DEVELOPMENT OF A PHARMACOLOGY CURRICULUM FOR THE NURSE IN ADVANCED PRACTICE

Scholarly Project for the Degree of M. S.

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ABSTRACT

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This project establishes the curriculum outline, course content and teaching method of a masters level pharmacology course for nurses enrolled in a family track advanced practice nursing program. The literature today fails to document or give rationale in regards to pharmacology content and course approach that nurses that students earning an advanced nursing degree in a family based program should be taught.

It is extremely important that nurses in advanced practice have a strong understanding of the drug therapy they will be utilizing. This course was developed using the cooperative learning theory as the theoretical framework. Based upon the concept of social interdependence, this theory enhances the knowledge of adult learners while utilizing the expertise of group members in the sharing of knowledge.

The course is designed as a four credit hour semester course in which three credit hours (three clock hours) is devoted to lecture and one credit hour (three clock hours) is devoted to a lab designed for group case studies. The course outline and curriculum was developed by utilizing the top 200 drugs dispensed most often in U.S. Community Pharmacies, the 20 most frequent principle diagnoses encountered by general family practitioners and the 20 most frequent principle reasons for visits to general family practitioners. These three sources accurately represent the drug classes that should be taught for this course.

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CHAPTER 1

The Problem

A revolution in healthcare is beginning to take place as new models of care begin to make important contributions in achieving the goals of access to cost-effective, quality healthcare for all people. This evolution includes the redesign and development of new healthcare professional practice roles and models of care that are dramatically changing the way physicians, nurses and other healthcare professionals practice. Graduate nursing education is beginning this process by blending the roles of the clinical nurse specialist (CNS) and the nurse practitioner (NP) into a nursing professional called the advanced practice nurse (APN). The result is a nurse prepared at the clinical masters' level who is well prepared to provide comprehensive primary care and illness management in a variety of settings throughout transitional points of illness, and works with physicians and other health care professionals in expanded collaborative relationships.

The evolution of this more autonomous role for the APN must bring with it a deep understanding of clinical pharmacology and therapeutics and the basis for prescriptive authority. As a result of the amount of prescribing the APN will be performing and the strong emphasis placed upon prescriptive authority in his or her practice, it is imperative that the curriculum provide a well structured, comprehensive, clinically based pharmacology course which addresses the pharmacological needs of the most common primary care problems the APN will encounter in his or her practice.

Currently, pharmacological content at the graduate level is diverse and inconsistently taught depending on the course curriculum of the program. Great variations exist among college and university curricula in graduate nursing education. Fullerton and Pickwell (1993) indicate that most nurse practitioner programs offer pharmacology as an integrated component of clinical practice courses and that most graduates have studied pharmacology in this manner.

Curriculum standardization with other health care providers (physicians, dentists and physician assistants) is key to the credibility of how APNs are educated to prescribe (McDermot, 1995). McDermott (1995) found that "the range of options and requirements that exist nationally includes differences in curricula, classroom hours, number of credits, continuing education requirements, and teaching methods (e.g., self-directed, lecture, learning tapes, correspondence courses)" (p.28). Providing undergraduate and graduate courses that identify pharmacology as a separate, not integrated, subject establishes a parity with other professional organizations that now take exception to the way nursing pharmacology courses are structured and taught (Chavigny, 1994). Even though advance practice nurses must compete with other healthcare providers, including physicians and physician assistants whose pharmacology education is not in question, pharmacology content should reflect the prescribing patterns of nurse practitioners rather than using what is taught in medical and dental school as the basis of comparison (Waigandt & Chang, 1989). Although nurses in advanced practice are educated regarding pharmacology, the literature to date does not clearly articulate the concepts of pharmacology or the content and framework of how

an advanced practice nursing student should be taught pharmacology.

According to Spatz (1996) however, "Nurses do possess adequate pharmacologic knowledge. APNs are educated regarding pharmacology pertinent to their specialty area. Additionally, all nurses receive a broad pharmacologic basic education in their baccalaureate programs" (p.274).

Ideally pharmacology should be taught to the APN student as a separate course and not integrated into other course curricula (such as pathophysiology, therapeutics or during practicum class/case study time). The pharmacology course must have a strong basis in teaching the fundamentals of:

1. Pharmacology, including physical and chemical properties, biochemical and physiological effects, mechanism of drug action, and therapeutic & other uses of drugs;
2. Pharmacokinetics, encompassing absorption, distribution, binding or tissue localization, biotransformation, and excretion; and
3. Pharmacodynamics, which entails the study of the biochemical and physiological effects of drugs and their mechanism of action.

It is also important that the course be taught by a reputable instructor with a strong knowledge in both pharmacology and nursing. According to Waigandt and Chang (1989) "Instructors who teach pharmacology in nurse practitioner programs should have their major educational preparation in the field of pharmacology" (p. 59).

The focal point for this course should be the therapeutic selection and application of drugs based upon the corresponding disease state and mechanism of drug actions. This

method will enhance the selection process for nurse practitioners of medications related to disease states that he/she encounters along with the effects of other disease processes. The course should compare and contrast the various drugs for specific disease states and rationalize the use of the most appropriate drug(s) based upon the patient's presentation and history.

This course should also be designed to educate the student toward a more in-depth, cellular based level in pharmacology than the nurse has previously experienced at the undergraduate level. At the undergraduate level the role of the nurse as it relates to pharmacology is primarily that of administering medications, observing and monitoring medication effectiveness and observing for signs and symptoms of adverse reactions. At the graduate level the nurse will also take on the role of medication selection and prescribing. The roles of administering and observing the patient for effectiveness and side effects will remain, however in this new advanced role the nurse will be expected to select and prescribe the most efficacious and therapeutic drug warranted by the patient's disease state and health status.

This course should, therefore, be taught from a more scientific model with regard to drug chemistry and the pathophysiological changes that drugs possess upon the body. The undergraduate pharmacology instruction that the student has been exposed to, along with the knowledge that he/she has gained through his/her years of nursing practice, acts as the foundation in proceeding with this course.

