undesired

drug-related problems. Each prescription order-medication profile set was designed to address a single DUR element, a drug-drug interaction in this case, and no others. In this way, the teaching assistants and graders always know if the student has found the intended review element and can give appropriate feedback on the student's work.

When the patient medication profiles for desks #1 through #24 have been written for Section #1, the computer is ready to create the profiles for the other sections. Since for a given week and desk number, the medication profiles for all sections should contain different patients and medications and yet contain the same required DUR elements as the masters, the computer does the following: (i) looks at the appropriate master profile from section #1 (same week and desk number); (ii) picks a new patient of the same sex and approximate age as that on the master profile; (iii) gives the new patient the same allergies and medical history; and (iv) creates a similar but different medication profile by choosing different entries, that is, different RxNums from the same therapeutic class as those of the master. The number of days between refills is specified in the drug database (Days column in the Rx File) and the computer uses this spacing interval in creating the new profiles. Note the medication profile for Nancy Hodgson (Week #7, Desk #7, Section #2) as seen in Appendix I. It was created by the computer from Helen Mueller's profile. The amount of variation seen in the computer generated profiles depends on the variety of prescription orders in the drug database and the number of entries in the master profile.

Because of the way the computer uses the Rx File to generate new profiles from master profiles, great care must be used in classifying drugs and prescription orders by therapeutic class. For example, because cimetidine interacts with many other drug classes, prescription orders for cimetidine have to be separated from non-interacting H₂ antagonists in the therapeutic drug classes of the Rx File. If this were not done the generated profiles might not contain the same drug-related experiences as the master profiles. Similarly, if a pattern of drug overuse is the desired drug-related experience, prescription orders containing this element are put in a separate therapeutic class so the computer can only choose other prescriptions with an overuse pattern when creating the new profiles when this is desired. Adult and pediatric prescription orders for a given therapeutic class also require segregated classes to avoid adult prescription orders being given to pediatric patients, and vice versa when the computer generates new profiles.

When all the patient profiles for a given week have been generated, a list of new prescription orders for these patients is created. In our lab, new prescription orders are given over the telephone to the students. This is done to give students the additional experience of taking telephone prescriptions. Like the patient profiles, the telephone call-in list of new prescription orders is generated by the computer. For this list, the week number, desk number and the RxNum for the desired prescription orders are entered. The computer merges this information with the patient data in the new profiles to create a call-in list. The call-in entries for Helen Mueller are shown in Appendix J.

When the semester has been completed, the computer can be instructed to remove all new prescription orders added by the students so the original sets are regenerated. Prescription orders added to the profiles by the instructors

can also be erased individually, section by section, or, if entirely new sets are desired, all prescription orders on the medication profiles can be removed. On January 1 of each year, dates on all profiles are advanced by one year so that patient ages stay the same and profiles remain current. The drug database is reviewed frequently to make needed changes. Profiles and call-in lists can easily be edited individually; however, mass changes for prescription orders on all profiles and call-in lists can also be made quickly by changing information in the Rx File. Any change made on a prescription order (RxNum) in the Rx File is transmitted to all the profiles and call-in lists containing that item. This is especially useful when a drug product is discontinued, or when accepted dosage forms or dosage regimens for a disease state changes. It would be very tedious to make these changes individually on all profiles and call-in lists.

Student Exercises Using the Prescription Order-Medication Profile Sets

The physician (teaching assistant or pharmacist) calls each student at his or her lab desk and gives the student the two new prescription orders from the call-in list (Appendix J). The student, using a computer terminal located at the lab desk, enters the -patient's name and requests a print-out of that patient's profile. For the above example, the student at Desk #7 retrieves the profile shown in Appendix H. The student then analyzes both the new prescription orders and the current orders on the existing profile, and completes a product report and patient consultation sheet (Appendix A) for each prescription order.

Students are told to contact the doctor concerning drug-related problems if, in their professional judgment, this is indicated. You will notice on the call-in list (Appendix J) that Helen Mueller has three prescription orders. The first two orders are those originally telephoned to the student. It is expected that when the student at Desk #7 evaluates this patient's medical history and new prescription orders, the cimetidine-theophylline drug-drug interaction will be noticed. The student must then contact the physician and discuss the situation. This experience is a very important part of these lab exercises. One of the essential but difficult skills for the students to acquire is that of tactfully approaching a health-care provider or patient about a drug-related problem. In the above case, the contacted physician (teaching assistant or pharmacist) changes the prescription order to a different, non-interacting H₂ antagonist, RxNum 717, Axid capsules. This is the third entry for Helen Mueller on the telephone call-in list.