It is essential that the pharmacology curriculum be consistent with the specialty of the program in which the student is enrolled and the characteristics of the patient

population that the nurse will be encountering in practice. For example, if the nurse will be practicing in a setting that encompasses the entire lifespan then the course should also instruct the students on what affects age has in relationship to drugs. The nurse will need to know how the changes that occur in various age groups affect drug therapy and the differences among drug pharmacokinetics (absorption, distribution, metabolism and excretion). It is also important that the course complement other courses within the program and be designed in the curriculum at the same time or after a strong pathophysiology course.

In general, the following are assumed to comprise the skill base of CNS and NP nurses in advanced nursing practice:

1. comprehensive assessment diagnostic ability
2. management of health and illness problems
3. assessment and intervention of complex systems
4. the ability to critically analyze research findings
5. leadership in healthcare
6. cooperation and collaboration skills
7. autonomy and the ability to make critical, independent judgements (Gilliss, 1996).

As one can ascertain from the above skills, pharmacology plays a major integrative role across this continuum.

Nineteen states currently give NP's prescriptive authority (including controlled substances) independent of any required physician involvement in prescription writing.

Eighteen states allow nurse practitioners to prescribe (including controlled substances) with some degree of physician involvement or delegation of prescription writing. Thirteen states allow nurse practitioners to prescribe (excluding controlled substances) with some degree of physician involvement or delegation of prescription writing, and one state in the United States allows nurse practitioners no statutory prescribing authority (Pearson, 1997).

Therefore, the outcome of this project will be to develop a curriculum outline, course content, and hours of course content in a masters level pharmacology course for nurses enrolled in a family track APN program. The cooperative learning theory will be the framework utilized for this program. This framework was chosen because of the types of students enrolled and the variety of backgrounds that they will bring, which will help students through the learning process. The course will also serve as a foundation in which research regarding pharmacology and the nurse in advanced practice can be established to validate their role as prescriber in the medical community, and gain a greater understanding for changes in the course curriculum.

CHAPTER 2

Theoretical Framework

The method of teaching pharmacology to nursing students in advanced practice is critical to the students' learning this subject. Significant details regarding specific drug classes, accompanied with the diverse pharmacology background that each student brings with him/her, places a unique combination of opportunity and barrier toward the subject that should be considered in the development of this course. The barriers can be minimized through utilization of the cooperative learning strategies.

Cooperative learning has been described by David and Roger Johnson as a new paradigm for college teaching (Johnson, Johnson & Smith, 1991). This theoretical framework is based on research regarding the concept of social interdependence. Social interdependence, according to Johnson and Johnson (1989), is a social situation in which individuals join together to achieve mutual goals whereby the individual's outcomes are affected by the actions of others. Cooperation exists when the structure provides for individuals to act in such a way as to promote each other's success.

According to Glendon & Ulrich (1992), "cooperative learning is an interactive teaching strategy that stimulates critical thinking, fosters a feeling of community within the group, and promotes individual responsibility for learning through group process techniques" (p. 37). Cooperative learning consists of participants working together in heterogenous groups, often consisting of four to six members, depending on the class size and course content. The participant groups are then assigned cooperative tasks by

the teacher or facilitator. These tasks include solving common problems, learning a specific content, and working on case studies.

Cooperative learning is considered a powerful, active learning strategy in which students help and promote each others learning through explanation, discussion and sharing of knowledge (Goodfellow, 1995). This active sharing of knowledge and learning helps to bridge gaps among members of the group stemming from differences in age, personal and professional experience, and cultural background. Group work also teaches the members listening skills, communication skills, social relationship skills, and group processing techniques (Glendon & Ulrich, 1992).

Research has shown that methods of cooperative learning produce greater academic achievements, improve student self esteem, and promote positive attitudes regarding their education than the traditional methods of teaching (Sharan, 1980). It is therefore apparent that cooperative learning increases an individual's accountability by increasing the student's feeling of responsibility for learning the material, while at the same time helping the group learn.

The model of cooperative learning was selected as the basis for this course because it has been found to increase students' learning, creativity, responsibility, collaboration, and attitudes, which are highly integral when furthering the education of professionals in health care (Goodfellow, 1995). Cooperative learning also provides a team learning experience, which according to Senge (1990) is a vital part of the modern organization and prepares the student for practice in the 21st century. Nurses have always been a part of the health care team. Teaching and learning from this type

of approach helps to strengthen the team concept, which will not only help them in learning pharmacology, but will also help prepare them for clinical practice. Cooperative learning also helps to integrate classroom study with professional work, along with educating the student through the use of personal experiences (Goodfellow, 1995). As a result of the diversity in the groups, nurses with personal experiences can share these with the group, which will then help other students learn from these experiences. Students with a strong background in a certain area of pharmacology will also be able to teach others in a manner that is understandable to them. A nurse with a strong cardiac background, for example, will be able to help other nurses learn how these drugs work and to better help them understand the concepts as a result of personal experiences.

Model

The cooperative learning model for nursing education (Beck, 1995; see Figure 1) consists of four concentric circles that allow the flow of information to remain within the concentrics, and also move from one circle to another and back. The first or outermost circle consists of six items related to the overview and description of the course. The components within this circle include course structure, objectives, content, planning, cooperative learning strategies, and evaluation. The majority of objects contained in this outermost circle are flexible in nature, with the exception of the course objectives, which must be fixed. The outermost circle runs in a clockwise manner, moving from left to right. It is important to note that as this circle begins

with the course structure, the next move is to the objectives. These two components are fixed and unchangeable once the course begins. Content, planning and cooperative learning strategies are the next three components of this circle which move between these components. This is important to note, for all three of these components depend upon the make up of the course participants, and therefore need to continually change throughout the course. Following these three components is the evaluation of the course, which once again is fixed and unchangeable.