When preparing the new prescriptions, the student selects and packages the appropriate drug products, enters the new orders in the computer profile database, and prints labels for the drug products. The student is required to document any therapy changes or interventions in the "Patient Notes" section of the patient medication profile. An updated patient medication profile (Appendix K), is printed. Students may print personalized patient education leaflets from the *USP-DI* for their patients. The student then takes the properly labeled drug product, the prescription order, the updated profile, the patient education leaflet, and completed trade product report sheets and patient consultation sheets to the patient consultation room. The student gives a consultation to a teaching assistant or pharmacist who plays the role of the patient. This, of course, is an essential part of the whole patient-care process. At the beginning of the

semester, many students are rather nervous when giving their patient consults. As they become more practiced, they acquire confidence and feel much more at ease. During the course of the semester, each student has three experiences consulting with a patient where questionable use of prescription medications is involved (DUR elements #4, #6, and #9). These exercises give the students opportunities for learning how to interact with patients in sensitive situations. This year our consultation rooms were equipped with videotaping camcorders and television monitors. Students may tape their consultations for later review. We hope that this capacity will enable them to more readily improve their communication skills; this is part of the continuing development of our project.

EVALUATION

Since its inception, this project has undergone evaluation in the areas of content validity of the teaching materials, and overall success of the project in teaching students how to perform pharmaceutical care activities in outpatient settings.

Evaluation of Content Validity of the Teaching Materials

1. Model Patient Consultations. The first draft of the model consultations was written using information in the *USP/DI Advice for Patients*. Because this reference gives extensive information, while our template was limited to one page, judgments had to be made on what information to include. Since we wanted the model consults to concentrate on information that is important clinically, members of our clinical faculty were to review the model consults and validate the information given on these guides for clinical significance. The models were then revised based on the comments received. This was done in the summer of 1990. Since that time, the model consults have been reviewed and revised several times as we continue to solicit feedback from students and pharmacists.

The template for the consults was recently revised, and the new format is shown in Appendix L. Previously we used the consult list of 12 topics shown in Appendix A. We learned that, when given so many topics without a more general framework, students and pharmacists had difficulty remembering all the topics. In the revised format, the individual topics are given under five more general areas. Furthermore, this new format gives more importance to the introduction section and positioned the topic of name of medication and therapeutic indication with the patient assessment. This change in sequence has become important since many medications have multiple therapeutic indications, which makes it prudent to discuss a patient's understanding of his or her therapy first. This also stresses the important concept of interacting with the patient concerning his or her therapy rather than merely instructing the patient concerning the medication.

2. Drug Utilization Review. The DUR elements seen in Appendix C were chosen after a review of the literature and in consultation with practicing pharmacists. Each prescription order-medication profile set was designed to address a single DUR element. We wanted to be confident that each of the sets represented the drug-related problem (and only the problem) it was intended to display. Further, we wanted each of the sets to be

complete and clinically accurate with respect to patient and drug parameters. To accomplish this task, various pharmacy references were consulted. The *USP-DI* was used as a prime source of information. *Drug Interaction Facts* and *Drug Interactions* were also consulted for information on drug-drug interactions. Clinical faculty were asked to review the various sets. Recently various sets were evaluated by a group of community pharmacists as part of a continuing education program. Finally, students using the sets have been excellent reviewers of the material. With 120 students each semester using and analyzing the materials, new and helpful information has been uncovered each year. This year it became apparent that many areas of therapeutics are changing so rapidly that a yearly evaluation of the sets by a clinical specialist is necessary. For example, while the use of two calcium channel blocking agents was at one time considered a duplication of therapy, recent literature gives examples of its beneficial use in certain cases.

Evaluation of Project Teaching Outcomes

- 1. Patient Consultation.** Our students have been assigned patient consultations as a part of their dispensing course work for over ten years. The changes that we have made in this area have been gradual. From our experiences acting as patients for the students' consults, we have noticed great improvement in their performance. Furthermore, in informal discussions with pharmacist preceptors in our internship and externship programs, we have had very positive feedback on the improved performance of our students.
- 2. Drug Utilization Review.** Our present model for teaching DIJR, which uses planned prescription order-medication profile sets, was instituted in the Spring Semester of 1992. In anticipation of this, evaluation instruments were administered three times during the Spring 1991 semester, at the beginning, at midterm, and at the end of the semester. This class was then retested during the following year as students completed their in-patient clerkships. Therefore, we have data from a control group. Each succeeding class has been tested in the same way using the same evaluation process. The evaluation instruments consist of eight to ten prescription order-medication profile sets that have been evaluated in advance by clinical faculty members identifying: (i) whether they saw a drug related problem element and what it was; and (ii) whether the presentation of the element was clinically accurate. The data from these evaluations have not been analyzed; however, informal verbal feedback from students, teaching assistants, and pharmacists involved with this project has been extremely positive. Last spring students were asked to give written comments on their course evaluation sheets, and we were very gratified by the responses.

THE FUTURE—PLANNED MODIFICATIONS AND IMPROVEMENTS

Although we are quite pleased with the progress of this project, we recognize various areas where additions, modifications and improvements should be made. Several are listed below:

1. Add nonprescription drug products to the patient medication profiles and provide opportunities for the stu-

dents to counsel patients on over-the-counter drug products.

2. Expand the drug database.
3. Create additional patient profile records with more complex drug therapies and drug-disease situations.
4. Add laboratory data, and physician diagnostic information and treatment goals to the patient records.
5. Expand and improve the patient database, providing patients with "personalities," and adding nontraditional patients and patients with special needs.

CONCLUSION

We feel that the scenarios which we have created for our students to give them experiences in learning to perform pharmaceutical care have been highly successful. The students seem to enjoy the challenge of performing DUR and counseling our simulated patients about their medication use. The students show obvious satisfaction upon properly evaluating and resolving drug-related problems and successfully interacting with simulated patients and physicians to maximize desired therapeutic outcomes.

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APPENDIX A

PATIENT CONSULTATION

1. Introduction:
2. Name of medication:
3. Indication:
4. Patient Assessment (allergies, other medications):
5. How to administer (Sig, special instructions):
6. What to do about a missed dose:
7. How long to continue taking:
8. Side effects and precautions:
9. Monitoring of therapy:
10. Storage instructions:
11. Refills:
12. Check for Patient Understanding of Information:

APPENDIX B

PATIENT CONSULTATION

Drug Class: Antiulcer agent. H₂ Antagonist

1. Introduction: Hello, I'm your pharmacist.
2. Name of medication:
3. Indication: Prevention or treatment of ulcer
4. Patient Assessment:

- A. Have you ever used this type of medication before? What has your doctor told you about it?
 - B. Have you ever had an unusual or allergic reaction to a medication of this type?
 - C. Are you presently taking any prescription or nonprescription medications?
5. How to administer (Sig, special instructions):
 - A. Repeat directions.
 - B. Scheduling doses: Histamine H₂: qd: hs; bid: am & hs; 3-4id: w/meals and hs.
 - C. It may be several days before this relieves your stomach pain—do not stop taking. If you have unrelieved stomach pain, you may take antacids with this, however, wait 1/2-1 hour between taking this medicine and the antacid.
 6. What to do about a missed dose:

It is important not to miss any doses. If you miss a dose, take as soon as possible; if almost time for your next dose, skip the dose and go back to regular schedule.
 7. How long to continue taking:

Continue taking for full time of treatment, even if you feel better, since symptom relief does not correlate with actual healing.
 8. Side effects and precautions:
 - A. This drug is quite free of side effects, but if you notice anything unusual that was not present before beginning therapy, consult your doctor.
 - B. Watch your diet and avoid foods that cause you problems. Also avoid or limit use of aspirin, medicines for arthritis, caffeine in coffee, tea and soft drinks, and alcoholic beverages as these may irritate the stomach and/or increase acid production.
 - C. Do you smoke? If yes—cigarette smoking delays the ulcer healing process. You may want to take steps to quit or at least decrease your smoking and *do not smoke* after your last dose of the day.
 9. Monitoring of therapy:

Consult your doctor if your pain continues or gets worse.
 10. Storage instructions:

Store at moderate temperature, away from direct light and humidity.
 11. Refills: Your prescription has ____refills.
 12. Check for Patient Understanding of Information:
 - A. Is there anything you would like me to explain?
 - B. So that I am sure I have covered everything, and that you understand how to use your medication, why don't you tell me how you will use it.