The second outermost circle characterizes the principles of group process and includes: group process, interchangeable group roles, rotating leadership, student/teacher interaction and group development. Group work and involvement are the most significant ingredients in this area of the model, and incorporate the participants/students of the course into the mainstay of this teaching model. It is important to note that throughout this entire circle each component is bi-directional and has the ability to move between each component and back upon itself to help assist the participant in the learning process of this material.

The third circle represents the classroom structure and format consisting of three parts: organization, small group discussion and large group discussion. The organization time is used with the lecture part of the class to answer questions and to prepare for new topic discussion. The small groups will be composed of four to six students. These groups will remain consistent throughout the semester and work on the case studies presented to each group. Case studies used can either be the same for all small groups or different. In interest of time and course content needing to be covered,

for this course a combination of lecture and small groups will be utilized. Therefore depending on the number of groups, two to three case studies will be utilized for each area of content. This format should allow for a more richer discussion and less reporting to take place.

The final and innermost circle consists of the roles of the faculty and students. This circle denotes the relationship existing between the teacher/facilitator and the students. This circle also accounts for the changes in roles between the students and the teacher.

It is important to note that in this model the role of the teacher is different from the traditional teacher role. This model depicts the role of the teacher as more of a facilitator, while the students will periodically take on the role of teacher. It is important to maintain correct information being discussed during group learning and communication to the rest of the group. However, the teacher must be aware that he/she acts primarily as a guide, rather than a source, in this situation.

Cooperative learning plays a dual role in the education of pharmacology for the nurse in advanced practice. It is not only one of the best methods to be utilized in this educational process, but it also assists in preparing the student for their role as a nurse in advanced practice.

CHAPTER 3

Review of the Literature

Despite the expansion of the role for the nurse in advance practice and the increasing autonomy that masters prepared nurses are obtaining, the literature does not document what should be taught from a pharmacological standpoint, the drug categories that should be taught, or how a pharmacology course should be taught to students earning an advanced practice nursing degree in a family based program. As a result of gains made in advanced practice, along with nurses gaining prescriptive authority throughout the United States, it is imperative that the pharmacology content be defined for this group of practitioners in order for students to acquire optimal learning of this subject.

One analysis by Waigandt and Chang (1989) does compare pharmacology training of nurse practitioner programs with that of medical and dental programs. This analysis only evaluated the hours of didactic course work spent in thirteen study categories of pharmacology. The study clearly shows that in 1989 nurse practitioners received 22.38 total hours of pharmacology training in their program compared to medical students who received 93.15 hours and dental students who received 65.29 hours. The study also concluded that ten of the thirteen pharmacological categories studied by all three groups were significantly different between nurse practitioners and medical and dental students with regard to didactic hours. In these ten categories, nurse practitioners had fewer hours than medical and dental students. According to Waigandt and Chan

(1989), "NP programs must endeavor to provide instruction equivalent to that in medical and dental programs" (p. 59). Pharmacological content for the nurse in advanced practice must also be based on the program for which they are enrolled and intend to practice. For example, geriatric programs must contain a geriatric based pharmacology course that emphasizes drug therapy in the elderly, while a family track program must contain a pharmacology course that relates to the family unit, encompassing drug therapy throughout the lifespan along with the types of drugs this population is most likely to require.

Depending upon the setting in which the nurse in advanced practice chooses to practice, as well as the geographic location, there will always be differences in drug prescribing among practitioners. Most of these differences, however, will be within drug classes. Therefore, once the nurse in advance practice is educated regarding the drug class, he/she should be able to utilize any of the drugs within that class, regardless of setting or location. For instance, once the nurse in advanced practice has been educated regarding the class of H-2 blockers used for peptic ulcer disease, he/she should quickly be able to have a working knowledge of all the drugs in this class, whether it be cimetidine (Tagamet®), famotidine (Pepcid®), or any of the other drugs in this class.

Another important issue that must also be taken into consideration is that nurses in advanced practice should not be required to have a thorough working knowledge of specialty drugs, such as chemotherapeutic agents used in treating cancer, or anti-retroviral agents used in treating patients with HIV/AIDS. If an advanced practice

nurse in a general practice setting is co-managing a patient who is taking a specialty class of drugs, then he/she should become familiar with those drugs to prevent adverse outcomes as a result of drug interactions or changes in drug efficacy. Furthermore, if a nurse in advance practice does decide to practice in a specialty area, further education in pharmacology is warranted with regard to the types of drugs he/she will be utilizing in that practice.

As a result of the lack of information regarding pharmacology course content for a family based graduate level nursing program, the major drugs and drug classes for the primary disease states that nurses practicing in this setting will encounter were derived from several sources. The sources include the 20 most frequent principle diagnoses encountered by general family practitioners, the 20 most frequent principle reasons for visits to general family practitioners (Ostergaard & Schmittling, 1997), and the top 200 prescription drugs prescribed by all practitioners (Zoeller, 1997). These sources adequately represent the disease states and drug classifications for all practitioners in a family or general practice setting, and therefore also represent the types of patients and prescription drugs that nurses in advanced practice will encounter in their practice setting.

The first source utilized was the top 200 drugs dispensed most often in U.S. Community Pharmacies for the 1996 calendar year (Zoeller, 1997). This list, of the top 200 prescribed drugs, lists the total number of new and refilled prescriptions for the 200 most prescribed drugs in U.S. community pharmacies in 1996. The list is compiled by the number of new prescriptions written, and prescriptions refilled in U.S.

community pharmacies by product name and manufacturing company. The list, therefore, may contain several entries of the same product manufactured by different companies. This must be taken into consideration when reviewing this list. For example, the antibiotic amoxicillin as a product is listed three times to make up three of the total 200 drugs in the list. Amoxicillin is first listed at rank number one under the name Trimox® from the pharmaceutical manufacturer Apothecon. The second listing of amoxicillin at rank fourteen is manufactured by the pharmaceutical company Beecham Labs. The third and final listing of amoxicillin, in the list of 200, is at rank 23 by the pharmaceutical manufacturer Biocraft.

The list of top 200 medications can offer many insights into the most prescribed medication categories by all practitioners, from specialists to general or family practitioners. General and family practice physicians have the highest number of office visits compared to all other physician specialties, accounting for 27.6% of all physician office visits (Ostergaard & Schmittling, 1997). This number exceeds all other physician specialities, with internal med physicians having the second highest number of office visits of 14.3%. The assumption can therefore be made that general and family practice physicians are the largest group of prescribers of the medications on this list.

The 200 top prescribed drugs can then divided into 18 separate categories (see Figure 2). These eighteen categories were developed to represent the primary use, actual use, or American Hospital Formulary Service (1997) classifications to encompass all drugs within the list. The most prescribed category was that of anti-

infective agents, which included anti-microbial, anti-fungal and anti-viral agents. Figure 2 lists all eighteen categories and the entities contained within each category.

The second source utilized to determine the pharmacological categories that should be taught for this course comes from the 20 most frequent principal diagnoses for visits to general family practitioners in the United States, and the 20 most frequent principal reasons for visits to general family practitioners in the United States (Ostergaard & Schmittling, 1997; see Figures 3 & 4). According to Ostergaard & Schmittling (1997) "when categorizing the principal reason for patient visits to the offices of primary care physicians, it becomes clear that many of the most common symptoms are presented to the offices of family physicians" (p. 1148).

Figures 2, 3, and 4 may then be combined as Figure 5, in which the 18 drug categories are listed with the corresponding reason for visit and diagnoses that could be applied to each classification. This allows for stronger documentation of the drug categories/classifications that should be taught at this level. The majority of drug classifications are repeated frequently within the reasons for visits and diagnoses categories. Although psychotropic and anti-diabetic agents did not have a principle reason for visit, one can assume that for both of these categories of medications patients may present for another reason.

Therefore, based upon these sources, their relationship to general family practitioner prescribing, and the role of the nurse in advanced practice the drug categories/ classifications were developed to be included for this course (Figure 6). It is also important that this content be updated every two years using the same

information that has been used to develop the drug classifications/categories for this course in order to stay current and up to date. Another useful source that can be used once the course is implemented would be a survey from the students who have taken the course. This survey would be undertaken at yearly intervals for the students' first three years in practice to determine the drug categories/classifications that they are utilizing in practice to support or help modify the curriculum content.

Course Text

The text that will be utilized for this course is the Textbook of Therapeutics: Drug and Disease Management edited by Eric T. Herfindal and Dick R. Gourley. The casebook that accompanies this text, edited by Donna Schroeder, will also be utilized for the lab portion of this course. This text was selected because of its therapeutic basis as it relates to the pharmacology of disease management. The text is organized by disease groups and gives the student the tools to manage the disease, establish treatment plans, outcome goals and monitoring parameters which are all consistent with the role of the nurse in advance practice. The text also emphasizes quality and cost with regard to disease management with drugs, thus working from a realistic approach in today's health care environment.

The casebook is designed to assist the student in the development of therapeutic skills, and make patient-specific decisions. The cases are developed in a SOAP (Subjective, Objective, Assessment, Plan) format, consistent with the way nursing students are educated in charting and looking at the entire picture of the patient. This

format will not only enhance the students decision making expertise but also advance their method of thinking.

CHAPTER 4

Pharmacology Sections Approach

Appropriate prescribing and prescriptive authority plays a major role in enabling advanced practice nurses to provide comprehensive care, whether they practice in a specialty area or family practice setting. The scope of practice for nurse practitioners in the United States encompasses birth through aged clients, with the health problems they manage being acute, preventative or chronic in nature according to Holland, Batey & Dawson (1985, p. 44). Therefore a pharmacology course for student nurses in an advanced practice family program must gain a thorough working knowledge of the drugs they will be utilizing in this practice setting that also encompasses the entire lifespan.

Course Structure

It is important that a solid cellular level therapeutics-based pharmacology course prepare the APN student with a rational basis in the pharmacologic management of patients with simple, acute, chronic, and complex conditions, as well as for the prevention of disease.

The course is designed as a four credit hour semester course in a 4 (3+1) format. Each week will include three clock hours of lecture (3 credits) and a three hour lab (1 credit) in which case studies are reviewed and discussed in small groups. Case studies will help the participants develop skills needed in therapeutics and provide the facts and

knowledge to make therapeutic decisions and also help the student in making patient-specific decisions related to drug therapy (Schroeder, Gourley, & Herfindal, 1996). Ideally the course should be taught after an extensive pathophysiology course, but prior to students beginning their clinicals so that they will have a strong base and working knowledge as they begin their clinical course work.

Although participants may arrive with a strong background in pharmacology from their baccalaureate course work, this course will build on the knowledge the students have previously gained. The course will build from the basics of pharmacology into specific drug therapy, placing a strong emphasis on therapeutics.

Content Rationale

The course will begin with the basic principles of pharmacology. Beginning at this level will help to emphasize and begin to lay the groundwork for understanding and applying pharmacology as the scientific study of drugs in living systems, which also includes pharmacokinetics, pharmacodynamics, and pharmacotherapeutics.

The concepts of pharmacokinetics should be taught first so that the student understands factors affecting routes of administration, plasma drug levels, duration of therapeutic effects, volumes of distribution, half-life, and clearances, along with how changes and differences in patient characteristics (e.g., sex, age, gender, disease) and how drug characteristics (e.g., formulation, water and lipid solubility, molecule size) affect drug therapy. Students should also be taught how to calculate creatinine clearance, half-life, and changes in drug dosages associated with patient changes in

liver and renal functioning.

Once a strong understanding of these principles are identified, the course can proceed to the principles of pharmacodynamics. Pharmacodynamics is defined by Ross & Gilman (1985) as "the study of the biochemical and physiological effects of drugs and their mechanisms of action." (p. 35). Pharmacodynamic principles include:

1. mechanism of drug action, including structure activity relationships and cellular sites of drug actions,
2. quantitation of drug-receptor interactions, and
3. the relationship between drug dosages and the patient response which includes potency, biological variation, and maximum efficacy.

To complete the basic principles, the students should finally be taught the principles of therapeutics. Principles of therapeutics should be designed to teach students individualization of drug therapy and how patients respond differently to the effects of drugs, along with how to approach these differences. This section can also be utilized to teach students about drug-drug interactions, tolerance, adverse drug reactions and drug toxicity. The principles of therapeutics will then remain the philosophy for which this course is taught.

The next and final section, before advancing to specific drugs and agents, is the regulation section. This section could be taught at the very beginning of the course or placed here. It warrants a place here to bring into account the realization of prescribing and what is entailed. This section should teach the student about drug regulation and development, drug nomenclature, classification, prescription writing and drug

information sources.

Once the above general information regarding pharmacology, pharmacokinetics, pharmacodynamics, therapeutics and regulations has been taught, specific information regarding drugs can begin.

Specific information regarding drugs can be presented three different ways. One method of presenting this information is through the use of drug classes (ie. calcium channel blockers, ACE inhibitors). A second method utilized in teaching drug information is classified as disease states (ie. asthma, hypertension). The third method utilized is in reference to body systems (ie. gastrointestinal tract, cardiac disease). Utilizing any of these methods is effective and offers a great exposure to the majority of drugs and drug classes. A solid argument can be raised regarding the utilization of teaching drugs by any of these methods. To prevent overlap and repeat of information, and to approach the information in a similar fashion that the APN will be using in practice, a clinical pharmacology and therapeutics approach will be adopted. This approach will combine all three methods while utilizing a more clinical approach in teaching pharmacology at this level.

Primarily a disease state approach will be used. In order to offer a more in depth coverage of drugs, however, drug classes in their entirety will periodically be discussed even though they may not be warranted for the disease. For example, while talking about infectious disease, all classes of antibiotics will be covered even though coverage will mainly be focused on antibiotics for otitis, sinusitis, pneumonia, pharyngitis and urinary tract infections. Another approach utilized will be related to reasons for visits

to a general family practitioner, such as constipation and diarrhea, which will then place the emphasis on the gastrointestinal system, because of the mechanism of action for the drugs used.

Information on various drugs and drug classes discussed should primarily include:

a. indications for use

b. mechanism of action (primarily at the cellular level and more broadly when indicated)

c. expected physiologic and/or psychologic response

d. adverse drug reactions

e. contraindications

f. untoward effects

g. drug interactions

h. dosages

Lectures regarding disease states and specific drugs will begin with the cardiovascular agents, which will include drugs used for congestive heart failure, angina, hypertension, diuretics and lipid lowering agents. The next topic section will include the endocrine system, which will include diabetes mellitus, thyroid medications and corticosteroids. Respiratory medications will be covered next and include asthma or reactive airway disease, allergic rhinitis and head colds, cough and nasal congestion, and chronic obstructive pulmonary disease. The gastrointestinal (GI) system will be the next area covered, inclusive of drugs used for peptic ulcer disease, reflux esophagitis and GI complications, such as diarrhea, constipation, nausea and vomiting.

Infectious disease will be the next topic section covered, as well as the most extensive for this course. This is important because most advanced practice nursing curriculums do not cover the subject in depth as it pertains to microbiology and the appropriateness of antimicrobial prescribing. As a result of the increasing resistance to antibiotics occurring today, nurses in advanced practice need to have a strong basis, rationale, and reason for the antibiotics they will be prescribing. This section will include immunizations, otitis, sinusitis, pneumonia, pharyngitis, urinary tract infections, sexually transmitted diseases and a small overview on HIV/AIDS and the immunocompromised host.

The next topic section will include female hormonal contraception with oral birth control, and estrogen replacement therapy. This section will also discuss drugs in pregnancy and breast feeding.

Psychotropic and neurological medications will be covered next and include agents used for anxiety, sleep disturbances and depression, along with medications used for seizure disorders and parkinsons syndrome. Although these diseases are usually managed by a specialist and co-managed with a family practitioner, it is important that family nurse practitioners have a good understanding of these drugs because of the side effects, drug-drug interactions, and therapeutic levels that many of them warrant. It is extremely important for family practice nurse practitioners to have a good working knowledge of the drugs in these classes, because on a short term basis they will encounter reasons to prescribe them.

Pain management and arthritis is the next topic section that will be covered. This

section can be somewhat difficult to cover because many controlled substances exist for the management of pain, and the majority of states do not allow nurse practitioners to prescribe these agents. Therefore it is problematic to determine how much emphasis should be placed on this topic. It is important for the student to understand their use and more importantly, when they should be prescribed. Nurse practitioners may be the initial evaluator for patients in pain, and therefore will need to know if the need for stronger narcotic analgesia would be beneficial for the patient. This section will also cover non-steroidal anti-inflammatory agents and skeletal muscle relaxants.

The final section will primarily include topical agents used in the treatment of dermatological disorders. It is important for the nurse in advance practice to have an understanding of the various topical agents available for skin disorders because of the various products available, as well as the difficulties that can occur when used improperly.

The entire course curriculum/calendar is represented in Figure 6. It is based upon each week's lecture content and presentation and then the corresponding lab content that will be covered as well.

CHAPTER 5

Student Evaluation

According to Bruffee (1993) "The third responsibility taken on by teachers who organize consensus groups, or any other kind of collaborative learning, for that matter, is to evaluate the quality of students' work, both individual and collaborative" (p. 44). This is especially important during group work and in a group that brings along diverse members.

Student evaluations within collaborative learning can be fulfilled by teachers using two methods: as referees while the work is going on and as judges in evaluating the work once it has been completed (Bruffee, 1993). It is important to evaluate the process using both methods in order to obtain a true comprehension of the students level of understanding.

For this course, evaluation will take place using both the method of a referee while the groups are discussing and collaborating on case studies during lab time, and also evaluating written work that will be handed in by one student of the group for each lab time.

During the lab time the class will be divided into groups consisting of four or five participants per group. The groups will all have several case studies based upon previous lecture material to review, discuss, and answer questions regarding the cases. During the discussion the instructor will interact with all of the groups, spending time listening, provoking thought among the members, as well as keeping the groups on

track. At the end of each lab session one student will write a synopsis of one of the cases that was discussed. This synopsis will include a short SOAP note of the case, answers to the questions that are presented for the case, rationale for the answers. along with a brief overview of any contributing factors in the case. Notes, text and case information may be utilized during this time but this synopsis should be written without the assistance of other students. Throughout the course each student will be asked to provide between 2-4 synopses, depending on the size of the groups. A copy of this synopsis will be handed to the instructor, as well as to each member of his or her group. Each member of the group will then critique the synopsis that was written, making corrections that each feels is necessary to further convey their reasoning, or completely changing the information if they feel the writer did not understand the rationale that the group decided upon. All critiques will then be handed into the instructor and be evaluated against the first synopsis to assess differences that were found, and then to assess how each member evaluated the case both separately, as well as with members of his or her group.

At the conclusion of each lab session, the instructor will approach each group and discuss for 5-10 minutes the findings that the group arrived at and share, when indicated, the conclusion that other groups arrived at.

These methods will evaluate each groups work, as well as the work of each student. The group as a whole will be evaluated on their efforts of collaboration amongst members, and active participation during lab group discussion. The students writing the synopsis will be evaluated on the comprehension of each synopsis written with

regard to rationale and justification, along with their ability to SOAP the case and the correctness in answering the case questions. They will then be evaluated with regard to the written critiques from their group members to assess their comprehension with the discussion that took place in the group.

This method of evaluation allows each student to view the case from their own standpoint, but also allows them to utilize the expertise of their colleagues, which is highly warranted for the nurse in advance practice.

Course Evaluation

This course will be evaluated using multiple techniques. All students will be given an evaluation tool (adapted from Michigan State University College of Nursing) at the end of the course to evaluate the course, course objectives, and instructor(s) ability based on a five point scale (1=strongly agree; 2= agree; 3= disagree; 4=strongly disagree; 5=not applicable). The evaluation will be based on the following questions:

Course Evaluation Questions:

1. The course was consistent and met the objectives and intent.
2. The course content was relevant to my learning needs.
3. The content was organized to facilitate learning
4. The course length was sufficient to meet the objectives

Personal Objectives:

1. The course allowed me to develop a better foundation for prescribing pharmacological treatment given the patient history.

2. The course provided rationale for appropriate medication prescribing for the primary care patient.
3. The course increased my knowledge in being able to evaluate clinical indications, contraindications, side effects, dosages, and interactions related to pharmacological agents discussed.
4. The course gave me a better understanding of terminology and pharmacological issues related to drug therapy.
5. The course discussed proper dosages, general mechanisms of action, monitoring guidelines, and at least three general side effects for each class of medications discussed.

Instructor Evaluation:

1. The instructor was able to keep my attention and interest.
2. The instructor related information in a systematic manner.
3. The instructor demonstrated a high level of skill and knowledge.
4. The instructor used examples to clarify content.
5. The instructor presented information at an appropriate level of difficulty.

The second method of course evaluation will come from surveying students who have participated in the course once they are in practice. All students will be surveyed for the first three years of their practice to assess the course for content, depth of content and information they feel the course should have covered. This information will be reviewed each year looking for trends and patterns.

Implications for Practice

This course is designed to enhance the pharmacology knowledge base relative to prescribing, pharmacological action, and clinical decision making for nurses in advanced practice. This will allow the nurse in advance practice to have a greater respect and understanding of drug therapy, apply general principles of pharmacology to improve patient care and outcomes, and to gain a stronger reputation among other disciplines in the medical profession.

A strong basis of pharmacology is important in prescribing, not only because of the impact on the patient alone, but also on the population in the community. For example, as a result of the explicit antibiotic/infectious disease component in this course the nurse will also have a greater understanding of the antibiotic resistance patterns and problems that we are facing, thereby allowing more effective prescribing in treating patients with antibiotics which will not only lead to greater patient outcomes, but will decrease the incidence of resistance to antibiotics that is exponentially increasing on a yearly basis throughout the community as a whole. Thoughtful and appropriate prescribing with regard to antibiotics is one of the major defenses we currently have to help decrease the resistance of bacteria to antimicrobial agents.

This course will also allow the nurse in advance practice to feel more comfortable in prescribing and drug monitoring, therefore promoting and allowing a more secure feeling when prescribing. This security will help the nurse reach optimal pharmacological therapy promptly, therefore improving patient outcomes more quickly and potentially preventing complications that may exist by not maximizing drug

therapy. This will also have a greater effect financially. For example, a nurse in advance practice who is not completely comfortable from a pharmacological standpoint, assesses a patient with extremely high blood pressure. As a result of her expertise she initiates an antihypertensive medication at a reduced level for fear of dropping the blood pressure too much. This necessitates the patient returning to the office/clinic several times before the blood pressure is well controlled, therefore increasing the financial expenditures of the patient or insurance. Similarly, if the patient has further complications before the blood pressure is well under control, this may also lead to greater financial expenditures on the part of the patient or insurance company.

This course will also assist the nurse in advance practice to develop his/her own specialized formulary. Discussion of the majority of medications in each class will allow the nurse to evaluate major drug classes and choose one to three drugs from each class to prescribe, therefore allowing a greater understanding of the medications that he/she is prescribing, not only from a therapeutic and pharmacologic standpoint, but also in regard to adverse reactions, patient information, and drug interactions. This course will give the nurse an opportunity to discuss and review most of the drugs in the drug classes reviewed and allow him/her the opportunity to select drugs from each class in his/her practice that are most appropriate for the patient population in which he/she is involved.

From a practice standpoint, this course will give the nurse in advance practice the knowledge skill and expertise to collaborate and work with other professionals (physicians, pharmacists, etc.) regarding pharmacology and drug therapy. This course

should give nurses the knowledge to discuss changes in drug therapy not only from a pharmacological basis, but also regarding pharmacokinetics, and pharmacodynamics as well. This will not only enhance the nurses skill level but also increase the reputation for this level of practitioner.

Implications for Research

This course can now be used as the foundation for further research as it pertains to pharmacology, prescribing and prescriptive authority for nurses in advanced practice. Further research in prescribing patterns of nurses in advanced practice will need to be complete. One method in doing this would be to look at the practice patterns of the nurse in advanced practice along with that of physicians for common disease states.

This course also has the variability of being taught as a computerized WEB course or as workshops for continuing education credits for nurses currently in advanced practice. For those types of courses further research can be accomplished in assessing the changes in practice patterns this course would have for the nurse participating. This could be accomplished through the use of pre and post tests or case studies. One could also use a follow-up questionnaire after three months of taking the course to assess the changes the course had on the nurses prescribing patterns.

This course and further research will have a further impact with regards to prescriptive authority for nurses in advanced practice.

FIGURE 1

Model of Cooperative Learning for Nursing Education (Beck, 1995)

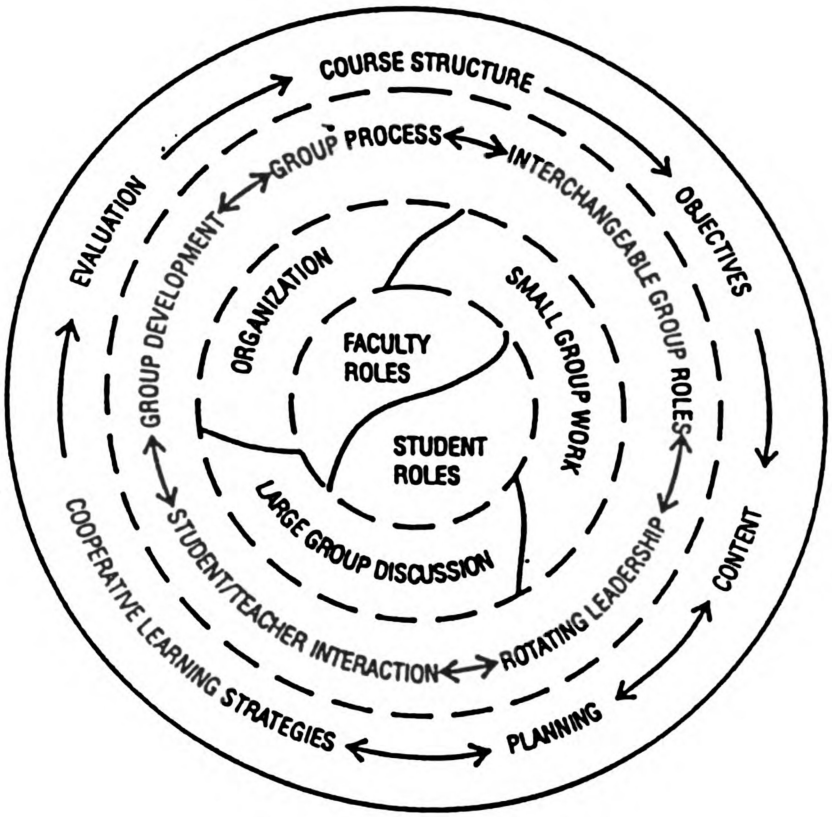

FIGURE 2

Classification of the Top 200 Drugs

No.	Drug Class
1	Anti-infectives (Antimicrobials/Antifungals/Antivirals)
2	Anti-hypertensives (ACE inhibitors/Calcium Channel Blockers/Alpha & Beta blockers)
3	Female Hormones (Birth Control/Post Menopause Replacement hormones)
4	Pain Medications (Centrally acting analgesics with Acetaminophen/NSAID's)
5	Psychotropics (Anitdepressants/Anxiolytics/Hypnotics/Antipsychotics)
6	Respiratory Medications (Bronchodilators/Antihistamines/Steroid inhalants)
7	Gastro-intestinal (H-2 blockers/Proton Pump Inhibitors/Misc. GI drugs)
8	Anti-diabetic (Insulin/Oral Hypoglycemic Agents)
9	Diuretics
10	Thyroid Replacement
11	Lipid Lowering Agents
12	Cardiovascular Agents (Postive Inotropic Agents/Vasodilators/Anticoagulants)
13	Misc. Agents (Anorexigenic Agents/Stimulants/Misc. CNS Agents/Hemorrhealogic Agents)
14	Topical Agents (anti-infectives/Steroids)
15	Anticonvulsant Agents
16	Potassium Chloride Supplements
17	Steroids (oral)
18	Muscle Relaxants

FIGURE 3

Office Visits by 20 Most Frequent Principal Diagnoses for Visit: United States, 1993

No.	**Principal Diagnosis**	**No. of visits (in thousands) to General Family Practitioners**
1	Essential Hypertension	13,363
2	General medical examination	7,627
3	Acute URI of multiple & unspecified sites	7,534
4	Bronchitis not specified as acute or chronic	6,196
5	Chronic sinusitis	5,577
6	Suppurative and unspecific otitis media	5,210
7	Diabetes mellitus	4,940
8	Acute pharyngitis	4,796
9	Health supervision of infant or child	3,961
10	Sprains and strains of other and unspecified parts of back	3,486
11	Asthma	3,284
12	Normal pregnancy	3,044
13	Special investigation and examination	2,616
14	Other disorders of urethra and urinary tract	2,521
15	Influenza	2,413
16	Allergic rhinitis	2,364
17	Dorsopathies, other and unspecified disorders of back	2,153
18	Symptoms involving respiratory system and other chest symptoms	2,057
19	Depressive disorders, not elsewhere classified	2,006
20	Rheumatism (excluding back), other disorders of soft tissue	1,959

FIGURE 4

Office Visits by 20 Most Frequent Principal Reasons for Visit: United States, 1993

No.	Principle reason for visit of patient	No. of visits (in thousands) to General Family Practitioners
1	Cough	10,639
2	General medical examination	8,693
3	Symptoms, referable to throat	8,403
4	Back symptoms	5,946
5	Ear ache, or ear infection	4,894
6	Head cold, upper respiratory infection (coryza)	4,620
7	Hypertension	4,513
8	Stomach and abdominal pain, cramps, spasms	4,411
9	Blood pressure test	4,260
10	Headache, head pain (excluding sinus and migraine)	4,167
11	Physical examination required for school or employment	3,964
12	Well baby examination	3,765
13	Skin rash	3,490
14	Fever	3,172
15	Nasal congestion	3,047
16	Prenatal examination, routine	3,025
17	Chest pain and related symptoms (excluding heart pain)	2,922
18	Papanicolaou smear	2,791
19	Neck symptoms	2,737
20	Medication, other and unspecified	2,653

FIGURE 5

Categorical Combination

Top 200 Drug Classification	**Principal Reason for Visit**	**Principal Diagnoses**
Anti-infectives	Symptoms, referable to throat Ear ache, or ear infection Head cold upper respiratory Fever	Acute URI or multiple & unspecified sites Bronchitis, not specified as acute or chronic Chronic sinusitis Suppurative and unspecific otitis media Acute pharyngitis Other disorders of urethra and urinary tract Influenza Symptoms involving respiratory system and other chest symptoms
Anti-hypertensives	Hypertension Blood pressure test	Essential hypertension
Female Hormones	Papanicolaou smear Prenatal examination (routine)	Normal pregnancy General medical examination
Pain Medications	Back symptoms Headache, head pain (excluding sinus and migraine) Neck symptoms	Sprains and strains of other and unspecified parts of back Dorsopathies, other and unspecified disorders of back Rheumatism (excluding back), other disorders of soft tissue
Psychotropics		Depressive disorders, not elsewhere classified
Respiratory Medications	Cough Head cold, upper respiratory infection Nasal congestion	Acute URI of multiple & unspecified sites Allergic rhinitis Asthma
Gastro-intestinal	Stomach and abdominal pain, cramps, spasms	Special investigation and examination
Anti-diabetic		Diabetes mellitus
Diuretics	Hypertension Blood pressure test	Essential hypertension

FIGURE 5

Categorical Combination (Con't.)

Thyroid Replacement	Medication, other and unspecified	General medical examination
Lipid lowering Agents	Hypertension Blood Pressure test Chest pain and related symptoms (Excluding heart pain)	Essential hypertension
Cardiovascular Agents	Hypertension Blood Pressure test Chest pain and related symptoms (Excluding heart pain)	Essential hypertension
Misc Agents	Medication, other and unspecified	Special investigation and examination
Topical Agents	Skin rash	Special investigation and examination
Anticonvulsant Agents	Medication, other and unspecified	Special investigation and examination
Potassium Chloride Supplements	Hypertension Blood Pressure test	Essential hypertension Other disorders of urethra and urinary tract
Steroids (oral)	Skin rash Medication, other and unspecified	Acute URI of multiple & unspecified sites Asthma Allergic rhinitis
Muscle Relaxants	Back symptoms Neck symptoms	Dorsopathies, other and unspecified disorders of back

FIGURE 6

Pharmacology Course Curriculum/Calendar

Week	Lecture Content	Lab Content
One	Pharmacokinetics Absorption/Distribution/Metabolism Plasma Drug Levels Volume of Distribution Half-Life Clearance Patient Specific Differences Disease Specific Differences	Application of Drug levels Application of the cytochrome P-450 Metabolism Pathway
Two	Pharmacodynamics Mechanism of Action Drug/receptor Interaction Drug/dose Response Relationship	Case Study Calculations
Three	Therapeutics Individual Drug Variation Response to Drug Therapy Drug/drug Interactions Drug Tolerance/addiction Adverse Drug Reactions Drug Toxicity	Regulations Drug nomenclature Drug development Drug information Writing prescriptions Legal and ethical issues of prescriptive authority
Four	Cardiovascular Agents Congestive Heart Failure Angina Hypertension I	Case Studies
Five	Cardiovascular Agents (Con't.) Hypertension II Diuretics Lipid Lowering Agents	Case Studies
Six	Endocrine Diabetes Mellitus Thyroid Corticosteroids	Case Studies
Seven	Respiratory Medications Asthma (Reactive Airway Disease) Allergic Rhinitis/Head Cold Cough/Nasal Congestion C.O.P.D.	Case Studies

FIGURE 6

Pharmacology Course Curriculum/Calendar (Con't.)

Week	Lecture Content	Lab Content
Eight	Gastro-intestinal Disorders Peptic Ulcer Disease Reflux Esophagitis GI Complications Diarrhea/Constipation Nausea and Vomiting	Case Studies
Nine	Infectious Disease I Immunizations Otitis Sinusitis Pneumonia Pharyngitis	Case Studies
Ten	Infectious Disease II U.T.I.'s S.T.D.'s HIV/Immunosuppressed Patients	Case Studies
Eleven	Female hormonal contraception Estrogen Replacement Therapy Drugs in Pregnancy Drugs in Lactation	Case Studies
Twelve	Psychotropics Anxiety Sleep Disturbances Depression Neurology Seizure Disorders Parkinsons Syndrome	Case Studies
Thirteen	Pain Management/Arthritis Centrally Acting Analgesics Non-Steroidal Anti-Inflammatory Agents Skeletal Muscle Relaxants	Case Studies
Fourteen	Dermatology Acne/Dermatitis/Psoriasis Burns Infections	Case Studies

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