APPENDIX C

DRUG UTILIZATION REVIEW (DUR) PROFILE REVIEW ELEMENTS

- 0 - No element
 - 1 - Incorrect or missing information on new prescription order
 - 2 - Allergy or other adverse reaction to prescribed drug
 - 3 - Inappropriate dose, schedule, dosage form, or route of administration on a new prescription order
 - 4 - Under-utilization of a current medication listed on patient profile
 - 5 - Duplication of medication class or problem with undesirable additive effects of different medication classes
 - 6 - Efficacy, compliance and side effects check on a refilled prescription order
 - 7 - Undesirable drug-drug interaction
 - 8 - Undesirable drug-disease interaction
 - 9 - General inappropriate use of medication or over-utilization of medication listed on patient profile
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APPENDIX D

MASTER SCHEDULE

Week	Drug Class	DUR Profile Review Element		
		Group A	Group B	Group C
		1	Oral Theophylline Ophthalmic Ointments	0
2	Pediatric Antibiotics Antitussive-Decongestants	1	2	3
3	Bronchodilator Inhalers Corticosteroids	0	1	9
4	Oral Contraceptives Narcotic-Analgesic Combinations	2	0	5
5	Benzodiazepines NSAIDs	8	5	1
6	Oral Antidiabetic Agents Calcium Channel Blockers	0	4	0
7	Antiulcer Agents Digoxin (Groups A & B) Refills-ACE Inhibitors (Group C)	7	3	6
8	Diuretics Digoxin (Group C) SL Nitroglycerin (Group B) Refills-ACE Inhibitors (Group A)	6	0	7
9	Potassium Supplements SL Nitroglycerin (Groups A & C) Refills-ACE Inhibitors (Group B)	4	6	8

10	Beta Blockers Transdermal Nitroglycerin	3	8	4
11	Anticonvulsants Antidepressants	9	7	2
12	Anticoagulants Insulin	5	9	0

Group A = Desks 1, 4, 7, 10, 13, 16, 19, 22
 Group B = Desks 2, 5, 8, 11, 14, 17, 20, 23
 Group C = Desks 3, 6, 9, 12, 15, 18, 21, 24

APPENDIX E

THERAPEUTIC GROUPS

01. Nutritional Products
02. Blood Modifiers
03. Hormones
04. Cardiovascular Drugs
05. Respiratory Drugs
06. Central Nervous System Drugs
07. Gastrointestinal Drugs
08. Anti-infective Agents
09. Biologicals
10. Topical Preparations
11. Antineoplastic Agents
12. Miscellaneous Products

APPENDIX F

Rx File Grouped By PT Class

05. Respiratory Drugs

05.01 Bronchodilators

05.01.01 SYMPATHOMIMETICS, INHALATION PRODUCTS

	RxNum	Strength	Form	Qty.	ReF.	Days	Sub Dir.
PROVENTIL INHALER	137		INHALER	#1	4	30	2 INHS QID PRN
ALUPENT INHALER	286		INHALER	#1	4	30	2-3 INHS Q 3-4 H.
BRETHAIRE INHALER	131		INHALER	#1	4	30	2 INHS Q 4-6H
VENTOLIN INHALER	828		INHALER	#1	4	30	2 INHS Q 4-6H.
BRONKOMETER	132		INHALER	#1	4	30	1-2 INHS Q4H
TORNALATE INHALER	135		TNHALER	#1	4	30	2 INHS Q8H
MAXAIR INHALER	136		INHALER	#1	4	30	2 INHS Q4-6H
PROVENTIL INHALER	290		INHALER	#1	4	30	2 INHS Q 4-6H.
VENTOLIN INHALER	288		INHALER	#1	4	30	2 INHS Q 4-6H.

05.01.02 SYMPATHOMIMETICS, ORAL PRODUCTS

	RxNum	Strength	Form	Qty.	ReF.	Days	Sub Dir.
PROVENTIL TABLETS	522	2MG	TABLET	120	4	30	i QID
PROVENTIL TABLETS	523	4MG	TABLET	100	4	33	i TID

05.01.03 XANTHINE DERIVATIVES, ADULT

	RxNum	Strength	Form	Qty.	ReF.	Days	Sub Dir.
SLO-BID GYROCAPS	118	200 MG	CAPSULE	#60	5	30	i BID
THEO-DUR TABLETS	111	300 MG	TABLET	#60	5	30	i BID
THEO-DUR TABLETS	109	200 MG	TABLET	#90	5	30	i TID
RESPBID TABLETS	344	500 MG	TABLET	#60	5	60	1/2 TAB BID
SLO-PHYLLIN TABLETS	117	100 MG	TABLET	#100	5	22	1 1/2 TABS Q8H
THEO-DUR TABLETS	142	200 MG	TABLET	#90	5	30	i Q8H
THEO-DUR TABLETS	340	300 MG	TABLET	#60	5	30	i Q12H
SLO-BID GYROCAPS	848	200 MG	CAPSULE	#90	5	30	i CAP Q8H
SLO-BID GYROCAPS	849	300 MG	CAPSULE	#60	5	30	i CAP Q12H

APPENDIX G. Rx File Ordered By Drug Name

	PTClass	RxNum	Strength	Form	Qty.	Ref.	DaysSub	Dir
ACCURBRON SYRUP	05.01.04	89	50MG/5ML	SYRUP	240ML	5	12	i TSP Q 6HR
ACETAMINOPHEN SUPPOSITORIES	06.02.09	616	650MG	SUPP	#6	1	2	INSERT 1 SUPP PR Q4-6H PRN
ACETAMINOPHEN SUPPOSITORIES	06.02.11	774	325MG	SUPP	#6	1	2	INSERT i SUPP PR Q4-6H PRN
ACETAMINOPHEN UNISERTS	06.02.10	389	120MG	SUPP	#10	1	3	INSERT 1 SUPP PR Q4-6H PRN
ACETAMINOPHEN UNISERTS	06.02.09	615	650MG	SUPP	#6	1	2	INSERT 1 SUPP PR Q4-6H PRN
ACETAMINOPHEN UNISERTS	06.02.11	775	325MG	SUPP	#6	1	2	INSERT i SUPP PR Q4-6H PRN
ACETAMINOPHEN W/CODEINE #3	06.02.03	419	325MG/30MG	TABLET	#30	5	15	i-ii Q4-6H PRN PAIN
ACETAMINOPHEN W/CODEINE #3	06.02.18	711	325MG/30MG	TABLET	#30	0	3	i-ii Q4-6H PRN PAIN & FEVER
ACETAMINOPHEN W/CODEINE #3	06.02.93	756	325MG/30MG	TABLET	#50	5	9	i Q 6H PRN PAIN

APPENDIX H

Pharmacist: JT

Date: 03/13/94

Patient:	Mueller, Helen
Address:	178 Snob Hill
DOB:	06/04/34
Sex:	F
MD:	Foge, Misty
Allergy:	ASPIRIN
MedHx:	Asthma

Rx#	Date	Rx Name and Strength	Qty	MD	Directions
1	02/20/94	SLO-BID GYROCAPS 200 MG	#90	Foge, Misty	i CAP Q8H
1	01/21/94	SLO-BID GYROCAPS 200 MG	#90	Foge, Misty	i Q12H
4	10/31/93	CEPHAL.FXIN CAPSULES 500 MG	#20	Foge, Misty	i Q12H
5	10/31/93	LORTAB TABLETS	#30	Foge, Misty	i-ii Q4-6H PRN PAIN & FEVER
3	09/08/93	VENTOLIN INHALER	#1	Foge, Misty	I INHS Q6H PRN
7	08/05/93	TRIAMCINOLONE CREAM 0.025%	30GM	Foge, Misty	APPLY UT DICT TID
3	07/30/93	VENTOLIN INHALER	#1	Foge, Misty	i INHS Q6H PRN
7	07/21/93	TRIAMCINOLONE CREAM 0.025%	30GM	Foge, Misty	APPLY UT DICT TID
6	05/16/93	ILOTYCIN OPHTH OINT 5MG/GM	4GM	Foge, Misty	APPLY TO OS TID

Nonprescription Drug/Product Purchases

Patient Notes:

APPENDIX I

Pharmacist: JT

Date: 03/14/94

Patient:	Hodgson, Nancy
Address:	22 Salerno
DOB:	06/24/34 Sex: F
MD:	Behling, Frank
Allergy:	ASPIRIN
MedHx:	Asthma

Rx#	Date	Rx Name and Strength	Qty	MD	Directions
1	02/20/94	THEO-DUR TABLETS 300 MG	#60	Behling, Frank	i BID
1	01/21/94	THEO-DUR TABLETS 300 MG	#60	Behling, Frank	i BID
2	10/31/93	CECLOR CAPSULES 250 MG	#30	Behling, Frank	i Q8H
3	10/31/93	ACETAMINOPHEN W/CODEINE #3 32 MG/30 MG	#30	Behling, Frank	i-ii Q4-6H PRN PAIN & FEVER
4	09/08/93	PROVENTIL INHALER	#1	Behling, Frank	I INHS Q6H PRN
5	08/05/93	LIDEX CREAM 0.05%	15GM	Behling, Frank	APPLY UT DICT BID
4	07/30/93	PROVENTIL INHALER	#1	Behling, Frank	I INHS Q6H PRN
5	07/21/93	LIDEX CREAM 0.05%	15GM	Behling, Frank	APPLY UT DICT BID
6	05/16/93	GENTAMICIN OPHTH OINT 3MG/GM	4GM	Behling, Frank	APPLY TO OD UT DICT. TID

Nonprescription Drug/Product Purchases

Patient Notes:

APPENDIX J

Prescription Order Call-in List

Section: 1 Week: 07

Desk	Patient	RxNum	Drug Name	Strength	Qty	Directions	Refills	MD
07 A	Mueller, Helen	805	CIMETIDINE TABLETS	300MG	#120	i TAB QID	1	Foge, Mistv
		190	LANOXICAPS	0.05MG	#90	iii Q AM	2	Foge, Mistv
		717	AXID CAPSULES	150MG	#60	i CAP BID	1	Foge, Misty

APPENDIX K

Pharmacist: JT

Date: 03/13/94

Patient:	Mueller, Helen
Address:	178 Snob Hill
DOB:	06/04/34
Sex:	F
MD:	Foge, Misty
Allergy:	ASPIRIN
MedHx:	Asthma

Rx#	Date	Rx Name and Strength	Qty	MD	Directions
9	03/13/94	LANOXICAPS 0.05 MG	#90	Foge, Misty	iii Q AM
8	03/13/94	AXID CAPSULES 150 MG	#60	Foge, Mistv	i CAP BID
1	02/20/94	SLO-BID GYROCAPS 200 MG	#90	Foge, Mistv	i CAP Q8H
1	01/21/94	SLO-BID GYROCAPS 200 MG	#90	Foge, Mistv	i CAP Q8H
4	10/31/93	CEPHALEXIN CAPSULES 500 MG	#20	Foge, Mistv	qO12H
5	10/31/93	LORTAB TABLETS	#30	Foge, Misty	i-ii Q4-6H PRN PAIN &
3	09/08/93	VENTOLIN INHALER	#1	Foge, Misty	i INHS Q6H PRN
7	08/05/93	TRIAMCINOLONE CREAM 0.025%	30GM	Foge, Mistv	APPLY UT DICT TID
3	07/30/93	VENTOLIN INHALER	#1	Foge, Mistv	i INHS Q6H PRN
7	07/21/93	TRIAMCINOLONE CREAM 0.025%	30GM	Foge, Misty	APPLY UT DICT TID
6	05/16/93	ILOTYCIN OPHTH OINT 5MG/GM	4GM	Foge, Misty	APPLY TO OS TID

Nonprescription Drug/Product Purchases

Patient Notes:

03/13/94—Consulted w/Dr. Foge to change new order from Cimetidine to Axid due to possible interaction w/theophylline.

APPENDIX L

PATIENT CONSULTATION

- I. Introduction:
 1. Establish relationship with patient:
 2. Name of medication and therapeutic indication:
 3. Patient Assessment:
 4. Offer to consult:

- II. Administration:
 1. Label directions:
 2. Special instructions:
 3. What to do about a missed dose:
 4. How long to continue taking:
 5. Status of refills:

- III. Precautions:
 1. Side effects and precautions:
 2. Monitoring of therapy:

- IV. Storage instructions:

- V. Check for Patient Understanding of Information: