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Assessment of Learning Achievement and Practice Outcomes: Impact of a Problem-Based Learning Course in Continuing Pharmacy Education

by

Arlene I. Ponting

A thesis

submitted to the Faculty of Graduate Studies and Research

in partial fulfillment of the requirements for the degree of

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "Assessment of Learning Achievement and Practice Outcomes: Impact of a Problem-Based Learning Course in Continuing Pharmacy Education," submitted by Arlene I. Ponting in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Educational Administration.

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This thesis is dedicated to my husband, Phil. His support and constant encouragement were integral to the completion of this work. This thesis is also dedicated to our children, Cathy, Stuart, and Maureen, whose understanding and sacrifices are greatly appreciated.

Abstract

Assessment of Learning Achievement and Practice Outcomes: Impact of a Problem-Based Learning Course in Continuing Pharmacy Education is a case study of the course Pharmacy and the Golden Years, Level II. The purpose of this study was to evaluate this course, which incorporates problem-based learning; to advance the field of CPE with respect to new learning and evaluation methodologies; and to assess the learning achievement and practice outcomes that have occurred as a result of the course.

Data were collected through the use of several assessment and evaluation forms, the scoring of a pharmaceutical care plan submitted by each student, and by conducting interviews of randomly selected pharmacists. Descriptive statistics of the data from the evaluation forms were analyzed. The pharmaceutical care plan was carefully marked by experts, who assigned an holistic and an analytical score using a detailed answer key. There was a strong correlation among the three scorers and between the holistic and analytical scores. The study provided information on how care plans can be marked and suggests that holistic scoring by an expert is reliable. Transcripts of the interviews were categorized and analyzed; interrater reliability was high.

The results show that the course increased drug-information skills and access to drug information, but only slightly increased the frequency with which information is used. The course increased abilities of the participants to communicate with physicians but did not significantly increase the frequency of this interaction. The course improved abilities to identify, prevent, and resolve drug-related problems. Pharmaceutical care also requires working collaboratively with the patient and other health care providers. Few pharmacists were writing care plans, but several were applying some aspects of pharmaceutical care. Most were solving the drug-related

problems studied in the course when encountered in practice. It is not clear whether learning is transferred to different drug-related problems.

The naturalistic approach of discussing practice outcomes with participants provided valuable information about the course and the application of learning to practice. Further study is required to determine whether PBL is more effective than traditional methods.

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I appreciate the assistance of course developer Cheryl Cox, who worked with the Division of Continuing Pharmacy Education to develop this course and who assisted in the design of the instruments and served on the test committee. The commitment and sharing of expertise of members of the test committee, Mr. J. Hanen, Mrs. T. Murzyn, Mrs. C. Turner, and Mrs. L. Romonko, is greatly appreciated, as is the careful scoring of the pharmaceutical care plans done by Mr. J. Hanen, Mrs. T. Murzyn, and Mrs. C. Turner.

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Chapter I

Introduction

The professions are undergoing rapid change and continuing professional educators are facing the challenge of helping professionals learn and change. "To help professionals meet the challenge, those involved in continuing education for the professions must re-think their own approach to their craft" (Baskett, 1993, p. 16).

Deficiencies in Continuing Professional Education

The field of continuing professional education has been criticized for conducting poor evaluations which have contributed little to improvements in the field and have been directed primarily to proving the worth of a program. In addition, the continuing education programs themselves have been inadequate. Although the need for continuous updating is recognized, most current educational activities do not meet expectations and needs (Kantrowitz, 1991; Maudsley, 1993; Miller, 1987; Nowlen, 1988). Houle (1980) was critical of the current practice in continuing professional education, which he said is "characterized either by eager directness and naive faith or by an apparent belief that only marginal effort and uninspired instruction are needed to bring practitioners to ever higher levels of performance" (p. 299). He suggested that it is surprising that professionals, whose work demands a high level of knowledge and understanding, are willing to accept such simple unsophisticated programs for their own continuing learning endeavors. Most programs follow traditional views that learning is an individual act in which the learner receives knowledge and wisdom from an expert, and then translates this into practice (Baskett, 1993).

Changes in Pharmacy Practice

The pharmacy profession in Canada and the United States is redefining the role of the pharmacist and the requisite knowledge and skills. Over the past three years many professional organizations have endorsed the concept of pharmaceutical care as the mandate of the profession of pharmacy. These organizations include the Alberta Pharmaceutical Association, the Canadian Pharmaceutical Association, the Canadian Society of Hospital Pharmacists, the American Pharmaceutical Association, the American Association of Colleges of Pharmacy, the American Society of Hospital Pharmacists, and the National Association of Retail Druggists (C.Ph.A., 1992; Winslade, 1993). The pharmaceutical care model of practice differs significantly from traditional pharmacy practice. It requires a shift from a product focus to a patient focus, with pharmacists assuming shared responsibility for drug-therapy outcomes and the quality of life of patients (Hepler, 1987; Hepler & Strand, 1990). The task which continuing pharmaceutical education faces is the massive re-education and reprofessionalization of large numbers of practicing professionals (Hepler, 1987).

New Understandings of Professional Learning and Change

In the past two decades there has been a revolution in thinking about learning and change. Schön (1983) suggested that imparting rigorous, technical, rational knowledge does not prepare professionals for solving the messy, complex, problematic situations encountered in practice. Many educators are recommending experiential learning which is either field based or classroom based (Kolb, 1984; Lewis & Williams, 1994). Baskett (1993) suggested that we move from an "outside-in model," in which the learner receives knowledge from an expert, to an "inside-out model," in which the learner learns by experience through self-directed learning, team learning, peer learning, and creating knowledge.

Problem-based learning is a form of experiential learning because it uses practice situations encountered in practice. Galinsky and Nickman (1991) suggested that "a problem-based, pharmacist-centered approach to continuing education is an idea worthy of serious consideration" (p. 433). However, this method has been used only to a limited extent in continuing medical education (Kantrowitz, 1991) and there have been no reports of its use in continuing pharmaceutical education. There are many questions associated with its use in this setting (Kantrowitz, 1991). The Division of Continuing Pharmacy Education at the University of Alberta has designed and delivered two problem-based learning courses in geriatric pharmacy.

Research Purpose

Because of the deficiencies of evaluations and programs in continuing professional education, the purpose of this study was to use different evaluation strategies to determine if problem-based learning is a better method and to add to our understandings of evaluation and educational design in the health professions. The development and delivery of problem-based courses are very labor intensive and require a high level of commitment on the part of the continuing education unit, the course developers, the course writers, the course tutors, and, more importantly, the pharmacists. It is important to know if this type of programming is effective.

Research Question

What are the learning outcomes and practice outcomes that have occurred as a result of the problem-based learning course Pharmacy and the Golden Years, Level II?

Sub-Questions

1. Was the course Pharmacy and the Golden Year, Level II, well planned, developed, and delivered? Could learning and practice outcomes be reasonably expected?

2. Did the course help the pharmacists increase their ability to write pharmaceutical care plans, and are they doing this in practice?

3. Did the course help the pharmacists increase their ability to use drug information, and have they increased their access to and use of drug information as a result of the course?

4. Did the course help the pharmacists increase their ability to discuss drug-related problems with physicians, and are they doing this to a greater extent as a result of the course?

Definitions

For the purposes of this study, the following terms have been defined:

1. ***Continuing education:*** for health professionals can be defined as those processes that are intended to improve health care through learning, and which may be either performed individually or in conjunction with offerings of CE providers. The learning which results may maintain or enhance professional competence and performance or increase the effectiveness and efficiency of health-care organizations (Suter, 1981).

2. ***Evaluation:*** collecting and analyzing data to establish the outcome of an activity or program and to improve it. Evaluation seeks to determine how acceptable, effective, and efficient a program is and how it can be improved in these three areas (Engel, Vysohlid, & Vodoratski, 1990).

3. ***Experiential learning:*** the learner is immersed in an experience and then through reflection about the experience develops new skills, attitudes, or ways of thinking (Lewis & Wi iams, 1994).

4. ***Pharmaceutical care:*** the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life.

5. ***Pharmaceutical care plan:*** an outline of the drug-related problem, the desired goal to resolve the problem, alternate ways of solving the problem, recommendations to solve the problem, and monitoring methods to be sure the recommendations are working.

6. ***Problem-based learning (PBL):*** "an instructional method characterized by the use of patient problems as a context for students to learn problem-solving skills and acquire knowledge about the basic and clinical sciences" (Albanese & Mitchell, 1993, p. 53).

7. ***Tutor:*** an individual who may or may not have an expertise in the subject area, whose role is to facilitate the problem-solving process by guiding student learning and initiatives, but not by lecturing or providing solutions.

Significance of the Study

During the past decade considerable research has been conducted on how professionals learn and make change to their practice. Continuing education "should be based on research and theory from the behavioral and social sciences and studies of the learning and performance of professionals" (Fox, Davis, & Wentz, 1994). There is need for extensive research in continuing education to enable CE providers to promote and provide learning opportunities that are effective. Problem-based learning may be an effective approach; however, it has not been implemented in continuing pharmacy education. Research is required to determine if PBL is of value and if it reflects newer understandings of professional learning.

Chapter II

Literature Review

Evaluation in Education and the Social Sciences

"Evaluation is a new discipline but an ancient practice" (Scriven, 1991, p. 3). According to Scriven, the quest for quality is inherent to human activity; evaluation is the process of determining the merit, worth, or value of things. However, Scriven stated that evaluation has not reached its true potential because the field does not determine merit or net benefit; it primarily collects data. Progress has occurred in educational evaluation, as is illustrated by the following historical review.

History of Evaluation in Education

Over the past three decades the philosophy, purpose, and methodology of evaluation in education have evolved. The historical development of educational evaluation in the United States can be classified into three eras.

The first era was the Psychometric Era, spanning from the early 1900s to the 1930s. Evaluations in this era were (a) measurement oriented, (b) student centered, (c) conducted using the scientific paradigm of inquiry, and (d) oriented to standardized and objective measures that were norm referenced (Guba & Lincoln, 1981).

The second era was the Tylerian Era, from the 1930s to the 1940s and onward. In the 1940s Tyler advocated the use of learning objectives when planning educational activities. The purpose of the evaluation in the Tylerian model is to determine if the objectives have been achieved. This approach was widely accepted and is still very prominent in evaluations of continuing education in the health professions. Tyler's rational approach was an advance in the field because it (a) focused evaluation on curricula and programs, not just on students; (b) differentiated between measurement

and evaluation; (c) was easy to understand and apply; and (d) distinguished between process evaluation and impact evaluation (Guba & Lincoln, 1981; Worthen & Sanders, 1987). However, according to Guba and Lincoln, the model did not (a) provide explicit guidance on determining merit or worth from data, (b) evaluate the merit of the objectives themselves, or (c) provide guidance on how to judge the importance of discrepancies between objectives and performance.

The third era is the Modern Era, from 1965 to the present. Research in evaluation in the United States flourished after 1965 for several reasons: (a) the requirement that all federally funded program be evaluated, (b) the concern that the field lacked conceptual and methodological expertise, and (c) the fact that evaluations conducted to date were of poor quality. During the past two decades, educators have developed over 50 different evaluation models (Worthen & Sanders, 1987).

Educational evaluation is just one step toward educational improvement; however, it has greater promise than any other approach because it provides educators with the information needed to help improve educational practices (Worthen & Sanders, 1987). Many educational evaluations in the past have been poorly planned and badly executed, and have made little impact. Worthen and Sanders further suggested that expectations of what evaluations can accomplish have been unreasonably high. Evaluations can only identify strengths and weaknesses; they do not correct them.

Evaluation Models

One model that merits further discussion is the discrepancy model developed by Provus (1971). This model requires setting standards; determining whether a discrepancy exists between the performance of some aspect of the program and the standard set for that performance; and deciding, on the basis of the discrepancy, whether to improve, maintain, or terminate the program or some portion of it.

Stake (1967) proposed a more holistic approach by evaluating not just outcomes, but also antecedents (inputs) and transactions (process). Stake (1978) stated that the two basic acts (countenances) of evaluation are description and judgement. He advised evaluators to obtain data on unintended effects, to document observed aspects, and to compare this information to standards to make a judgment.

The two models described above are objectives oriented. Scriven (1974) advocated an opposite approach that he called "goal free evaluation." This method focuses on *actual* outcomes rather than *intended* program outcomes. Because bias is decreased and objectivity increased, the evaluator is more likely to observe unanticipated effects.

The management-oriented evaluation is another approach whereby the evaluator works closely with the administrator to identify decisions which were made with respect to the program, collects information about decision alternatives, and judges appropriateness of the decisions. The CIPP model, developed by Stufflebeam (1985), is the best known of this category. CIPP is derived from the words *context, input, process,* and *product.* This approach also assesses appropriateness of objectives and determines if objectives of the program have been achieved.

Criticism of the Field

Since the late 1960s the field of evaluation in the social sciences and education has been widely criticized. The major concern was the preoccupation of evaluators with rationalistic, objectivist, and mechanistic methods. Scriven (1991) claimed that this shortcoming occurs as a result of the value-free doctrine that is integral to the scientific method, and this emphasis conflicts with the mission of evaluation which is to determine merit, worth, or value systematically and objectively (to distinguish the worthwhile from the worthless).

Other well-known evaluators criticized the field of evaluation. Cronbach and a group of self-selected members of the Stanford Evaluation Consortium analyzed changes and problems in the field of evaluation (Cronbach et al., 1980). The authors called for a reformation in evaluation and presented their key ideas in the form of 93 theses. They suggested that evaluation should take several forms and that less rigorous approaches have value in many circumstances. They concluded that the symmetrical, nonsequential designs associated with laboratory research and survey research are rarely appropriate for evaluations. Evaluators often attempt to increase internal validity of the evaluation by using elegant designs; however, relevance is reduced as a consequence (Cronbach et al., 1980).

Parlett and Hamilton (1976) claimed that the scientific paradigm was not appropriate for studying innovative educational programs. Instead, they recommended a rich description of the program. This approach was referred to as *illuminative evaluation.* This model is concerned with description and interpretation, not measurement and prediction. The illuminative evaluation does not pass judgment but rather attempts to discover, document, and discuss the innovation and what it is really like to participate in it (Worthen & Sanders, 1987).

As early as 1979 Eisner expressed his concern about the use of scientifically grounded evaluation. He recommended a connoisseurship approach in which an expert in the area judges merit or value. Such an individual is able to appreciate and discern qualities and relationships that other less-skilled persons do not discern.

Stake's later writings, as described by Worthen and Sanders (1987), advocated a responsive evaluation in which the evaluator does not follow a predetermined evaluation plan but is responsive to the realities of the program. The evaluator interacts continuously with members of various stakeholder groups to determine what information they desire and how they would like to receive this information. The evaluator is not preoccupied with collecting precise data, but instead uses qualitative

techniques of observations and negotiations (Worthen & Sanders, 1987). Stake (1978) also advocated a case study method of inquiry because this method provides the reader with a natural basis for generalization.

Guba and Lincoln (1981) developed the naturalist evaluation model that takes into account the different value perspectives of the participants. The naturalistic approach studies the educational activity as it occurs naturally without constraining, manipulating, or controlling variables, as is the case in experimental research. The evaluator describes the informants' perceptions of the educational program and thereby enhances the reader's understanding of the study.

Evaluation in Continuing Education in the Health Professions

There are also shortcomings with respect to the purpose, design, and utility of evaluation of continuing education in the health professions. This is significant because the field is constantly challenged to prove the effectiveness of continuing education (Stufflebeam, 1985).

To address these concerns, the University of Southern California organized a conference of academicians and practitioners in continuing education in the health professions. The intention was to bring experts in education evaluation, who had little or no experience in the health professions, to discuss the issues and problems facing evaluators of continuing education in the health professions (Green, 1985).

Problems With Evaluation in Continuing Education in the Health Professions

At the above conference Stufflebeam (1985) outlined the following three deficiencies of evaluation practices in continuing education in the health professions:

1. The criteria for assessing evaluations in CE in this field are much too narrow. Two methods are predominant: randomized experimental research and determination of achievement of objectives. Evaluators in this field have almost

exclusively employed internal and external validity as the standard to judge quality and have not complied with standards for utility, feasibility, and propriety. This has led to suboptimization, resulting in unrealistic studies which have yielded information of limited utility. A wide range of modern methods should be employed.

2. Evaluations fail to take into account the uniqueness of professionals. Although the field emphasizes the importance of diagnosing and addressing individual learning needs, evaluations are conducted which assess the worth of programs based on average scores of a group measure.

3. The field is concerned almost exclusively with proving the worth of a particular continuing education program and shows little concern for designing and conducting evaluations to foster the improvement of programs. Evaluation studies rarely evaluate the quality of the program; therefore, conclusions are often drawn, based on weak educational treatments. No attempt is made to determine if an observed effect or treatment is meritorious, if the objectives are appropriate, if negative unanticipated effects have occurred, if alternative treatments are better, or if the costs can be justified. Evaluations should determine if the program translates existing theory and knowledge into practice. Stufflebeam (1985) stated that

> evaluation in this field seems embroiled in an identity crisis: while the annual cost of continuing education in the health professions is counted in the millions of dollars, specialists in continuing education in the health professions are hard pressed to identify even one evaluation that has demonstrated the worth of an investment in continuing education. (p. 33)

Green (1985) listed the following problems with continuing education in the health professions: (a) Rarely are CE programs designed to change the competence or performance of health professionals; (b) even if the program is systematically developed, the evaluation design does not definitively illustrate the impact of the educational activity; (c) rigorous scientific inquiry and controlled experimentation are impractical when evaluating CE for the health professions; and (d) the measurement

of competence and performance is not sufficiently developed to provide a baseline and a means to measure subsequent change.

A review of the literature illustrates further the shortcoming of the design and evaluation of continuing professional education.

Review of Evaluation in Continuing Education in the Health Professions

Bertram and Brooks-Bertram (1977) reviewed the literature on program evaluation in continuing medical education (CME) over a period of 17 years, from 1960 to 1977. They classified the studies into pre-experimental, quasi-experimental, and true experimental. The authors assessed 65 published articles according to evaluation design, validity of data-gathering instruments, and statistical analyses. The review did not describe the teaching methods used for the programs. The authors were unable to draw conclusions about the efficacy of CME because of the relatively descriptive and exploratory stage of CME evaluation.

Lloyd and Abrahamson (1979; cited in Stein, 1981) reviewed the CME literature published from 1966 to 1977 and identified 47 studies that used an objective method of evaluation, of which only 23 demonstrated changes in physician knowledge, competence, or performance.

Abrahamson (1984) summarized articles on CME from 1960 to 1982 and reported that only 6 of the 84 articles presented evidence of changes in patient outcomes as a result of CME. He described the development of CME evaluation as a progression from the assessment of attendance and participant satisfaction to the assessment of professional performance and patient outcomes.

Another review of over 200 articles was conducted to determine if the CME short course is effective (Davis, Putnam, & Gass, 1983). Evaluations were classified according to Type I (program perception or "happiness indexes"), Type II (measurement of competence), Type III (measurement of performance changes), and

Type IV (measurement of patient outcomes). Type I and Type II evaluations showed positive changes in the desired direction. Changes in behavior were less clearly shown. None of the studies evaluated patient outcomes. Davis et al. reported that there is no direct linear relationship between competence and performance, and performance and health care outcomes (p. 441). The authors recommended that educational objectives should determine the format of the short course, and that hands-on workshop experiences are necessary to achieve certain objectives.

Cervero (1984) recommended that several aspects of the program should be evaluated: (a) workshop design and implementation; (b) learner participation; (c) learner satisfaction; (d) learner knowledge, skills, and attitudes; (e) application of learning after the workshop; (f) the impact of application of learning; and (g) workshop characteristics associated with outcomes.

Nona, Kenny, and Johnson (1988) reviewed the literature in continuing education in pharmacy and other health professions to determine if the effectiveness of continuing professional education has been documented in the literature. In order to make the study more manageable, studies published before 1970 and studies which assessed participant satisfaction only were eliminated. They identified 142 studies that met their criteria. The review does not describe the educational treatments; it is solely concerned with outcomes. Several methods of evaluation were used in the studies. The study concluded that continuing education can be effective in improving professionals' abilities and performance. No attempt was made to explain why some programs were effective and some programs were not. Evaluation methods were all limited in scope.

McLaughlin and Donaldson (1991) reviewed the literature on the evaluation of continuing medical education from 1984 to 1988 to determine if programs were designed, implemented, and evaluated in order to enhance physician performance and improve patient outcomes. Of the 693 references identified, only 135 articles met the

criteria of the study. There were 89 reports that described evaluation techniques. Again there was a predominance of pretests-posttests and final examinations. Less frequently, performance audits, patient interviews, and chart reviews were conducted. The authors emphasized the importance of randomized controlled studies to ensure internal and external validity. They were "pleased" to report that CME programs nave included more scientific and quantitative assessments or evaluations in the last five years than in previous years. This illustrates shortcomings of the field, as expressed by Stufflebeam (1985) and Madaus (1985). The study concluded that CME does have an impact on physician performance and short-term patient outcomes. Only 68 (51%) of the articles described the educational methods employed; and of these, 56 (82%) used didactic teaching methods.

In another review of the literature, Davis, Thomson, Oxman, and Haynes (1992) located 777 CME studies, of which 50 met the selection criteria. One of the criteria was that the evaluation design be a randomized controlled design. The majority of the studies showed positive results in some important measure of medical practice.

This review of evaluation in continuing education for the health professions has supported Stufflebeam's (1985) assertion that the field uses limited evaluation methodologies with the randomized controlled study being considered the state-of-the-art. Manning (1985) advised educators in continuing education in the health professions to set realistic expectations for continuing education, to make a stronger commitment to evaluation of CE, and to improve evaluation methods.

These evaluations do not demonstrate significant learning and practice outcomes. However, this result may not be due solely to the design of the evaluation and failure to show effect; it may be more related to deficiencies in the design of the educational interventions (Green et al., 1984).

Effectiveness of Continuing Education in the Health Professions

The continuing education method most preferred by physicians is reading (Clark, Campbell, & Gondocz, 1993; Curry & Putnam, 1981). Curry and Putnam asked physicians what method of learning provided the greatest impetus to change their way of managing patients, and 42.5% chose reading compared to 11.8%, courses; 14.6%, informal discussions; and 12.4% consultations. However, little research has been conducted on the effectiveness of reading. Evans et al. (1986) conducted a randomized trial of a mailed continuing education program. They reported that the program led to significant knowledge gain over the short term, but that there was little retention of the knowledge, and the materials had no impact on practice performance.

Stein (1981) reviewed eight studies published during the 1970s that reported a change in physician behavior. The author claimed that these programs were effective because they incorporated sound educational principles and systematically evaluated learner achievement. The author concluded that didactic instruction alone is insufficient, but participative methods, such as hands-on experience, small-group discussion, and self-study materials, can improve performance.

Grosswald (1984) outlined two conditions that increase the chances of a continuing education activity enhancing professional learning and/or changing present practice: (a) The activity must be based on something the learner has the need and motivation to learn, and (b) learning activities must be designed to use methods and media that are most appropriate for achieving the goals of the program.

Davis et al. (1992) reported that continuing medical education programs which use practice-enabling or reinforcing strategies improve physician performance and in some instances health-care outcomes.

The traditional view in continuing professional education is that learning is an individual act in which professionals receive knowledge and wisdom from experts,

usually in a lecture format, and then translate this to practice (Baskett, 1992, 1993). Maudsley (1993) stated that "until recently, the longest and arguably the most critical component of the medical education continuum has relied on passive methods of learning which are of limited value in changing and improving the performance of physicians" (p. 53). Throughout the world, continuing medical education is content oriented, lecture based, teacher dominated, episodic, and is rarely education, but rather instruction (Kantrowitz, 1991; Miller, 1987). Continuing education programs have primarily focused on transferring knowledge; however, knowledge alone is not sufficient for competence (Maudsley, 1993) . This knowledge, which is acquired, is not in a working, usable form (Kantrowitz, 1991).

Nowlen (1988) described continuing professional education in the following way:

> A single instructor lectures and lectures and lectures fairly large groups of business and professional people, who sit for long hours in an audiovisual twilight, making never-to-be-read notes at rows of narrow tables covered with green baize and appointed with fact binders and sweating pitchers of ice water. (p. 23)

When professional schools moved to the universities, craft knowledge was devalued and replaced by scientific, rational, and universal knowledge (Baskett, 1993). Continuing education has followed this preservice model, focusing on the transmission of formal knowledge (Cervero, 1992). A further limitation of preservice education is that professionals are not taught how to decide when what they learned is no longer valid and needs to be changed; students are not taught how to keep up-to-date (Sackett & Hayes, 1991). Cervero (1992) stated that knowledge acquired from practice is necessary for wise action in practice and that "a model of learning from practice should become the centerpiece of systems of continuing education for the professions" (p. 92). According to Fox, Mazmanian, and Putnam (1989), physicians learn experientially by doing things and deliberately by thinking, reading, and reflecting.

Building on these new understandings of how professionals learn and change, the Royal College of Physicians and Surgeons of Canada has developed a maintenance of competence program (MOCOMP) which helps specialists critically evaluate continuing education activities, values self-directed learning, facilitates self-recording of learning activities, and encourages reflection about the learning and its appropriateness for application in practice. This program also enables specialists to compare their learning activity with that of their colleagues (Parboosingh & Thivierge, 1993). The MOCOMP program is designed to encourage self-directed learning and to improve the ability of continuing education programs to improve professional performance (Fox, 1993).

How Professionals Learn

In the past two decades there has been a dramatic change in how we understand learning. We are refuting the model with the teacher as the purveyor of knowledge and the learner as a passive receiver and are endorsing the value of experiential learning and building on the learners' previous experiences (Lewis & Williams, 1994). According to Lewis and Williams:

> Experiential education first immerses adult learners in an experience and then encourages reflection about the experience to develop new skills, new attitudes or new ways of thinking. During the last decade, experiential learning has moved from the periphery of education to the center. No longer supplemental to the acquisition of content, experiential approaches are considered fundamental to meaningful learning. (p. 5)

Kolb (1984) presented a model in which learning is a four-part process: (a) Learners have concrete experiences, (b) learners reflects on these experiences, (c) learners generalize from their reflections or integrate observation into theories, and (d) learners take action.

Schön (1990) emphasized reflection as well as experience. His model of learning from experience is comprised of five stages: (a) knowing-in-action, which is

embedded knowledge and automatic action; (b) surprises, which are unexpected inconsistent findings; (c) reflection-in-action, which determines how to resolve the usual occurrence; (d) experiment, which applies solution to the unusual occurrence; and (e) reflection-in-action, which assesses the situation and transfers learning to knowing-in-action. It is through this process that professionals extend their zone of mastery.

Experiential learning can be either field based or classroom based (Lewis & Williams, 1994). Both of these applications need to be incorporated in continuing education. Classroom-based experiential learning or 'active learning' requires students to be doing things and thinking about what they are doing. This can be achieved through role-plays, games, case studies, and simulations. Students encounter scenarios that could occur in real life, experiment with new behaviors, and receive constructive feedback in a safe environment. The value of experiences must be maximized through reflection and debriefing (Lewis & Williams, 1994).

Characteristics of programs which produce the best short-term knowledge gain with the least erosion include active participation, a narrowly defined subject area, reinforcement of learning such as group discussion, and the organization of material around clinical problems (Tamblyn & Battista, 1993).

How Professionals Change

Fox (1984) identified several factors which could influence the transfer of learning to the workplace: (a) congruence of the outcomes of the new performance with values of the learners, the coworkers, and the organization; (b) compatibility of the performance change with goals of the organization; (c) absence of sanctions which prevent implementation or presence of rewards which encourage implementation of the change; and (d) alteration of the existing power and authority structure of the workplace as a result of the change.

Cervero (1985) developed a model to study continuing professional education and behavioral change. The model identifies four factors that influence behavioral change: (a) the continuing education program itself—the quality of the design and implementation, (b) the proposed change, (c) the individual professional—motivation and willingness to change, and (d) the social system—receptiveness of the work environment.

Nowlen (1988) provided further insights by suggesting a framework represented by a double helix. One strand of the helix is comprised of the values and expectations of a culture, its mission, and the available resources. This strand is intertwined with the second strand, which is the individual professional's experiences, attributes, and limitations.

Tamblyn and Battista (1993) extensively reviewed the literature to identify interventions that change clinical practice and concluded that interventions which impact the practice setting or which affect reimbursement are more likely to change practice than are interventions aimed at improving knowledge and skills of the practitioner.

Many factors can produce a change in professionals' behaviors. The current view that education is the cause and that change is the effect is too simplistic. The Society of Medical College Directors of Continuing Medical Education commissioned a study to identify change in the lives of physicians and to describe the role of learning in the change process (Fox et al., 1989). This study showed that physicians regularly engage in a systematic process to change their practice. The change process was as follows: (a) exposure to a force for change which can be social, personal, or competency related; (b) physician forms a mental image of the outcome of the change; (c) physician assesses self to determine the abilities needed to make the change; (d) physician gains new competence; and (e) physician implements the new

competence. Continuing education programs can be of value in each of the above steps, although a large portion of the learning occurs with informal methods.

Belsheim (1986) described three models for continuing professional education: (a) the education model that focuses on the more traditional processes of objectives, teaching methods, organization of education experiences, and assessment; (b) the social change model that takes into account the practice environment; and (c) a problem-based model that encourages positive attitudes to learning and change by active rather than passive involvement of professionals.

Baskett (1993) advised continuing professional educators to help professionals develop learning environments, encourage action-reflection learning, enhance learning from experience, strengthen self-directed learning skills, promote team learning, and facilitate deep learning by modeling, reflection, and developing coaching skills. He recommended that lectures, seminars, and workshops be restructured to provide adequate opportunity for problem-based learning, informal interaction, and introducing and explaining alternate ways of learning. Bennett and Fox (1993) recommended the development of new models of education that facilitate learning from professional practice. They suggested that problem-based learning may be one such way.

Engel et al. (1990) recommended small-group, problem-based learning as an effective learning strategy to improve continuing education as one of the strategies of the World Health Organization to achieve health for all by the year 2000.

Problem-Based Learning

Boud and Feletti (1991) claimed that "problem-based learning is the most significant innovation in education for the professions for many years; some argue that it is the most important development since the move of professional training into educational institutions" (p. 13). It was originally developed at McMaster University

over 20 years ago and has since been instituted in about 60 medical schools around the world (Norman & Schmidt, 1992). Problem-based learning (PBL) is now used in many fields of practice such as architecture, engineering, the health sciences, and social work (Boud & Feletti, 1991). PBL has been defined as "an instructional method characterized by the use of patient problems as a context for students to learn problem-solving skills and acquire knowledge about the basic and clinical sciences" (Albanese, 1993, p. 53). Problem-based learning is different from other problem-based methods because the problem is presented first before students have learned basic concepts and not after, as in case-based education.

The rationale for PBL is that students do not remember or cannot use the knowledge which they learn in the traditional basic sciences courses because that knowledge is not structured in a way in which it can be recalled in practice (Barrows, 1985; Norman, 1991; Norman & Schmidt, 1992).

> The basic outline of the problem-based learning process is: encountering the problem first, problem-solving with clinical reasoning skills and identifying learning needs in an interactive process, self-study, applying newly gained knowledge to the problem, and summarizing what has been learned. (Barrows, 1988, p. 15)

Students work cooperatively in a small group and have access to a tutor who is often not an expert in the field of the problem presented, but who can facilitate the learning process.

A problem in PBL can be described as a set of circumstances in a particular setting where specific items of knowledge and understanding are applied in a logical analytical process (Walton & Mathews, 1989). Reasons for adopting PBL include

> the acquisition of a set of professional skills, e.g. the learning of scientific decision-making, clinical reasoning, the holistic approach, self-directed learning (for lifelong continuing education), collaboration in teams, and learning to listen, to respond and to partake in relevant discussion. (p. 544)

There are only a few reports of the use of PBL in continuing medical education, and no references were located which describe the use of PBL in continuing pharmacy

education. Kantrowitz (1991) posed many questions which need to be addressed regarding the use of PBL in continuing education: (a) An extended period of time is required for students to learn the techniques of PBL; will busy practitioners take the time? (b) will practitioners, who are accustomed to obtaining new information from a knowledgeable authority, be comfortable accepting new ideas developed by a peer group? (c) are there enough trained PBL facilitators? (d) are appropriate learning resources available to the practitioner? and (e) how effective is PBL, and does it appeal only to physicians with active learning styles? PBL has high face validity for practitioners because it is more representative of professionals' field of activity (Boud & Feletti, 1991).

Problem-based learning could be of value in continuing professional education for the following reasons: (a) Professionals are actively involved and learn in the context in which knowledge is to be used; adults like to learn in this way (Engel et al., 1990); (b) the expanding knowledge base of most professions makes it impossible for continuing education programs to provide all the required knowledge; therefore, programs must help professionals to develop self-directed learning skills to learn on their own; (c) many practitioners believe that practice consists of solving problems; therefore, learning in this format is similar to their view of practice; (d) PBL is highly motivating because the practitioners have encountered similar problems in practice or do so after a program; (e) practitioners like to hear how other professionals would handle a problem situation and to learn from each other; and (f) PBL encourages team work and develops communication skills which are increasing in importance in the health professions.

Barrows (1994) claimed that the learning is authentic because the patient problem simulations are based on actual patients and therefore present realistic challenges and opportunities. More importantly, students use the same sequence of

activities or behaviors to resolve the problem in the learning activity as they do in practice. PBL is a form of experiential learning.

Evaluation of Problem-Based Learning

Baud and Feletti (1991) stated that "good quality evaluation studies are currently hard to find, which leaves proponents and consultants in problem-based learning in the awkward position of advocating a philosophy devoid of the comparative research which skeptics most desire" (p. 245). A contributing factor is that good, universally acceptable measures of the outcomes of problem-based curricula are difficult to find or clearly interpret. Finally, there is limited research to show if problem-based curricula can improve outcomes such as changes in quality of care delivered (Boud & Feletti, 1991).

Assessment in Problem-Based Learning

Many potential advantages of PBL are listed in the literature (Barrows, 1985; Barrows & Tamblyn, 1980; Boud & Feletti, 1991). Norman (1991) has extensively researched this area. He suggested that if the central role of PBL is the acquisition and nurturing of problem-solving skills, we should try to assess this ability, independent of knowledge. However, he suggested that there is little support for the assumption of general, content-free problem-solving skills and that indeed PBL is really about knowledge learned in the context in which it is later recalled and used (Norman, 1991, 1992). Norman and Schmidt (1992) concluded that PBL can (a) increase retention of knowledge even over periods of several years, (b) enhance transfer of concepts to new problems and integration of basic science concepts into clinical matter, (c) increase interest in the subject, and (d) enhance self-directed learning skills which may be maintained.

Swanson, Case, and van der Vleuten (1991) have reviewed this field. Because the development of problem-solving skills is a major focus of problem-based learning, it seems obvious that these skills should be assessed. However, medical problem solving is not a unitary, consistent, content-independent skill that increases over time. Methods for assessing process are not well defined or reliable. Differences in students' self-directed learning skills, motivation to learn, and general ability will result in marked variation in learning outcomes. Therefore, Swanson et al. suggested that the quality of the learning process can be measured indirectly by measuring outcomes of that process rather than by attempting to assess the process itself.

Summary

The review of the literature reveals that the advancement in the field that has occurred in educational evaluation has not occurred in evaluation in continuing education for the health professions. Furthermore, the efficacy of the continuing education programs has been questioned. New understandings of how professionals learn support the value of learning through active participation, reflection, and solving clinical problems. Problem-based learning may be an alternative because it is a form of experiential learning. There are many factors besides education that influence how professionals change in practice.

Chapter III

Research Design and Methodology

Research Design

The research design of this study is the case study design, and the case to be studied is the Pharmacy and the Golden Years course, Level II. The case study method features descriptions that are complex, holistic, and detailed (Stake, 1978). This method allows for detailed descriptions of the design, delivery, evaluation, and outcomes of the course. The case study method can extend understanding and experience and was chosen for this study to help educators further their understandings of the use and value of problem-based learning and of alternate approaches to assessment and evaluation in continuing pharmaceutical education. The case study design is "epistemologically in harmony with the reader's experience and thus to that person is a natural basis for generalization" (Stake, 1985, p. 279). This study uses multiple sources and various types of data.

The previous literature review reveals that evaluations in continuing education in the health professions have been limited to either randomized experimental or quasi-experimental designs, or determining achievement of course objectives. These evaluations have added little understanding and advancement of the field because (a) they limited the scope of the evaluation, and important outcomes were often missed; (b) they did not evaluate all elements of the course such as planning, implementation, and appropriateness of the objectives; and (c) they did not identify which elements of the program were effective (Guba & Lincoln, 1981). Furthermore, Norman (1991) claimed that testing for achievement of course objectives is the "antithesis" of problem-based, self-directed learning. PBL is student centered and not teacher centered; each learner has different learning objectives. This is especially true in continuing education because there are no exams; hence participants have more

latitude to determine what they will learn and to what extent. For similar reasons a pretest-posttest method with questions to test knowledge is not appropriate because "learning is a personal, emotional, and cognitive act, the results of which are unique to the individual" (Baskett, 1992, p. 3).

Experimental approaches to prove value or provide firm evidence were not used for this study because they are authoritative and controlling and not in keeping with the collaborative learning atmosphere of the course. Furthermore, in an experimental research design so many extraneous variables would need to be eliminated to ensure validity that the situation would be so unlike practice, and the results would be of little value. This naturalistic study was a collective effort of the researcher, tutors, and students to assess course quality, learning, and impact on practice. This approach was endorsed by Guba and Lincoln (1989). They advised against using the scientific process for evaluation because with this approach the evaluator misses completely the fundamental social, human, political, cultural, and contextual elements of the educational activity.

Case studies can be used to test hypotheses (Stake, 1990). This study is designed to test the following hypothesis: A problem-based continuing pharmaceutical education course, if well designed and well implemented, can result in learning achievement and a change in practice. The learning achievement which is expected should be reasonable for the educational intervention. Interpretation of results should take into account that learning varies with the commitment of the learner, and the extent to which practice is changed depends on the level of commitment of the learner and the suitability of the practice environment.

Quantitative and qualitative methods are used to study the effectiveness of the course. This research design relies heavily on the practitioners' ability to assess the extent of their learning in the course and to report how they have applied this learning to their practice. Case studies can be highly statistical (Stake, 1985). This study will

research three areas: (a) evaluation of the course, (b) assessment of learning achievement, and (c) identification of practice outcomes.

Evaluation of the Course

The first phase of this study involves a thorough evaluation of the course. There are three reasons for this. The first is to determine if the course is a sufficiently strong educational treatment to expect learning and practice outcomes. The second is to identify strengths and weaknesses of the course so that the course can be improved in the future. The third is to add to current knowledge in the field on how to develop and deliver a problem-based learning course in continuing professional education.

Three methods are used to evaluate the course: (a) a detailed description of the course, the context, and how the course was designed and delivered, to allow the reader to judge quality; (b) an in-depth evaluation of the course by the participants; and (c) an evaluation by an external evaluator.

Description

A detailed description of the context, planning, and delivery of the course is presented. This study is of interest to other continuing professional educators, and a case study format enables readers who are knowledgeable in the field to evaluate the course according to their own experiences and criteria.

The context. The environment within which the planning and delivery of this course occurred is described in great detail because broad changes are occurring in the pharmacy profession. It is important for the reader to be aware of these changes in order to understand factors which influenced the initiation, development, and delivery of this course. Stake (1990) recommended that evaluators study and describe the context of the educational activity because context can influence the success of a

program and can be a major determinant of outcomes. Contextual data can aid the reader in deciding whether or not to generalize the findings for the evaluated case to other cases (Stake, 1990).

Planning. The planning model used and the expertise of the course planners can influence course quality. To provide information on these aspects, the following are described: the composition of the advisory committee, the format of the needs assessments, the process for determining goals and objectives of the course, the selection of the drug-related problems, and the process of writing the cases.

Delivery. The success of a problem-based learning course is highly dependent on how the course is implemented. The selection and training of the tutors, the involvement of physicians in the course, and the delivery of the joint physician/pharmacist workshop are described in detail. Also described are the demographics of participants, their attitudes to pharmaceutical care, and their confidence in discussing drug-related problems with physicians.

Student Evaluations

Evaluation and assessment by students is a key component in this research design. A variety of evaluation and assessment forms were used for this purpose.

External Evaluator

The course was evaluated by an expert, external to the course, who has expertise in problem-based learning. Because the researcher for the study was als the project coordinator for this course, another perspective was necessary to assist the reader in determining course quality. In accordance with Eisner's Connoisseur Model, the external evaluator was asked to determine if the course was of sufficient quality to produce learning and practice outcomes. The educational connoisseurship method is one in which an individual knowledgeable in the field appreciates and

understands what has been experienced and uses this appreciation or awareness as a basis for judgment (Eisner, 1985).

Learning Achievement

The study determined learning achievement in three ways: (a) scoring of a written assignment, (b) self-assessment by the students, and (c) observations by the tutors.

Written Assignment

Assessment of problem-solving skills. One of the goals of this course was to improve pharmacists' ability to provide pharmaceutical care, a model of practice which requires good problem-solving skills. A key component of this research design was the writing and scoring of a pharmaceutical care plan which is an indirect measure of problem-solving abilities. To determine if learning in the course contributed to the writing of this care plan, a qualitative approach was used. Pharmacists identified on the assignment sheet those components of their pharmaceutical care plan that they were able to complete as a result of learning achieved in this course.

The use of high-fidelity patient simulations to assess learning in this study was rejected for the following reasons: (a) Costs involved in setting up patient simulations were prohibitive, (b) there was insufficient time in the workshops for all participants to go through this process, and (c) studies show that pencil-and-paper patient-management problems correlate well to patient simulations and possibly the real world (Day et al., 1990; Elstein et al., 1978; Feletti & Engel, 1980).

Assessment of Professional and Group Skills

Professional skills and group skills were assessed by the tutors and by the students themselves. Tutors observed and assessed students' effort, interest, cooperation, communication skills, confidence, and ability to interact with physicians. Tutors were not able to accurately evaluate specific skills, but they were able to give an overall impression.

Self-Assessment

Because self-assessment is integral to continuous professional improvement, procedures for self-assessment were built into the research design. Several self-assessment items were included on the questionnaires completed after each workshops. Pharmacists also completed a self-assessment form on which they assessed their problem-solving skills and professional skills.

Practice Outcomes

Stake (1990) advised evaluators not to be too optimistic about what can be accomplished by a program and setting an unattainable target, but also not to be too pessimistic about human power and devote too little of the evaluation design to the discovery of effects. Student self-reporting and self-assessment were the sole research strategies used to determine practice outcomes.

Interviews

The objective of the interview was to obtain in-depth information on changes which participants made in their practice as a result of the course, and specifically if they were writing pharmaceutical care plans, whether they increased their use of drug information sources or their collaboration with physicians.

Evaluation Forms

Questions were asked on the evaluation forms to obtain more information about changes made in practice. The research design includes a "commitment to change" statement. On the last day of the workshop, pharmacists stated in writing changes which they intended to implement in their practice. This has been reported to be an effective mechanism for collecting evaluation data and for helping learners set implementation goals (Jones, 1990).

Study of the practice environment and its impact on the implementation of learning outcomes from this course is a research study in itself. Therefore, it will not be addressed in great detail in this study. Barriers to transferring learning to practice were investigated in a minor way.

Research Methodology

There are eight components to this study. They are as follows:

1. collection of demographic data,
2. evaluation and self-assessment of specific parameters by the students during or after each workshop,
3. evaluation by external evaluator,
4. assessment of students by the tutors,
5. evaluation of tutors and group functioning by the students,
6. self-assessment by students,
7. writing and scoring of the pharmaceutical care plans, and
8. interviews of randomly selected participants.

Development of the Instruments

Eleven instruments in all were developed by the researcher. Elements to be evaluated on each instrument were discussed with the course developer.

Questionnaire A

The objective of this instrument (Appendix E) was (a) to obtain demographic information, (b) to determine attitudes to pharmaceutical care, (c) to assess confidence in discussing drug-related problems with physicians, (d) to identify frequency with which participants use drug-information sources, and (e) to determine frequency of discussions with physicians of drug-related problems. The questionnaire was reviewed by five practicing pharmacists and the course developer. Reviewers were asked to identify ambiguous questions or questions which should be added or deleted.

Multiple-choice questions were used to obtain demographic and frequency data. Because the researcher was unable to locate an instrument to measure attitudes to pharmaceutical care, one was developed. Pharmacists were asked to indicate their level of agreement on a 5-point Likert scale with eight statements describing functions which pharmacists should perform in order to provide pharmaceutical care.

A "threshold" technique was used to assess confidence to discuss drug therapy with physicians. Various statements were made which described reasons to discuss a patient's medications with a physician. These statements were placed in order of difficulty with respect to degree of ability and confidence required to perform them. Interactions that were the easiest to do were listed at the top, and those posing the greatest challenge were at the bottom of the list. This ordering of tasks according to degree of difficulty was very challenging and required substantial feedback and discussion with the tutors and the course developer. Pharmacists were asked to check off only those interactions that they would be willing to perform. The assumption was that they would eventually reach a threshold point where they did not have the confidence to perform any of the remaining functions. Pharmacists would complete the same exercise at the end of the course, and this would determine if a change in their confidence to interact with physicians had occurred during the course.

Open-ended questions were also included on this first questionnaire to obtain information about the barriers in their practice to obtaining drug information and to working closer with physicians. Participants were also asked to identify their reason for enrolling in the course.

Evaluation of Workshops

The evaluation form for the first workshop (Appendix F) on developing drug-information skills was developed by the researcher and thoroughly reviewed by the drug-information specialist who developed and presented this workshop.

Another evaluation (Appendixes F, I, N) was developed to evaluate three of the remaining workshops. The objective of this evaluation was to determine (a) if the learning in that workshop was pertinent to practice, (b) if the degree of difficulty of the cases was appropriate, (c) if the independent group meeting was productive, and (d) if the discussion with the physician was worthwhile. Students were asked to indicate the number of hours they had spent preparing for the workshop.

The evaluation form (Appendix K) for the joint pharmacist/physician workshop was developed to evaluate (a) the speakers, (b) the cases, (c) the group discussion, and (d) the impact of the workshop on abilities to collaborate with physicians. Pharmacists were asked to identify one idea from the workshop that they intended to implement in practice. This form was developed with the assistance of the course developer and was reviewed by the physician who assisted in developing and organizing the joint workshop.

Evaluation of the Tutors by Students

The purpose of this instrument (Appendix L) was to determine how well the tutor (a) established a learning environment, (b) facilitated group discussion, (c) facilitated group cooperation, and (d) improved the extent and accuracy of the

learning. A form was designed for this purpose by modifying questions used by the University of Limburg, Maastricht, in the Netherlands (DeGrave, DeVolder, Gijselaers, & Damoiseaux, 1990). Tutors were given the opportunity to have input into aspects on which they would be evaluated.

Assessment of Students by Tutors

An assessment form (Appendix M) was designed to direct the tutors' assessment of each pharmacist in their group. The objective of the assessment was to evaluate overall professional ability, effort, confidence, and communication skills. Tutors also evaluated group dynamics and pharmacist-physician interactions. The tutors reviewed this form and made several recommendations for improvement. The tutors were concerned with how accurately they would be able to assess the students; therefore, a confidence rating scale was added to enable the tutors to indicate their level of confidence for each rating.

Self-Assessment

A self-assessment form (Appendix O) was developed for this study. Items on this form were the same as those on the form used by the tutors to assess the participants. This allowed comparisons of the assessment by the pharmacists with those of the tutors. Parameters were given for assessing communication skills and team skills.

Two of the three cases that the pharmacists worked up for the Saturday workshop with the physicians were cases from the Level I course, which they had completed one to two years previously. This provided an excellent opportunity for the pharmacists to compare their problem-solving abilities and the quality of their work in Level II to that in Level I and thereby assess growth in these areas.

Assignment Sheets for the Written Assignment

The initial draft of the assignment sheets was fairly complicated and required the students to complete detailed charts and forms. After discussions with the tutors. it was decided that these sheets were too directive and a more simplified form was developed (Appendix P). For each problem identified, students were asked (a) to provide the evidence in the case that it was a problem, (b) to identify the desired outcome or goal, (c) to list their recommendations or interventions, and (d) to describe their monitoring plan. The revised form was reviewed by the course developer and the author of the test case.

On the right-hand side of the assignment sheet the words *yes* and *no* were printed beside each section of the assignment. This enabled the pharmacist to indicate whether they were able to provide this information as a result of knowledge acquired in the course or if it was due to knowledge possessed prior to taking the course.

There was one page for each problem. The final page of the assignment packet asked the pharmacists to summarize their recommendations chronologically in the order that they should be implemented for the patient. Students were then asked to describe how they would implement the recommendations with the physician and with the patient.

Questionnaire B

This questionnaire (Appendix Q), completed during the last workshop, served several purposes and used various techniques. Open-ended questions were included to determine (a) the intention to transfer learning from the course to practice; (b) factors which influence transfer of learning to practice; (c) modifications which they have made in practice of the pharmaceutical care process; (d) the incidence of encountering the same problems in their practice, what these problems were, and whether the course had helped to solve the problem; and (e) improvement in their access to and

use of drug information. Space was provided for pharmacists to make additional comments .

A 5-point likert scale, with values from *strongly agree* to *strongly disagree*, was used to determine (a) participant satisfaction with various elements of the course, (b) support for various course modifications, and (c) improvement in ability to communicate with physicians.

A different method assessing interaction with physicians was necessary because the "threshold technique" used for the first questionnaire was not successful. Instead pharmacists were asked to identify whether the course had increased the extent to which they regularly performed the tasks which were listed on the first form by simply checking off *yes* or *no* beside each statement.

The form was reviewed by the course developer, a tutor, and the data analyst; and suggested changes were incorporated.

Scoring Key for the Written Assignment

Developing a scoring key for the written assignment was an arduous and time-consuming process (Appendix S). A test committee was formed comprised of four pharmacists with expertise in geriatric pharmacy. One of the pharmacists served on the advisory committee and was a tutor for both Level I and Level II courses. Another of the members was a tutor in both levels of the course and wrote one of the modules for Level II. The third pharmacist was a tutor in the course and wrote the module from which the test case was taken. The fourth pharmacist was not involved in the course in any way and brought a fresh perspective to the scoring process. The course developer and the researcher also served on the test committee.

Prior to the first meeting of the test committee, a memo was sent to all members asking them to study the assigned case thoroughly and to come to the meeting with the assignment sheets completed in the same manner as the students did

in the course. At the meeting the researcher explained the objective of the scoring and the process to be following in developing the scoring key (Appendix R). Two scores were assigned to each assignment: a holistic score, which is an heuristic assessment by an expert scorer to identify how well the pharmacist managed the patient; and an analytic score that was determined using a detailed answer key which weighted the problems in accordance with potential impact on desired patient outcomes. The test committee drafted general guidelines for assigning the holistic score and developed the answer key for the analytical score.

Process

Members identified six drug-related problems in the case and the specific information that should appear on the assignment sheet for each problem. The committee identified how the problem should be worded and the evidence in the case that there actually was a problem. Desired outcomes for each problem were determined. The committee decided upon which recommendations the pharmacist should make to the physician and the patient in order to resolve or prevent the drug-related problem. Lastly, actions which the pharmacist should take to determine if the recommendations were actually working were determined.

The committee then identified recommendations that should be included in the "Summary and Implementation" section on the final page of the assignment, the order in which the recommendations should be implemented, and how these recommendations could be implemented with the physician and the patient. This summary page became the basis for assigning the holistic score.

Once all the "answers" for each problem were identified, the committee assigned points to the problems. These points were weighted so that the final score would reflect quality of care; the committee wanted to avoid the situation of a student obtaining a high analytical score but totally mismanaging the patient. Rules were

devised for applying weights to raw scores, drawing upon methods used in other studies (Feletti & Engel, 1980; Norcini et al., 1990). The committee felt that the easiest way to assign points was to use a total-point system of 100. Then the committee decided how many points, based on 100, should be assigned to each problem. Those problems which were of greater significance to patient care outcomes received more points. On this basis, for the six problems, 25 points were assigned to two problems, 15 points to another two problems, and 10 points to each of the remaining two problems. This then became the basis for weighting; the weighting factor became 2.5, 1.5, and 1, respectively.

Next the committee decided how points should be distributed within each problem. Twenty-five points were assigned to each problem. Five points were assigned to each of the following: (a) problem identification, (b) outcomes, (c) recommendations, and (d) monitoring, for a total of 20 points. Two points were given to evidence and three points to defense. Of the five points assigned to problem identification, three were given for identifying the problem and an additional two points for naming the drug in the problem. Because of time constraints, the committee decided to assign points to each answer at the next meeting.

The committee concluded the meeting by deciding on which problems the pharmacist must identify to get a 'good,' 'fair,' or 'poor' rating for the holistic score. Up to this point, there had been consensus among all members. However, there was disagreement about whether identifying the "noncompliance problem" should be a requirement for a 'good' rating. Compliance had not been addressed in the previous cases in the course; therefore, some members felt that it was unrealistic to expect it for this case. Other members felt that solving this problem is fundamental to the role of the pharmacist, and not to include it would be negating a key responsibility of the pharmacist. It was decided, on a majority vote, to require identification of

noncompliance in order to get a good rating, and problems for the other ratings were determined.

A teleconference was held to assign points within the problems. Prior to the teleconference the first draft of the answer key and three sample assignments were sent to the members. The committee then went through each problem and each category within the problem to assign points to the specific answers. This required substantial discussion and consensus building.

The committee decided not to require pharmacists to defend their recommendations because it was somewhat redundant with information provided elsewhere on the assignment. It was also decided not to require students to specify in the monitoring section how often they would check and for how long, as this had not been required previously in the course. An additional two points were given for evidence, for a total possible of 22 points for each problem. The committee did not assign points to the last two problems because of time constraints. Concern was expressed about parameters for assigning the holistic score.

Following the meeting the researcher reread the literature on holistic scoring (Norcini et al., 1990). In a memo accompanying the minutes of the teleconference, the researcher advised the committee that they were trying to be too precise with the holistic scoring. This score should be the expert's assessment of the student's clinical judgment. A 9- or 10-point number scale was recommended, which eliminates the connotation of words such as 'good' and 'poor.'

A new scoring sheet was produced which incorporated decisions made during the teleconference. The researcher assigned points for the remaining problems to serve as a starting point for discussion. The third meeting was held by teleconference. During this meeting there was considerable discussion about weighting of the problems. Some committee members that felt it was inappropriate to award points to two of the problems because they were minor problems and not

necessary for good management of the patient, and could result in good plans getting poor scores. Therefore, it was decided that these two problems would be bonus problems and that they would be recorded separately. Points for the remaining questions were decided. The final scoring sheet was produced incorporating decisions from the teleconference.

Procedures

The following procedures were followed.

Ethical Considerations

The study was explained to the participants on the first class of the course. This was done face-to-face for the group in Edmonton and by teleconference with the groups in Calgary. A letter was also sent after the first workshop explaining the study again (Appendix B).

Participants were told that all their responses would be anonymous. At the first class a personal identification number (PIN) was given to all participants with an accompanying letter explaining how to use the PIN. They were asked to put their PINs on all forms which they completed. The researcher was the only person who had the list of PINs, and this was kept in a secure location.

Participants who were willing to participant in the study were asked to complete a consent form (Appendix A). Students were told that they could opt out of the study at any time. Pharmacists who consented to being interviewed after the course signed an additional consent form prior to the interview.

Anonymity was ensured by reporting grouped data, and the names of people or practice sites were not used in any reports, discussion, or publications. All completed instruments and questionnaires will be destroyed in accordance with University policy. There was no possible threat or harm to the participants in the study.

Administration of the Instruments

The first questionnaire was completed and collected at the end of Workshop A. The evaluation forms for the other workshops were distributed at the end of each workshop. The instrument to assess tutor and group functioning was distributed to the students at Workshops C and F. Pharmacists who did not have time to complete forms during the workshops completed them at home. Each group chose a leader who was responsible for collecting the evaluation instruments. During each workshop, this person circulated an envelope into which pharmacists were directly to put their instruments, to assure anonymity. A letter was sent explaining this procedure (Appendix D). The leader then sealed the envelope and gave it to the researcher.

Instruments to assess the pharmacists were mailed to the tutors near the beginning of the course and were accompanied by a letter further explaining the evaluation (Appendix C). They were collected after Workshops C and F.

In order to ensure that anonymity was maintained, a small piece of paper was stapled to the corner of each student or tutor assessment form. On this paper the tutor and the student wrote the name of the person whom they were evaluating. When the forms were returned, the researcher then wrote the PIN on the form and removed the paper with the name.

The evaluation form for Workshop D, the student's self-assessment form, and the case assignment sheets were given to pharmacists at Workshop D or mailed to those who were unable to attend this workshop. Detailed instructions were attached to the assignment sheets. There was one problem per page, several pages were provided to the students, and they were informed that more than the required number were provided. Therefore, there was no indication of the number of problems which they should identify in the case. Pharmacists were instructed to work up the case before they met with their group. Group leaders would collect the assignments when

the groups met. The group leaders were instructed to inquire at their group meeting between workshops whether all pharmacists in the group had completed their assignment. If not, the group was to discuss the test case last, and those pharmacists who had not completed their assignment could leave early. They would then complete the assignment and bring it to the next class. All participants were phoned or faxed to remind them to complete their assignment sheets and return them during their group meeting or at the next class.

The assignments were collected at Workshop E. Two photocopies of each assignment were made and sent to the scorers. Each case assignment was scored independently by two scorers. Initially, two scorers marked 18 assignments, and one marked 19. The answer keys were submitted to the researcher. The self-assessment form was collected at the last workshop. Time was provided during this workshop to complete the assessment of tutors and pharmacists and to complete Questionnaire B. Letters were sent halfway through the course and at the end of the course to participants who had not completed all the forms.

External Evaluator

A letter was sent to the external evaluator (Appendix U) asking this person to evaluate the course and clearly describing what was required. The external evaluator was asked to evaluate the planning process, the development process, the course design, and the course materials, as well as to assess whether the course could realistically result in learning achievement and practice outcomes. This individual met with the course developer, who described how (a) the drug-related problems were identified, (b) the authors developed the cases to incorporate these problems, (c) physicians were involved in the course, and (d) the workshops were designed to achieve the goals of the course. The external evaluator reviewed the following: (a) minutes of the advisory committee; (b) needs-assessment instruments, methods,

and reports; (c) course goals and objectives; (d) documents describing the planning, development, and implementation processes; (e) student materials; (f) the tutor's manual; and (g) the physician's manual. The external evaluator wrote a short evaluation report.

Interviews

Pharmacists to be interviewed were randomly selected using the PINs and a table of random numbers (Borg & Gall, 1989). Because this was a Level II course, the second column on the second page was arbitrarily chosen as a starting point. The numbers in the table were five digits; therefore, the first three digits were used. A proportional stratified sampling technique was used. Pharmacists were divided into five categories according to practice site and location (see Table 1). The number selected from each category was proportionate to the size of the subgroup. Once a category was filled, subsequent PINs which appeared in the category were ignored.

Table 1

Proportional Stratified Selection for Interviews

Practice site	Number in course	Number selected
Distance site - Calgary	8	2
Rural hospital	9	3
Rural community	1	1
Urban community	7	2
Urban hospital	4	2

Interviews with 10 pharmacists were conducted; they were of 35-45 minutes' duration. Pharmacists were invited by telephone to participate. All pharmacists contacted agreed to be interviewed. Four interviews were conducted three months

after completion of the course, three interviews after six months, and three interviews after nine months. All interviews were conducted in person by the researcher.

A semi-structured interview format was followed. The researcher explained how they were selected to be interviewed, how information from the interview would be used, and that all their comments would be anonymous. The pharmacists signed a consent form (Appendix T). The researcher explained that the purpose of the interview was to explore together ways that the course had helped them and ways that they had changed their practice, if at all. Pharmacists were encouraged to be honest and were advised that constructive criticism was necessary for course improvement.

The interviews commenced with the researcher asking the pharmacists if they had any comments that they would like to make about the course. Most talked for some time about the course. As each of the subject areas came up, the researcher asked questions to obtain further information. Near the end of the interview the researcher referred to the interview format (Appendix T) and asked any remaining questions that had not been discussed. All interviews were audio taped, and each interview was transcribed. The researcher listened to the audio tape of each interview and made any necessary corrections on the transcripts.

Data Analysis

Quantitative data were analyzed using the SPSS for Macintosh program. Interview data were categorized into predetermined groups.

Assessment and Evaluative Data

All data from the 11 assessment and evaluation forms were entered into a computer. Data for each instrument were entered separately, and for each form the PIN as well as the number of the instrument were entered. Likert scales were

assigned numerical values from 1 to 5. To summarize and organize this large amount of data, descriptive statistics were produced.

Correlational statistics were also calculated. Assessments of students by tutors at midpoint were compared to the assessments at end-point on the course, on a pharmacist-by-pharmacist basis, using the t-tests for paired samples analysis. This method was also used to compare the self-assessment by the students with assessment by the tutors.

Data From Scoring the Pharmaceutical Care Plans

Because this was the first time that scoring of a pharmaceutical care plan had been done in continuing pharmaceutical education, the data were thoroughly analyzed. There were 28 pharmaceutical care plans scored; each plan was scored by two scorers. Once all the answers sheets were returned, the scores were entered into a table and carefully inspected. A "rule of thumb" was used to identify discrepancies between the two sets of scores for each pharmacist. A discrepancy was defined as a difference of 2 or more for the holistic score and 15 or more for the analytical score. It was necessary to rescore nine care plans. Once these were returned, the holistic, analytical and bonus scores for each assignment were entered into the computer. A Pearson correlation coefficient was then calculated to determine how the three scores correlated for each scorer. All 65 scores were used because the purpose of this analysis was to determine if the relationship between the scores was the same from scorer to scorer; the numerical value assigned was inconsequential.

The discrepant scores were then eliminated, and the scorers were compared on a pharmacist-by-pharmacist basis using a t-test of paired samples. The two sets of holistic and analytical scores for each pharmacist were then compared. Also, descriptive statistics of the holistic, analytical, and bonus scores were produced. A correlation was also done of the time spent preparing for the workshop with the

assignment and the scores on the assignment. One item on the tutor and student self-assessment form, the assessment of ability to write a therapeutic and monitoring care plan, was used to compare these assessments with the care plan scores. This value on each of the tutor and self-assessment forms was correlated with the average of the holistic score and also with the average of the analytical score on a pharmacist-by-pharmacist basis. A Pearson correlation coefficient was calculated for this purpose.

Content Analysis for the Transcripts of the Interviews

The researcher identified categories for the content analysis. These categories were (a) physician-related aspects, (b) drug information-related comments, (c) pharmaceutical care plans, (d) prior knowledge for the assignment, (d) barriers to implementing learning from the course, (e) commitment to change, (f) practice outcomes, and (g) miscellaneous comments. Once categorization of the transcripts was started, it was apparent that there were other unique categories. Therefore, five more categories were added. These included (h) benefits derived from the course; (i) reason for enrolling; (j) aspects related to course evaluation—workload, course design, groups, references; (k) learning outcomes—knowledge and attitudes; and (l) recommendations for course improvement. Because these inductively derived categories were added, it was necessary to redo the transcripts, which were coded first.

The researcher went through each transcript and, using a highlighter pen, marked information specific to the categories identified. The number of the category and the PIN was then marked in the margin of the page. The transcripts were then cut into pieces according to categories, and the slips of paper were sorted into piles.

The content of the interviews was analyzed by another individual who is very familiar with pharmacy practice. The PINs of the pharmacists interviewed were sent to this individual to select three numbers randomly. A meeting was arranged at

which the researcher explained how the content of transcriptions was to be analyzed and which categories were to be used for this analysis. The researcher coded one transcription at the meeting to demonstrate how to categorize the transcript. This individual then categorized two "test" transcripts, and another meeting was held to discuss these and to answer questions about the categories. This individual then analyzed the content of the three transcripts for the three PINs that had been previously selected. This content analysis was then compared with that of the researcher, and the interrater reliability coefficient was calculated.

Validity and Reliability

Procedures were followed to address issues of validity and reliability.

Evaluation Forms

Validity of the various instruments was considered and measures taken to increase the likelihood that the instruments would measure what they were intended to measure. Face validity of the instruments was checked with the course developer and the six course tutors. These individuals reviewed Questionnaire A, the tutor assessment form and the student self-assessment form. They made recommendations on questions to be added or changed or wording that was ambiguous.

Assessment of students by tutors. Ratings can vary widely from tutor to tutor, depending on the stringency of the tutor. To increase validity, tutors changed groups halfway through the course; therefore, each student was assessed by two tutors. To increase reliability, parameters for assessment were given for two items: communication skills and ability to be a good team member.

Written assignment. The case assignment sheets were discussed with the course developer, the tutors, and the author of the case. Several changes were made to the forms as a result of this discussion. These individuals were concerned with

construct validity of the assignment. The purpose of scoring the care plan was to measure problem-solving skills and abilities to formulate a pharmaceutical care plan. It was felt that the initial sheets were too directive and therefore would not measure these skills. The form was modified to indicate only the type of information required.

The content validity of the assignment was good. Pharmacists were required to write 12 pharmaceutical care plans in the course. The assignment consisted of writing a care plan on the assignment sheets provided. This was similar to what they had been doing in the course and would therefore measure skills acquired or improved during the course. The face validity of the assignment was very good because the process on the assignment sheets was the same as the process used in practice to provide pharmaceutical care.

On the assignment pharmacists were asked to identify what they had learned as a result of completing the course, as distinguished from what they knew prior to taking the course. Pharmacists indicated that this was difficult to do; this may have decreased the reliability of this measure.

Problem-solving skills are content specific and should be demonstrated over a broad range of problems in order for conclusions to be reliable (Day et al., 1990). The assignment required the identification of four drug-related problems over a range of therapeutic classifications. In order to increase validity, more cases and more problems would have been advisable; however, this was not possible due to limitations of time and resources.

In order to increase reliability of the scores on the assignment, considerable time was spent by the test committee in developing the "key" for the analytical scoring of the assignment. Also, all assignments were scored by two individuals to increase reliability. Since there were only nine discrepancies, and correlations after rescoring between scores and scorers were high, it can be concluded that the instrument was very reliable.

Self-Assessment

The validity of self-assessment is reported to be low unless substantial training in self-assessment is given (Gordon, 1991, 1992). No training was given in this course; therefore, this will compromise the validity of the self-assessment. The purpose of this portion of the study was more to encourage reflection and self-analysis than to measure abilities accurately.

Interviews

The use of self-reports of behavior change as a method of evaluating continuing medical education courses has been reported to be valid (Curry & Purkis, 1986; Jones, 1990).

Purposive stratified sampling techniques were used to select pharmacists for the individual interviews to obtain a representative sample. Once the population was stratified, selection within each group was random. This increased the generalizability of the results.

To check the reliability of the content analysis of the interviews, another individual trained by the researcher analyzed three of the transcripts. An interrater reliability coefficient was computed to be $r = .77$; this value indicated a high consistency between the researcher and the external reviewer, and hence a high degree of reliability.

Limitations

Five limitations of the study are apparent:

1. Pharmacists may not have accurately reported their opinions or learning and practice outcomes. They may instead have reported what they thought the course developer and researcher would like to hear. This could have been a significant

limitation during the interviews because all individuals were personally known by the researcher because of close involvement during the course.

2. Pharmacists may not have had sufficient time to do the written assignment to the best of their ability due to job or family demands, and therefore scores on the assignment may not have reflected actual ability.

3. There were a lot of instruments in the study, and participants may have been tired of completing evaluation forms at the end.

4. On the assignment pharmacists indicated *yes* or *no* to indicate if they knew that section as a result of the course. It may not have been possible to distinguish learning in the course from prior knowledge.

5. Scores on the assignment do not reflect total learning in the course because assignments were completed before the group discussions, where a considerable amount of learning occurs.

Assumptions

Three assumptions were made:

1. The content of a pharmaceutical care plan is a good indicator of problem-solving ability and clinical judgment.

2. Tutors and students would report assessments accurately and fully.

3. The data-collection instruments and methods would collect valid and reliable data.

Summary

This study used the case study design. Detailed descriptions of the course are provided to enable the reader to judge course quality. The study met ethical requirements of the university. The study used 11 instruments to obtain assessment and evaluative data from the students and the tutors. The instruments were developed

by the researcher with the assistance of the course developer and were reviewed by the tutors. Instruments were carefully administered and collected, data entered, and descriptive and correlational statistics produced. An external evaluator evaluated the course. A key component of the research design was the scoring of a pharmaceutical care plan. A detailed process was used to develop an "answer key," and the plans were carefully scored. A thorough analysis of the scores was done. A naturalistic process was followed to identify practice outcomes by interviewing randomly selected pharmacists. The interviews were transcribed and the content analyzed, and this analysis was compared to that done by another individual. Interrater reliability was good. The validity and reliability of all components of the research design were good with the possible exception of the self-assessment and tutor assessment forms.

Chapter IV

Description of the Course and the Context

Changes in the Pharmacy Profession and the Health-Care Environment

The profession of pharmacy faces many challenges as the profession responds to changes in the health-care environment and a need to assume new responsibilities in order to secure a place in the health-care system of the future (Hepler, 1990; Winslade, 1993).

The profession has changed dramatically over the past 50 years. Hepler (1987) suggested that pharmacy has gone through three phases: (a) the empirical era of pharmacognosy and galenical pharmacy, in which the basic processes of pharmacy, such as compounding, were performed in a drug store; (b) the science era, in which the focus of education was chemistry and physical pharmacy, and the drug industry manufactured the drug; and (c) the patient-care era, in which the pharmacist is a drug advisor and, in addition to supplying the drug, works with other health-care professionals to ensure that the optimal effect is achieved with the prescribed drug and that the drug causes no harm. Currently, practice predominantly reflects the science era, with the pharmacist primarily dispensing and providing a product-oriented rather than a patient-oriented service.

Leaders and educators in the profession have recognized that this technical dispensing function, which is often derogatorily referred to as "count, lick, stick, and pour," is not a sustainable role. The Pharmaceutical Inquiry of Ontario (The Lowy Commission, 1990) stated that pharmacists in Ontario were vastly underutilized and were not achieving their full professional potential as members of the health-care team. This report questioned the rationale of paying pharmacists as professionals

when they are not fully using their knowledge and expertise, and also questioned how the functions of technicians and pharmacists differ (Winslade, 1993).

In order for pharmacists to expand the professional component of pharmacy practice and assume responsibility for drug-use control, Hepler (1987) stated that "schools of pharmacy may be asked to undertake major re-education and retraining of existing practitioners in unprecedented numbers" (p. 383).

Hepler (1987) also clearly outlined the barriers to patient-oriented practice in the community: (a) reimbursement on the basis of product sold and not service, (b) an abstract concept of the health-care team, (c) a lack of sufficient information about the patient, and (d) conflict with the physician. Winslade (1993) listed additional impediments: (a) the question of authority of the pharmacists to accept responsibility, (b) a lack of time in practice, (c) a lack of data management systems, (d) a lack of pharmacy's commitment to patient-oriented practice, and (e) a lack of confidence by pharmacists in their ability to provide pharmaceutical care.

Course Development to Respond to the Need

The Division of Continuing Pharmacy Education at the University of Alberta recognized that to prepare pharmacists for this change in practice a new design of continuing education programming would be required that would help pharmacists acquire the necessary knowledge, skills, attitudes, and confidence. Continuing education offerings at the time were episodic; they were evening lectures, occasional day-long seminars, and traditional print-based correspondence courses.

In 1987 proposals were written to develop extensive courses in four areas. These plans were presented to a planning committee for continuing education and to the network of contact pharmacists throughout the province. The course in geriatric pharmacy was unanimously chosen because of the aging population and because older

adults have chronic diseases necessitating long-term use of medications. The Division commenced planning a course in geriatric pharmacy.

Planning Committee

The planning committee was formed which was comprised of four practitioners with expertise in geriatric pharmacy, a physician, association representatives, two faculty members, and an adult-education consultant. Prior to the first meeting all members were sent reading materials describing issues influencing the educational needs of pharmacists. The planning committee discussed the following: (a) possible future changes in the profession and the health-care environment, (b) the future role of the pharmacist, and (c) the educational resources which pharmacists need.

The course was named Pharmacy and the Golden Years because this title reflected two important aspects: (a) that the senior years are very special years that can be "golden," and (b) that older adults present a golden opportunity for the pharmacist to provide professional care because of the complexity of their medication regimes. Needs assessments, including a survey and focus groups, were conducted. The goals and objectives of the course were determined and a course developer hired to develop a course which met these objectives.

Course Design

The Level I course was comprised of seven workshops. Four of the workshops involved learning about problems in the elderly, communicating with the elderly, watching an interdisciplinary team conference discuss an elderly patient, and accompanying a home-care nurse when visiting an elderly patient at home. The remaining three workshops were modules with case studies in which a patient case was presented. Pharmacists worked up the case using worksheets provided and

discussed the case with other members of their group and their tutor. The modules were on age-related changes in the elderly, pharmacodynamics, and pharmacokinetics.

This course was a pilot course for the purpose of testing learning methodologies and activities. Satisfaction of the participants was high, and pharmacists reported that the course helped them enhance their level of professional service. At the same time, more articles were appearing in the literature supporting the need for a change in the role of the pharmacist. This was encouraging; the Division modified the course and delivered it again by distance throughout the province.

Evaluation

Both the pilot course and the first distance-education course were evaluated by external evaluators. The methodology used was a pretest-posttest comprised of 10 multiple-choice questions and a formative and summative evaluation. To further determine participant satisfaction with the course, the evaluators interviewed pharmacists who volunteered to be interviewed. Time was allocated during one of the teleconferences in the course for the evaluator to determine students' concerns and to obtain their recommendations for improvement of the course. Data from the pretest-posttest did not clearly demonstrate significant knowledge gain. However, these results were incongruent with observations of the tutors, who witnessed significant growth and learning by participants during the course. Results were also incompatible with anecdotal reports by the pharmacists of the impact that the course had on them attitudinally or motivationally or changes that they had made in their practice as a result of taking the course. Concern was expressed that "it was very difficult to measure the content and the learning aspect with the short pretest-posttest" (Hanen, minutes, Planning Committee, 1991).

Audits of pharmacy services in nursing homes revealed that pharmacists who had taken the geriatrics course were providing a higher level of service than those

pharmacists who had not. These pharmacists credited the geriatrics course for making this difference (Thornton, 1994).

In 1990 another seminal article on pharmaceutical care, by Hepler and Strand, was published. This article defined pharmaceutical care in the following way:

> Pharmaceutical care is the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life. Pharmaceutical care involves the process through which a pharmacist cooperates with a patient and other professionals in designing, implementing, and monitoring a therapeutic plan that will produce specific therapeutic outcomes for the patient. (p. 536)

This article clearly articulated the role of the pharmacist in the identification, prevention, and resolution of drug-related problems. This further reinforced the suitability of the problem-based learning approach to help pharmacists learn for this new model of practice. The steps followed in the course to work up the patient case paralleled the steps in the pharmaceutical care process. The Commission to Implement Change in Pharmaceutical Education stated that "pharmaceutical care involves a series of problem-solving exercises to achieve the outcome of care" (Association of American Colleges of Pharmacy, 1993, p. 381).

The Division recognized the need to expand educational programming in the geriatric area. The Level I course was the first and only extensive geriatric course in continuing pharmacy education, and clearly there was a need for further courses to help pharmacists improve their abilities to provide pharmaceutical care to the older adult. Funding was obtained for development of a Level II course through the Faculty's 75th Anniversary campaign. Funds for evaluation of the level II course were built into the proposal because of a recognition of the need to improve educational design continuously and the need for more informative assessment methods.

Level II

Planning (Advisory) Committee

The planning model for the Level II course was similar to that of the Level I model. A planning committee was formed; many of the members were the same as for the Level I course. The first planning meeting was held on May 22, 1991. Members were sent four articles to read prior to the meeting and were asked to assess how the content of the articles would impact continuing education and specifically the geriatrics course. The course evaluator for Level I presented findings from the evaluation of the pilot and the distance course. The committee discussed the learning model used in Level I. Because the Level I course was to be delivered again in the fall of 1991, the committee made recommendations for modifications so these could be tested for incorporating into Level II. The committee discussed whether the lecture should take place before or after the case study, or whether a lecture was needed. It was decided that lectures were not necessary for each of the sessions, and if incorporated, they should follow the self-directed study.

The committee also decided that Level I is, and Level II should be, at a post-baccalaureate level and should qualify for credit for an advanced degree. The committee discussed the feasibility of offering a Certificate in Geriatric Pharmacy because of the interest in specialization in pharmacy practice. It was decided not to embark on this at this time because more than two courses would be required, and future development is contingent on acquisition of adequate resources.

The committee held two teleconferences to discuss the modifications made to Level I and to formulate a needs assessment for Level II. The name of the committee was changed to "Advisory Committee."

Needs Assessment

It was decided that the needs assessment would be comprised of (a) a survey of pharmacists who had completed Level I, (b) a teleconference with tutors from Level I to obtain their recommendations for improvement, and (c) interviews conducted by practicing pharmacists on the advisory committee of other health-care professionals in order to determine their needs for pharmacy service when caring for the older adult.

Concurrent Delivery of Level I

That fall the Level I course was delivered to 10 sites in Alberta and three groups in another province. The materials were modified again to improve readability, and the course was offered in another site in another province starting in mid January.

Two teleconferences were held with the leaders to get their feedback on the changes which were made in Level I to field test for Level II, and a report outlining these suggestions was written and mailed to the Advisory Committee. A discussion plan was written to serve as a guide for members of the Advisory Committee when interviewing other health professionals.

Course Content

The Advisory Committee met to review the information from the needs assessment, to give direction to the course developer, and to discuss delivery formats. Abilities which the committee felt should be developed in Level II included (a) evaluating drug literature, (b) retrieving drug information, (c) refining the problem-solving process, (d) interpreting laboratory results, (e) working with an interdisciplinary team, (f) communicating with other health-care professionals, and (g) marketing home-care services. The committee discussed ways which students

could access drug information. A medical librarian was invited to the meeting to provide advice. Computer access to commercial data bases was discussed, but it was too costly to provide. It was decided to work with local libraries to provide resources and to consider the possibility of a traveling resource library.

Because working with other professions, particularly physicians, was a priority, the course developer attended an invitation workshop organized by the Canadian Medical Association entitled "A Continuing Medical Education Strategy For Care of the Elderly." This workshop (a) provided insights into daily activities of rural family physicians and how the pharmacists can assist in a team approach, (b) increased understandings of the learning needs of the physician and ways the pharmacist can assist by providing information, and (c) facilitated establishing contacts for planning joint medical-pharmacy continuing education programs in Alberta. This exposure was valuable for planning the joint pharmacist-physician workshop and also when integrating physicians into the workshops during the course.

The course developer drafted the goals and objectives for the course, drafted a course schedule, outlined topics for the cases, and identified issues which influence team functioning. The committee approved the goals and objectives in principle, with minor modifications, prioritized the case study topics, and recommended some resource people.

The course developer then worked with a panel of experts to identify and prioritize the drug-related problems for the disease entities identified by the pharmacists in the survey and selected by the Advisory Committee.

Course Writers

The course developer identified four case writers and explained the guidelines to follow when developing the cases and the steps to take when designing the case content. Each writer wrote three cases. The responsibilities of the case writers were

(a) to develop case scenarios, both community and institutional-based, in accordance with guidelines; (b) to identify learning issues for each case; (c) to identify appropriate reference materials and supply one camera-ready copy of each; (d) to write an answer key (pharmacy care plan) for each case; (e) to revise cases in response to comments from peer reviewers; and (f) to submit a hard copy and computer disc with the final copy of the module. All cases were reviewed by a geriatrician and three other pharmacists with expertise in geriatric pharmacy. The course developer worked with other experts to develop the literature-evaluation module and the joint pharmacist-physician workshop.

A focus group was held with a pharmacist, two members from the pharmacy faculty, and four family-practice physicians to discuss the problems associated with drug use in the elderly in the community and how pharmacists can help resolve these problems. The purpose of the focus group was to improve physician-pharmacist interaction in the course and to improve course content.

Course Delivery

The following section describes aspects of course delivery.

Promotion. Pharmacists were informed in the fall that the course would be offered in the following spring, and in January registration materials were sent to all pharmacists who had taken the Level I course.

Tutors. Letters were also sent to selected pharmacists asking them to be tutors. There were eight tutors, four of whom were facilitators for only half the course. All four of the case writers were tutors in the course; three tutored for half the course and one for the full duration of the course. Two of the other tutors were experienced tutors, and two individuals were tutoring for the first time.

Training sessions. Two training sessions were held in Edmonton. In preparation for the training session, tutors were to work up the cases for the

workshops to be discussed at that session. The course writers were the trainers for their cases and conducted the session in the same way that they would in the course. In this way they modeled good facilitation skills.

During the first training session the course developer explained the following: (a) the goals and objectives of the course, (b) the format for each workshop, (c) the tutor's responsibilities for each workshop, (d) the involvement of physicians in the course, and (e) a framework to link the pharmaceutical care plan to the physician's medical and functional problem lists. The course evaluator explained the evaluation instruments and obtained recommendations on ways the instruments could be improved. The course writer for the first workshop on drug information explained content and format for this workshop, and the course writers for cases in the next two modules led the case discussion. The tutor's manuals, containing the case write-up completed by the case writers (the "key"), were distributed. The tutors debated the "correct" answers, and a consensus was reached.

During the second training session the pharmaceutical care plans for cases in the last three workshops were discussed. In addition, the following took place: (a) the course developer explained the format for the joint workshop with the physicians and outlined the tutor's responsibilities, (b) the researcher explained the balance of the evaluation plan, (c) the tutors modified the case assignment sheets, (d) the tutors from Calgary reviewed how the course was going at their location, (e) the tutors suggested ways to improve the course, (f) the course developer reviewed the problem-solving process and ways that tutors could improve the discussions, and (g) the group discussed ways to improve the pharmacist-physician interaction. There was a brief comparison of Level II to Level I. The following differences were identified: decision making was at a higher level, and there was no variety in the workshops.

Physician involvement. Several meetings were held with the physician who was helping organize the joint workshop to develop a model for physician-pharmacist

interaction and to delineate the role and responsibilities of the physician and the pharmacist with respect to patient care. A form was designed to be used during the evening workshops in the course and the joint workshop.

Two meetings were held with the five physicians who would be giving a presentation or serving as tutors for the joint Saturday workshop. Two of these physicians also participated in the evening workshops. The first meeting was a planning meeting. During the second meeting, the schedule for the program was discussed as well as how the groups were to function, the roles of tutors, and how to assess the value of the joint physician-pharmacist interaction. Each physician was assigned one of the three cases to work up. Questions were formulated for the groups to discuss.

The course developer invited six physicians, four in Edmonton and two in Calgary, to participate in Workshops B, C, E, and F. Their role was to listen to the recommendations made by the pharmacists with respect to the drug therapy for the patient in the case and to respond as they would in an actual practice situation. The cases and reference material were distributed to the physicians at the beginning of the course, and the physicians were asked to work up the cases prior to each workshop. During the first half of each workshop the physicians met to discuss the cases with each other while the pharmacists were doing the same in their groups.

The Workshops

There were six workshops in all. The time between workshops varied from 10 days to two weeks.

Workshop A. On the first evening, pharmacists registered, received their course materials, and signed up for a group. The sign-up sheets specified the number of hospital pharmacists and community pharmacists to be in each group, according to ratios enrolled in the course. The tutor for that group was identified on the sign-up

sheet. This enabled pharmacists to choose their tutor and the group with which they wanted to work. It also was a way of ensuring a blend of hospital and community practitioners in the groups.

The first workshop was on drug information. The first half was a didactic presentation on how to answer a drug-information question, how to evaluate drug information, and factors to consider when choosing a reference such as a text or journal. During the second half of the workshop the pharmacists moved to their groups, where various reference texts and journals were located. Participants answered certain questions using these texts and then moved to another room to use another set of reference texts. The tutor then reviewed the cases in the first module, and the group identified the learning issues for each case. The group made arrangements to meet to discuss the cases before the next workshop. The pharmacists then reconvened as a large group, and the evaluation process was explained. A parallel workshop was held in Calgary.

Students were told that because this was a Level II course, references for the cases would not be provided. They were encouraged to find references on their own, and if they had difficulty, there was a master binder of all references provided to each group. Pharmacists were not pleased with this arrangement. They indicated that they were busy people, they did not have time to go to a library, some did not have access to a library, and they had paid fees and expected the references to be provided. It was apparent that a change of plan was necessary, and permission was obtained through CanCopy to photocopy the references for each pharmacist. These were provided at the next workshop.

Workshops B, C, E, and F. The format for these four workshops was the same. The pharmacists met with their tutors and presented the pharmaceutical care plan that they had decided upon as a group when they met informally between workshops. The tutor directed discussion by asking questions. All three cases were

discussed, recommendations were finalized, and a pharmacist was selected to discuss each case with the physician.

After the break the physician joined the group. An overhead transparency was provided to the tutors to direct the physician-pharmacist dialogue. The physician gave an overview of the medical problems, and the pharmacist presented drug issues. The pharmacists presented the recommendations using a role-play format or simple dialogue. At the end of the workshop the group discussed the value of the pharmacist-physician interaction. Observations by the course developer and evaluator, as well as feedback from the tutors, indicated that the physician-pharmacist dialogue during this first workshop had not proceeded as well as they had expected. A form was developed for the tutors to report observations of the physician-pharmacist interaction during Workshop C.

The group was also to review the three cases for the next workshop and to identify the learning issues. There was [illegible] we needed to bring closure to the cases, so for Workshop E the pharmacists convened as a large group and discussed how the groups had managed each of the patients.

Workshop D. This joint workshop with physicians was held on a Saturday morning. There were 57 professionals in attendance; this included 5 pharmacy tutors, 6 physician tutors, 4 speakers, and 2 organizers. There were presentations by three physicians on the following topics: (a) why elderly patients have an increased risk of adverse drug reactions, (b) how to choose appropriate drug regimes for the elderly, and (c) difficulties that family physicians encounter in the community when managing drug therapy for elderly patients. There was one presentation by a pharmacist on how a community pharmacist can assist family physicians manage the medications of their elderly patients. These didactic presentations were followed by small-group discussions. Physicians were assigned to a group with a tutor. The pharmacists remained in the groups in which they had been during the course, and with the same

tutor. Pharmacists had received the three cases prior to the workshop and were to have worked up all three cases. Physicians received the cases when they registered that morning. Each group was assigned one of the three cases to discuss.

After discussing the case, one group of pharmacists joined one group of physicians to discuss the case jointly. After resolving the drug-related problems in the case, the groups were (a) to discuss the benefits of team interaction in their practice settings, (b) to examine barriers to effective physician-pharmacist-patient interaction, and (c) to identify ways to change practice to improve this interaction. All participants then reconvened as a large group to discuss these three questions.

The Pharmacists

The success of a course depends greatly on the participants: their interest level, their abilities, their commitment, and their practice sites.

Enrollment

Thirty-one pharmacists in all enrolled in the course. After the first workshop one pharmacist in Edmonton and two in Calgary withdrew because of the workload.

The largest proportion of pharmacists (58.1%) worked in an institutionalized setting, and 42% worked in the community (see Figure 1). However, of the community pharmacists, 46% also serviced a nursing home or long-term-care facility. Therefore, a large percentage of the participants served institutionalized patients.

The majority of the pharmacists (58%) were employees, and 42% were owners or managers (see Figure 2). The degree to which managers in the community and the institution are able to make changes independent of their supervisors or the owner is questionable. Owners are decision makers, but there were only five owners in the

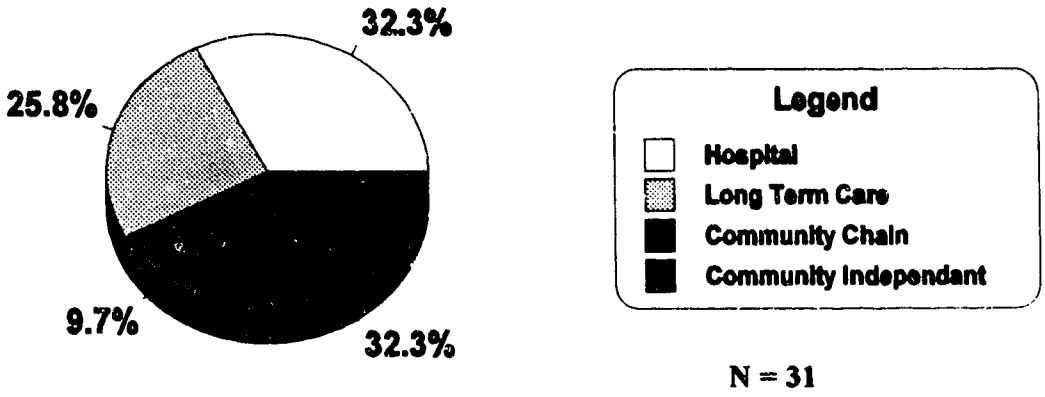


Figure 1. Description of pharmacists by employment setting.

course. This statistic may be of significance when assessing practice outcomes of the course.

Almost 75% of the participants had practiced for over 10 years (see Figure 3). Therefore, the majority of the participants had not been exposed to the pharmaceutical care model during their undergraduate education, and many received little instruction in clinical pharmacy. Pharmacokinetics, drug-therapy monitoring, and interpreting laboratory values are all content areas that have been added to the undergraduate curriculum recently. Knowledge in many of these areas is required to work up the cases in the course. These individuals therefore learned this either on their own or through formalized courses after graduation.

Over 80% of the participants had spent over half their work time serving older adults, and of these 35.5% had spent over 90% of their time (see Figure 4). Therefore, regardless of the practice setting, a large portion of the patients served by the participants in the course were elderly. This was likely a factor in the pharmacists' decision to enroll in this course.

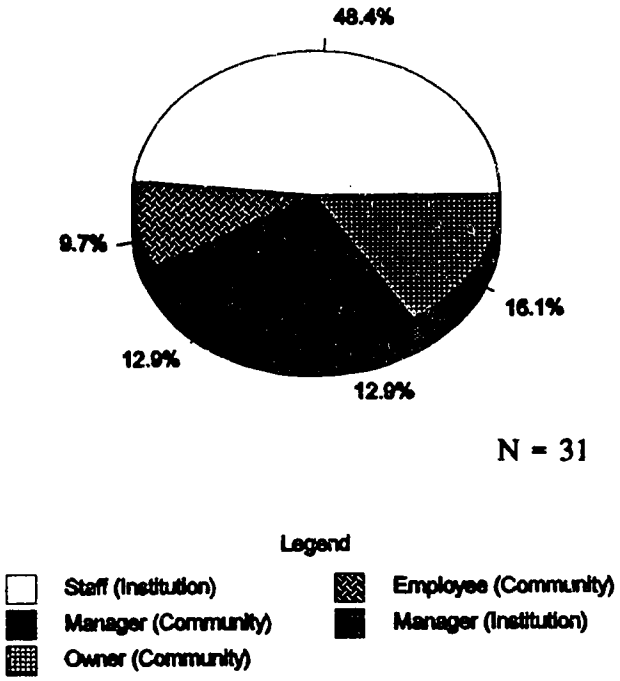
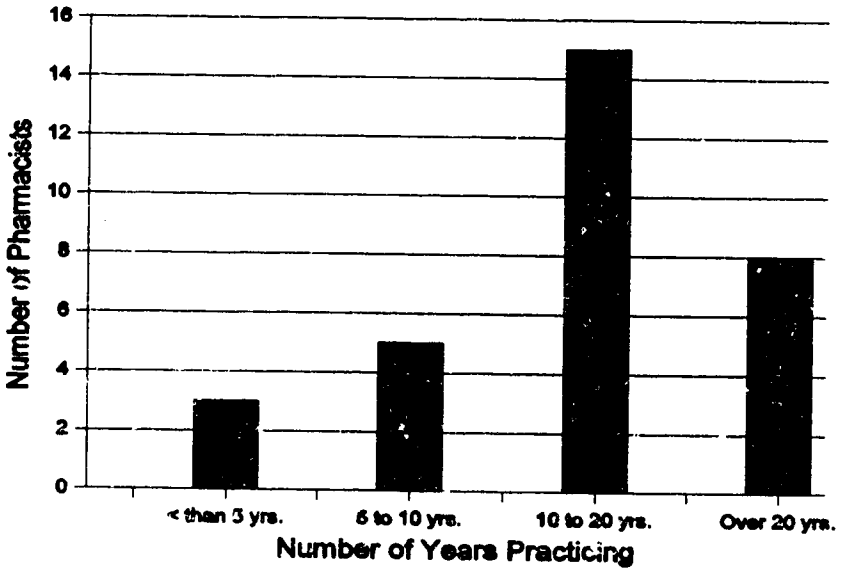


Figure 2. Distribution of pharmacists by employment position.



N = 31

Figure 3. Years practicing pharmacy.

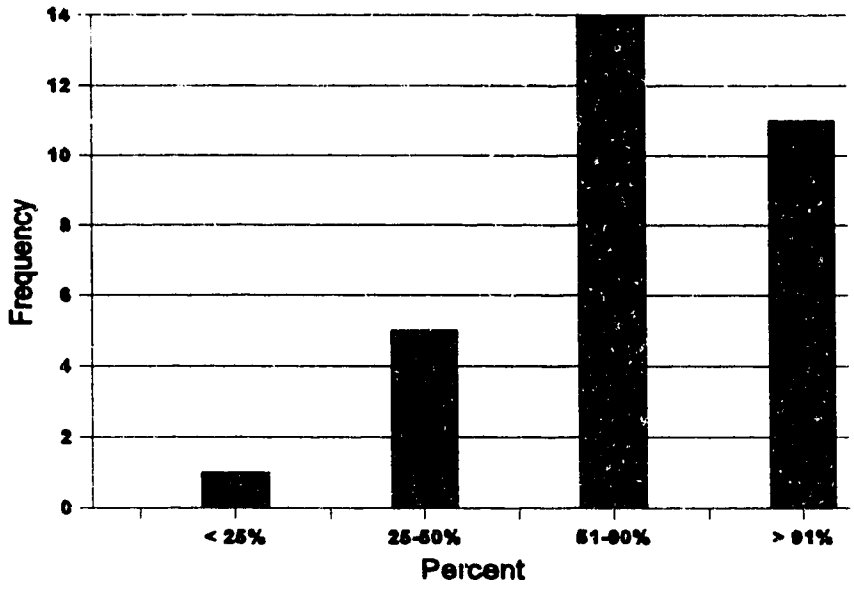


Figure 4. Time spent serving older adults.

Attitudes to Pharmaceutical Care

The pharmaceutical care model requires adoption of a new philosophy of pharmacy practice. Questions were asked on the questionnaire completed at the first workshop to determine the participants' level of support for this expanded professional role. The results are presented in Table 2. They indicate that the course participants had a very positive attitude to assuming responsibilities inherent in practicing pharmaceutical care and that there was a consistent level of support. The mean for each of the statements ranged from 4.55 to 4.71, and only the values of *agree* and *strongly agree* were chosen.

Table 2

Components of Pharmaceutical Care Which Pharmacists Should Do

Component of pharmaceutical care	Mean	SD
Formulate recommendations to resolve or prevent a drug-related problem.	4.71	.46
Communicate these recommendations to the physician or the patient.	4.68	.48
Monitor the patient in order to identify any drug-related problems.	4.61	.50
Prevent potential drug-related problems.	4.71	.46
Work with a team to assist in the design of patient-specific therapeutic goals.	4.68	.54
Assume responsibility for recommendations, and share responsibility for drug-therapy outcomes.	4.55	.51
Document any intervention or recommendation which they make.	4.58	.56
Be a source of drug information for the physician.	4.70	.47

Working With Physicians

The pharmaceutical care model requires working with other health-care professionals to improve the quality of life of the patient (Hepler & Strand, 1990). The physician is the key professional with whom pharmacists must work to optimize drug-therapy outcomes. The physician prescribes the drug; pharmacists can only make recommendations. Working collaboratively with the physician to optimize drug therapy is difficult for many pharmacists. They come from a culture of, fill the prescription, do it accurately, do not ask questions, and do not provide information lest it conflict with physicians' orders. Pharmacists have traditionally taken a subordinate role to physicians.

This course involved working with physicians; therefore, it was important to determine the participants' level of comfort in interacting with physicians when they started the course and to determine if the course has made any improvements in this regard. A list of reasons to contact the physician was given, and pharmacists were asked to check those interactions which they were willing to perform in their practice. The reasons for contacting the physician were listed in order of increasing difficulty or increasing level of confidence required. The intent was that there would be a threshold point beyond which pharmacists would no longer be willing to perform the remaining interactions.

There was no threshold point. Almost half of the participants were willing to perform all the tasks. Only two pharmacists checked each task in descending order until they reached a point where they would go no further. For the remaining pharmacists, the tasks which they were willing to perform were scattered throughout the list. Although it was not possible to determine a threshold point, the frequency data provide good information on the willingness of the participants to perform the various tasks. It is presented in Table 3. From the data, it is apparent that a large portion of the pharmacists were willing to discuss drug-related problems with physicians. This indicates a fairly high level of confidence by most participants to interact with physicians. The fact that there were fewer pharmacists who were confident to obtain patient-specific data from the physician is important because this is an important requirement for providing pharmaceutical care.

Table 3

Confidence in Contacting the Physician

Description	Frequency (n=31)
Prescribed dosage form is not available.	30
Recommend another drug because the prescribed drug is too expensive.	25
Discuss appropriateness of the prescribed dosage regimen.	24
Recommend another drug because of a possible drug interaction or adverse effect.	29
Obtain patient data in order to better monitor or counsel the patient.	20
Recommend discontinuing a drug.	29
Recommend lab test or drug levels.	21
Recommend another drug because it is the drug of choice in this situation.	21

Reasons for Enrolling

Pharmacists were asked to indicate on the questionnaire completed at the first workshop their reasons for enrolling in Level II (see Table 4).

Table 4

Reasons for Enrollment

Reason	Frequency (n=31)
Increase knowledge and/or skills	22
Improve or make changes in practice	4
Liked Level I	8
Liked the group work	3

The majority (70.1%) of the pharmacists enrolled in the course in order to increase their knowledge and skills; and of this number, 13 indicated that their reason was to increase their knowledge only. Only four pharmacists indicated that their reason was to improve how they practice, such as "to increase profile monitoring," "to further my practice," "to give reasons to support my recommendations," "to meet the challenge of providing pharmaceutical care," and "to help with daily practice." This is particularly significant, because the majority enrolled in order to improve their own personal abilities intrinsically but not to change behavior in practice. Clearly, many pharmacists enjoyed the Level I course, found it beneficial, and wanted to extend this experience. Three pharmacists liked the small-group work; they liked working with other pharmacists in a collegial environment and discussing problems with them.

These results agree with those of Richards (1980), who reviewed the reasons that physicians attended CME programs. He identified the following: (a) it is part of being a professional, (b) the subject matter is interesting, (c) they are validating previous experience, (d) they are attaining specific objectives, (e) they need a change of pace, or (f) they need more solid content.

The following comments from one of the interviewees illustrates this:

> "There are several reasons that I was interested in the course. The two main reasons were professional reasons and work-related reasons. I was hoping to get some education, more formalized instruction in problem-solving types of skills. For our work here at the hospital we do a lot of profile monitoring. Moving from community practice to hospital practice was a large challenge for me. So I found the course was a good overview. I also felt too that with the population getting older, we do have a lot of elderly people who are admitted to hospital. And then the personal reasons were essentially because of my own aging parents and the fact that I get asked so many questions by people who find out I am a pharmacist."

Summary

The pharmacy profession is moving to a patient-oriented practice and a pharmaceutical care model of practice. This requires major re-education of existing practitioners. In response to the need, two curricular courses in geriatrics were developed using an adult-education planning model of advisory committees and needs assessments. These courses incorporated problem-based learning principles and distance-education strategies. This study evaluates the Level II course and assesses the impact of this course. The majority of pharmacists enrolled in the course either worked in an institution or serviced one, had practiced over 10 years, and spent over half of their work time serving older adults. Most had a very positive attitude to assuming responsibilities inherent in pharmaceutical care and were confident to discuss drug-related problems with physicians. The majority enrolled in the course to increase their knowledge and skills; few indicated that their reason for taking the course was to improve their practice.

Chapter V

The Results: Course Evaluation

Recent trends in continuing professional education support the value of learning from practice (Bas kett, 1993; Kolb, 1984). The problem-based learning (PBL) approach enables offering experiential learning in a classroom environment, but it has not been used extensively in continuing professional education. This course incorporates a modified problem-based learning method. The other unique component of the course is the interdisciplinary feature with physicians joining the groups to discuss the cases with the pharmacists. The purposes of this chapter ar (a) to evaluate thoroughly the planning, development. and delivery of a problem-based learning course to further understandings of the use of PBL in continuing professional education; (b) to evaluate the value of the interdisciplinary component; and (c) to determine if lea- actice outcomes can realistically be expected from this course.

I ources is presented to assess the value of the PBL and inter d to assist the reader in judging quality and deter ns for outcomes. The three sources are (a) an externa c elements of the course by an expert in problem-based learning, (b) data from the evaluation forms completed by the participants, and (c) evaluative comments from the interviews. The description of the planning and delivery of the course in Chapter IV will also assist the reader in judging quality.

Planning and Development of the Course

The external evaluator thoroughly evaluated the planning and development processes for the course by reviewing all pertinent planning documents and course materials and by discussing these aspects with the course developer and the project coordinator (Appendix V). The external evaluator made the following statement in her report:

> The Planning Advisory Committee has appropriate representation and appears to have functioned well. Planning for the course was grounded in a needs assessment of those who complete the previous Level I course and a review of current trends and changes needed in both pharmacy practice and education as identified in recent literature.

Course Materials

The course materials were evaluated by the external evaluator and the students.

External Evaluator

The external evaluator reviewed all course materials and suggested minor improvements. This assessment of the course and planning materials was very favorable, as is illustrated in the following statement from the report:

> In summary, my review of all the planning materials and course materials lead me to the conclusion that great care and attention was given to the development of the course. . . . My overall impression is of a high level of quality in all the course components.

Student Evaluation

The course participants' assessment of the quality of the materials concurred with that of the external evaluator. On the final evaluation form participants evaluated the course materials. Table 5 presents their level of agreement, on a 5-point Likert scale, with statements that the course materials were of high quality and that the references provided were useful.

Table 5

Quality of Course Materials

Statement	Mean	SD
The course materials were of high quality.	3.89	.89
The references provided were useful.	4.10	.77

Students were satisfied with course materials; 22.2% strongly agreed and 55.6% agreed that they were of high quality. Participants frequently commented, either on the evaluation forms or during the interviews, that there was an excessive amount of paper used for the course materials. Several pharmacists indicated that they did not complete the 10-page form for review of the systems which was included for each patient case. They recommended providing a template form to which they could refer for all patients.

Pharmacists were also satisfied with the references provided; 52.9% agreed and 29.6% strongly agreed that the references were useful. A few comments were made that references were too extensive and that some were not relevant.

Course Design

Problem-based learning courses differ remarkably from lecture-based courses. In PBL a patient case is given and learners, through their self-directed learning, acquire the knowledge to solve the drug-related problems in the case. There were no lectures in this course.

Problem-Based Learning

On the final evaluation form students were asked to assess if PBL was an effective way for them to learn. Students indicated their level of agreement, on a 5-point scale, with the following two statements (see Table 6):

Table 6

Satisfaction With Course Design

Statement	Mean	SD
The problem-based learning approach is an effective way to learn.	3.96	.83
I am satisfied with the amount of learning which I did in this course.	3.90	.83

Of the participants, 77.8% supported problem-based learning. During the interviews several pharmacists expressed strong support for the problem-based learning approach. According to one pharmacist:

> "You don't have to know the information. I think that is where we've been really hung up in pharmacy, because we've been so knowledge based, so that all of our exams have been memorizing and giving it back. And that's not what we need to do in continuing education because there is not a hope; we can't expect people to memorize that vast body of knowledge that's out there and increasing daily. So it's a methodology of getting at that."

The majority of the participants (70.3%) were very satisfied with the extent of their learning in the course.

Request for lectures. Even though there was a high level of support for problem-based learning, participants strongly supported the addition of lectures to the course. On the final evaluation form pharmacists indicated their level of agreement with the statement "I would occasionally like a lecture in the course," and 92.6% either strongly agreed (66.7%) or agreed (25.9%) with the statement. The mean was 4.56 (.75). Three pharmacists wrote comments on the evaluation forms:

> "I think it is important to learn how to retrieve drug information, but I would also have appreciated some lectures."

> "Because there was no lecture portion to tie the ideas together, I found that I became very frustrated trying to learn more from references when what was really needed were some clinical opinions. The more I read, the more questions I had."

> "Would like more lectures or cases from 'experts,' physicians or pharmacists, knowledgeable in the area."

Similar opinions were expressed during the interviews:

> "I think if someone maybe did an overview of the disease state and maybe condensed some of the things in a nutshell, because I think what can happen in a situation like this is, different groups will extract different types of information."

> "[With a lecture] I think you could come away with clinical pearls that you're going to remember; and so, to me, that's the kind of formal approach I would like to see that will tie up everything."

Not everyone agreed that lectures are important:

> "I think that's just an old habit we have of being talked at. . . . You have to have people exercising their brains, . . . despite the fact that I know this is more work than having a lecture. But no—the interaction with the physicians and the case studies is the way to go, to learn."

> "How many lectures have you gone to that you're half snoozing? And so the lecture isn't individualized enough, plus what the lecture gives is something you can find in a textbook anyway."

> "I think it depends on how you learn. That is the big thing. If you learn by just sitting there and being a sponge, that's fine. But if you learn better when you're actually doing something and figuring something out on your own. . . . I think both worked for me, but I think I enjoyed more the interaction and, you know, problem solving on my own and then comparing it with other people's."

Groups

Learning in problem-based learning courses is dependent on how well the small groups function.

Learning From Each Other

One theme that ran through many of the interviews was that pharmacists learned a great deal from each other and that this was both useful and enjoyable. Comments such as the following were made:

> "I think interacting with other pharmacists . . . was great for me because you tend to get in these ruts of thinking and only approach it from one way. And we do our assignments independently and get together as a group. And you'd think—I never even thought about that. And it sort of broadens your perspective, and so at the end hopefully you can come out with something a little bit different, . . . new ways of approaching it."

"[I learned a] tremendous amount from other pharmacists. . . . You go to a course like this, you're in contact with these people, and naturally things come out and you learn so much more."

"Sharing in the groups was very important. We did come up with a lot of the right answers on our own."

Group Functioning

Group meetings between workshops. The pharmacists worked up the case on their own, and then they met with their group between workshops without their tutor to decide on one pharmaceutical care plan for the group. They presented this plan to their tutor at the next workshop. After each of three workshops, pharmacists evaluated the value of meeting with their group. A 5-point Likert scale was used, and the results are presented in Table 7.

Table 7

Working With Their Group Prior to the Workshop Was Worthwhile

Workshop	Mean	SD
Workshop B	4.0	.90
Workshop C	4.3	.61
Workshop E	4.1	.63

To verify further the value of the groups meeting independently, participants were asked if this requirement should be continued. A 5-point Likert scale was used, with 5 being *strongly agree*. The mean was 4.23 (.71), and 81.4% thought that it should be continued.

Group meetings during the workshops. At mid-point in the course and at the end of the course, pharmacists evaluated how their group had functioned during the workshops. Pharmacists indicated their level of agreement with two statements, using a 10-point scale, with 1 as *low* and 10 as *high*. The results are shown in Table 8.

Table 8

Group Functioning During the Workshops

Statement	Mid-point Mean	Mid-point SD	End-point Mean	End-point SD
Atmosphere during the workshop was permissive and informal.	8.5	1.4	8.1	1.80
Each member participated in the discussions.	8.9	1.2	8.8	1.48

The pharmacists were very satisfied with the functioning of their groups when they met between workshops and during workshops. The decrease in satisfaction may be due to the change of tutors at midpoint in the course.

Composition of the Groups

On the first night of the course the pharmacists signed up for the group and tutor of their choice. The sign-up sheets specified the number of hospital and community pharmacists to be allowed in that group. During the interviews some pharmacists expressed support for having hospital and community pharmacists in the same group:

> "I think it's good to have discussion within the group too because everybody's experiences with different drugs are different, especially people that work in nursing homes."

> "We had such a diverse group, and I would encourage that the next time you people put groups together have some from retail and some from hospital and some from a nursing home or whatever so that you get a nice, rounded group."

On one of the evaluation forms two pharmacists expressed serious concerns about the dynamics between the hospital and community pharmacists:

> "I will never take a course where I have to be with hospital pharmacists. The ones in my group were poor team members and lacked the common sense of the real world and lacked any respect for retail pharmacy."

"I think splitting the groups into retail and hospital would have been more beneficial in this level. A lot of time was wasted trying to decide the retail application of each case rather than discussing the important learning issues."

"The retail pharmacists tend to need different information and not as in-depth information as what we like to have or I like to have in a hospital practice."

Tutors

Group functioning can be significantly influenced by the tutor. It is important to know how well the pharmacists thought the tutors facilitated learning and group discussion. Tutors rotated halfway through the course, and participants evaluated the tutors at the mid-point and the end-point of the course. During the course the tutors were referred to as "facilitators" because their role was to facilitate learning and not to teach. Table 9 shows the results of the tutor evaluations. A 10-point scale was used, with 1 *low* and 10 *high*.

Table 9

Assessment of Facilitator by Pharmacists at Mid-Point and End-Point in the Course

	Mid-point		End-point	
Statement	Mean	SD	Mean	SD
The facilitator regularly posed questions stimulating the discussion.	8.55	1.34	8.77	1.30
The facilitator corrected the group when necessary.	8.57	1.32	8.54	1.27
The facilitator was well prepared and organized.	8.64	1.50	8.77	1.34
The facilitator provided good direction about course activities.	8.55	1.34	8.42	1.30
The facilitator was able to handle dynamics of the group well.	8.46	1.25	8.69	1.35

These results show a high level of satisfaction with the performance of the tutor. On the evaluation form pharmacists were asked to comment, if they wished, about how their group had functioned, how their facilitator had performed, and how they thought this aspect of the course could be improved. Two comments were made on the mid-point evaluations:

> "Our facilitator provided excellent guidance and answered all of our questions. Also, extra pertinent information was provided. Our facilitator was very knowledgeable."
>
> "During the time with the physician interaction, I felt that the facilitator overdominated the conversation with the physician. It was an opportunity for group members to interact, and there was little opportunity and/or time, with the facilitator dominating the conversation."

Several comments were also made about the tutors at the end of the course:

> "Our group functioned exceptionally well both at formal course meetings and in our own group get-together. Facilitators were both knowledgeable."
>
> "Our facilitator was fantastic!! The best!!"
>
> "Overall, I was impressed with the interaction between the group and facilitator. Their sharing their practical experience was quite helpful."
>
> "I found that our first facilitator was more adept at asking the right questions to head us into areas she wanted covered. Overall, both facilitators were very good and a pleasure to work with."

There were a few negative comments about one facilitator:

> "Our first facilitator was able to keep better control of the time spent with the physician. She was able to keep the discussion on track and made sure our concerns were addressed."
>
> "Would like the facilitators to have more background knowledge, i.e., about lab values, . . to be more conversant about the drugs used in case studies, to offer more knowledge."

Pharmacists were not specifically asked about their groups or the tutors during the interviews. However, some pharmacists had comments which they wanted to make:

"Our tutor was just excellent, excellent. And so knowledgeable and able to work with the group and very, very tactful in dealing with people. And so I learned a lot. And in fact, just being with her, I think I learned so much."

"Our tutor wouldn't just sit there giving you the answers; she'd make you think, but she'd help."

From these evaluations we can conclude that the tutors did an exceptional job of leading their groups.

Course Content

Two factors that can significantly alter learning achievement and practice outcomes are (a) the usefulness and pertinence of the learning, and (b) cases with the right degree of difficulty. Cases that are too simplistic result in little learning gain, whereas cases that are too complex leave the learner frustrated and poorly motivated. The following two questions were asked after each workshop, and the ratings, on a 5-point scale, are given in Table 10.

Table 10

Knowledge Gained Was Useful and Pertinent to Practice

Workshop	Mean	SD
Workshop B	4.21	.50
Workshop C	4.52	.51
Workshop D	4.67	.49
Workshop E	4.28	.68
Workshop F	4.41	.50

Pharmacists definitely thought that the knowledge gained in each of the workshops was of value.

The results are somewhat weaker with respect to difficulty of the cases (see Table 11); however, generally there was agreement that the level was appropriate.

Table 11

Cases Were the Right Degree of Difficulty

Workshop	Mean	SD
Workshop B	3.91	.66
Workshop C	4.03	.82
Workshop E	3.72	.89

Workload

During the course participants frequently commented on the heavy workload. These comments are significant in the study because time spent on a course can be an indicator of learning. If significant time is spent reading and working up the cases, meeting with group members, and attending the workshops, it could be assumed that this effort would translate into significant learning. However, this issue significantly impacts the satisfaction of the participants as they proceed through the course. and a balance needs to be achieved.

Time Spent on Each Workshop

On the evaluation form for four of the workshops, pharmacists were asked to indicate the number of hours that they had spent preparing for the workshop. The results are presented in Table 12. The results show that there was a wide range (from 1 to 30 hours) in the time spent by pharmacists between workshops. On average, the pharmacists spent 9.5 hours per workshop over a 10- or 14-day span. The time spent on Workshop D was less than that on the other workshops. This would be expected because the pharmacists were re-working cases that they had done in Level I. The time spent on Workshop B was less than that on Workshops C and E. A contributing factor could have been that references were not provided for this workshop, so

Table 12

Hours Spent Prior to Workshop

Workshop	Days*	Mean	SD	Mode	Range
Workshop B	14	8.12	4.65	6.0	18.0
Workshop C	14	10.44	5.19	12.0	17.0
Workshop D	10	7.78	4.24	6.0	18.0
Workshop E	10	11.46	6.39	12.0	29.0

*Number of days prior to workshop

pharmacists did less reading. The most time was spent on Workshop E. For this workshop, pharmacists were required to submit one of the care plans for scoring.

The tutors were asked to assess each pharmacist's level of preparation for the workshops on a scale of 1 to 10, with 1 being *low* and 10 being *high*. The mean of this measure at mid-point was 8.03 with an *SD* of 1.86, and the mean at end-point was 7.93 with an *SD* of 1.39. These results indicate that the tutors thought that the students were well prepared for the workshops.

To determine how well the tutor's assessment related to the number of hours reported by the students, the average number of hours spent on Workshops B and C was correlated with the tutors' assigned value at mid-point in the course. The Pearson correlation coefficient was .194 and was not statistically significant. This indicates that there was no relationship between the tutors' assessment of preparation and the time spent by the students.

Assessment of Workload

Excessive work can result in frustration and anger; this can decrease the extent of the learning or motivation to transfer the learning to practice. Pharmacists indicated their level of satisfaction with the workload for each workshop, using a 5-point Likert scale. The results are presented in Table 13.

Table 13

The Workload Was About Right

Workshop	Mean	SD
Workshop B	3.54	.84
Workshop C	3.55	.91
Workshop E	2.84	.99
Workshop F	2.56	2.93

Satisfaction with the workload in the course eroded as the course went on, with 70.4% indicating dissatisfaction at the end of the course. On the evaluation forms four pharmacists expressed concern about the time commitment required. Their comments were as follows:

> "An excellent course yet again!! But just too much work!! Especially at this time in my life. Thank God, it is over. But it was great."
>
> "Workload—I wasn't prepared for it and found it difficult to fit into my schedule. I lead a very busy life!!"
>
> "The course load was a bit much for me at this time."
>
> "Next time, perhaps inform more about the work involved with the course—it was a big overwhelming if you work full-time, etc."

Comments made during the interviews included:

> "I know my husband said, 'You've got some more of this to do?' I basically—I shouldn't say I had to put my marriage on hold, but it was almost that way for that length of time."
>
> "I found it very, very heavy. . . . And if it was spaced out a little more it would have been OK. But yet I liked the fact that it was done in the amount of time that it was—but the content that was thrown at you during

that period of time was very heavy. You know, I was spending maybe 15, 20, 25 hours . . . just reading . . . every week. . . . and that would include getting our groups together during the weeks that we weren't there [in class]."

Pharmacist-Physician Interaction

One of the goals of the course was to improve the frequency and confidence with which pharmacists discuss drug therapy with physicians. A thorough evaluation was conducted of the interdisciplinary aspects of the evening workshops and the joint Saturday program.

Evening Workshops

On the evaluation form completed after each workshop, pharmacists indicated their level of agreement on a 5-point scale with the statement that the discussion with the physicians during the workshop went well. The results are shown in Table 14.

Table 14

Discussion With the Physician Went Well

Workshop	Mean	SD
Workshop B	4.25	.75
Workshop C	4.54	.64
Workshop E	4.04	1.02

These results indicate a high level of satisfaction with the discussion of the cases with physicians when they joined the groups during the last half of each workshop.

Discussions of the Value of the Pharmacist-Physician Dialogue

During Workshop B, the first workshop in which physicians joined the group, the groups discussed the value of the pharmacist-physician discussion. A form was provided for a pharmacist in the group to record the points raised during the

discussion. Pharmacists indicated that they learned the following: (a) an approach and appropriate phrases to use when discussing patient care with a physician, (b) to identify oneself rather than the drug store or practice site, (c) that physicians can have a different perspective of the problem, (d) that physicians like factual information, and (e) that some physicians prefer receiving written recommendations and a drug profile. One group thought that the role-playing could be improved.

Although pharmacists appeared to be satisfied with the discussions with the physicians after the first class, the course developer and the tutors had some reservations. They observed the physician assuming more of a teaching role, rather than interacting on a collegial, equal basis. Therefore, a form (see Appendix J) was designed to direct observations of the tutors during the second workshop in order to obtain more feedback on this component of the course (see Table 15). Tutors from all six groups responded.

Table 15

Tutor Assessment of Pharmacist-Physician Interaction After Workshop C

Interaction	Yes	No
Were the pharmacists comfortable discussing drug therapy with the physician?	5	1
Were the pharmacists looking to the physician for the answers or did they consider the physician the drug expert?	2	4
Did the pharmacists grant authority to the physician and put themselves in a subordinate position?	2	4
Did the physicians respect the knowledge of the pharmacists and consider this to be a learning experience?	5	1

These results suggest that, with the exception of one group, the pharmacists and physicians were interacting on a collegial and equal basis.

Comments written by the tutors on the form included:

> "I don't think they [the pharmacists] considered the physician the drug expert, but I don't think they would 'argue' for a particular recommendation if the physician would not be in agreement."
>
> "Pharmacists seemed to demonstrate professional esteem."
>
> "Pharmacists were more comfortable this second time."
>
> "Comments from both physicians were very positive. I think they very much appreciated the experience and felt they learned a lot."
>
> "Physician commented that he values pharmacists' input on patient's drug therapy."

Comments by five of the tutors were very positive; however, one tutor made the following comments:

> "The pharmacists ended all their statements with a question mark. . . . It immediately puts the control/knowledge in the hands of the person being asked. The pharmacists seemed unwilling or unable to make a statement with confidence and accept the responsibility for their comments."
>
> "I felt the physicians involved felt themselves to be less team members and more information sources."

The pharmacists also frequently commented on the evaluation forms about this one component. One pharmacist thought that the physician was not sure what exactly was expected and that some of the role play and cases were not that relevant for physician involvement. There were also some very positive comments:

> "This course was excellent. I would very much like to see more such interactive interdisciplinary courses. I would enthusiastically recommend this course to my colleagues—pharmacists and physicians.
>
> "Course was great. Enjoyed the physician interaction. Enjoy case-based learning, more relevant."

On the evaluation form completed during the last class, pharmacists were asked to comment on any aspect of the course which they would like. Seven pharmacists commented on the physician-pharmacist interaction. Four comments were very positive including statements such as "Working with physicians was a good approach and a good learning experience"; "Physician involvement was an asset"; "I would

very much like to see more such interactive interdisciplinary courses"; and "Enjoyed the physician interaction."

There were, however, concerns about what the role of the physician was, and this was strongly expressed by three of the participants:

> "Was the physician here to teach us, or were they here to be a sounding board for our ideas and suggestions?"
>
> "I felt a lot of the therapeutic decisions made depended on which physician you had. In most interactions with the physicians, I felt they had the attitude that 'I,' the physician, knew the answer; how close can you come to it? It was never a real equal sharing, and let's forget who is what here, and let's get the best result for the patient. Seems physicians never want to look like they are wrong."
>
> "Interacting with the physicians was interesting, but I did not find it particularly productive as far as increasing my skills for interacting with physicians. A team approach was not taken. The attitude was more of 'I know the answer; let's see if you come up with the right idea.' More 'give and take' of ideas was needed."

Joint Pharmacist-Physician Workshop

The second type of interaction with physicians was the joint workshop held on a Saturday morning. Pharmacists indicted their level of agreement on a 5-point Likert scale with the following statements, as shown in Table 16.

Table 16

Evaluation of the Joint Workshop

Statement	Mean	SD
The small-group discussion based on the cases was an effective way to learn.	4.50	.67
Discussion of the cases with another member of the health-care team was useful.	4.64	.49
I would attend more joint educational programs.	4.73	.46

Pharmacists highly rated the joint workshop.

Comments on the Evaluation Form

There were a few comments that the cases were not adequately finished because of time constraints. Each group discussed only one case during the workshop, but pharmacists had prepared three cases and wanted to discuss all of these. One pharmacist suggested sending completed case work-up sheets to all participants. Two pharmacists wanted more lecture time and less group time; however, two other pharmacists expressed the opposite point of view.

There were also suggestions that the number of attendees be increased substantially. One pharmacist thought the workshop was excellent and wanted to see more people benefit. Another pharmacist expressed the view that it would be preferable to have more physicians participating so that they could see what pharmacists know and can do.

One pharmacist who especially like the interaction wrote:

> "This workshop was excellent. Both physicians and pharmacists went into the small-group session apprehensive but were greatly reassured when both sides approached problems very systematically. . . . We were just starting to get into wonderful discussions when our session came to a close."

There were suggestions for improvement:

> "Pharmacist-physician discussion needed more structure (i.e., simulate a team conference). Short discussion of each case at the end so that everyone could benefit from the ideas presented."

> "If physicians do not see cases before the session, the pharmacists should not either. This would encourage real situations we face in our practice."

> "I would like all three cases presented and covered with physicians and a more structured approach."

Miscellaneous Open-Ended Comments

Several comments were received on the workshop evaluation forms. There were many comments about the lack of time during the workshops; several pharmacists thought that three cases were too many. Five pharmacists complained about having to submit an assignment. The following comments were made:

> "I felt that we were almost treated like school students to have a written test to submit."

> "Each member of our group had unusual stresses during the term of this course and especially during the time prior to this workshop. None of us needed to hand in an assignment."

A few pharmacists did not like the learning issues and felt that they were a poor use of time during the workshop. Several pharmacists liked the physician involvement; others felt that this portion needed to be more structured. For example, the overhead transparency used for directing dialogue with the physician needed to be improved.

Evaluation of the Drug-Information Component

A goal of the course was to increase drug information skills and increase access to drug information. The first workshop specifically dealt with this goal and the pharmacists evaluated this workshop. Generally, pharmacists thought that the workshop was well organized. The mean indicating agreement with this statement was 3.67, with an *SD* of .92. There was general agreement that the workshop was of some value but that there was room for improvement. The following statements support this.

Evaluative Comments During the Interviews

Comments which illustrated the value of this workshop include:

> "The part that I liked in the first lecture was telling us about the different references and pinpointing which you should probably have on your shelf and which may serve the purpose of three others. So that really helped."

> "I still think it's a good portion of the course just because you re-think about how to look at an article and see whether it is a valid article. And I still think that is something a lot of people need to think about when they read an article. I mean, even now I sometimes don't think, 'You know, they are telling me this; is it actually valid?"

Three participants did not find the workshop to be particularly useful. One comment was:

> "I didn't find it terribly valuable. Again, from our point of view we have some good textbooks. . . . We've access to journals. We do literature searches if we need to through the university library. And we contact PADIS all the time, so beyond that it didn't help. I didn't find it valuable."

Getting the References

Course planners did not intend to provide references for each student; one set was given per group. However, pharmacists adamantly requested their own set. As a result, references were provided at the second workshop. Therefore, participants obtained their own references to work up the cases for Workshop B. Pharmacists were asked on the evaluation form if they were able to obtain sufficient information to work up the cases. For Workshop B, 71.4% agreed and 25% strongly agreed that they were able to obtain sufficient information. Therefore, either participants obtained information from other sources, or the groups circulated the binder with the references to all members of the group. When asked after Workshop C if they had obtained information in addition to the references provided, 96.6% said that they had. Only one pharmacist said no. After Workshop E, 84.6% indicated that they had obtained information in addition to the references provided, and 15.4% said they had

not. This suggests that participants were actively obtaining drug information from other sources even though the references were provided for most of the workshops.

On the self-assessment form pharmacists were asked to assess their initiative to obtain information from other sources. There was a wide range of commitment; the mean was 7.43 on a 10-point scale, but the *SD* was 2.04, so there was considerable variance.

Several pharmacists who were interviewed wanted to be given the references as part of the course materials. Comments were:

> "To go and to physically search for a book in a library I think does not appeal to a lot of us."

> "And it's hard if you live outside the city. You know, all of these people, not only do they work, but they have other commitments as well. And it was difficult for me to cope with the one night going in. But the course is much more than the one night. So you find that you've got to do hours of reading and you've got kids on the go. I mean, that's not an excuse, but that's the reality of life. And I think if you were to offer the course and all information, you'll have to research in the university library. I couldn't commit myself to days in the university library."

> "People are really keen and I read all of those references, and I think a good portion of the people who took that class did. . . . I appreciated having extra articles, and that's where you learn from. I didn't want to have to search out references because sometimes we have hit dead end with those references. So I enjoyed having extra information to read."

There were some positive aspects to searching for references:

> "What I thought was really valuable in Level 2 was . . . finding some of the references. And I think that is probably where I was able to contribute to the group because we would meet here at the hospital in our drug-information room. And we have Micromedics on-line on the computer, so that was a big, big help to a lot of our group as well. And sharing that kind of information was good."

Sufficient Quality to Produce Results

The external evaluator was asked to do the following: "Using your professional judgment, assess whether the course could realistically result in learning achievement and practice outcomes." The following is the response of the external evaluator:

"To begin with, the cases come from practice. By working through the cases, the participants are learning more about real-life situations that a pharmacist may see in relating to the older adult client. The problem-based approach and small-group work greatly facilitate further development of critical-thinking, problem-solving and decision-making skills. All of these were identified as necessary for pharmacists in one of the journal articles included in the planning materials. The course definitely provides an opportunity for the participants to experience the new role of the pharmacist and pharmaceutical care. Given the quality of the case, the use of problem-based learning and tutors, and interactions with physicians, in my judgment the participants should have met the goals of the course."

Summary

The extensive evaluation by the participants and the evaluation by the external evaluator provide a basis for concluding that the course was very well planned and delivered. The external evaluator highly endorsed these components of the course. The participants highly rated the course materials, but several thought that there was too much paper and that too many references were provided. The pharmacists liked the problem-based learning approach and thought that it was an effective way to learn. They thought that meeting with their groups between workshops was very worthwhile, and they liked the sharing atmosphere in their groups. There were opposing views on the value of having hospital and community pharmacists in the same group. The tutors received very high ratings and many positive comments. The pharmacists thought that the cases were pertinent to their practice. The workload was very heavy, with 70.4% expressing dissatisfaction with this aspect at the end of the course. The pharmacists liked the involvement with physicians but thought that the physicians were often not clear on what their role was. The joint workshop was highly rated. There were conflicting comments on the value of the drug-information workshop and a high level of support for providing the reference material. The conclusion is that the course was of sufficient quality to expect learning achievement and practice outcomes.

Chapter VI

The Results: Learning Achievement

The purpose of this chapter is to present the results on the extent of the learning that occurred as a result of completing the course Pharmacy and The Golden Years, Level II. Learning achievement in three areas was studied: (a) learning to identify, prevent, and resolve drug-related problems as demonstrated by the ability to write a pharmaceutical care plan; (b) learning to communicate and collaborate with physicians; and (c) learning to use drug-information sources.

Learning to Write a Pharmaceutical Care Plan

Three methods were used to assess learning: (a) self-assessment and reporting by the students, (b) observations and assessment by the tutors, and (c) scoring of the pharmaceutical care plan which each student submitted.

There are many abilities required to write a care plan. These include the ability (a) to identify drug-related problems and determine an end-point for each problem, (b) to identify possible alternatives to solving the problem, (c) to formulate recommendations to be made to the physician and/or the patient, and (d) to develop a monitoring plan to assess the appropriateness of the recommendations.

Student Assessment of Learning

The ability to assess oneself is fundamental to maintaining professional competence throughout one's professional life (Gordon, 1991, 1992). In this study, pharmacists completed a self-assessment form and responded to self-assessment questions on the evaluation form, completed during the last workshop of the course.

Questions on the final evaluation form. Students were asked to assess how well the course increased their ability to provide pharmaceutical care to patients in their practice. This is a global assessment of abilities required to identify, prevent, and resolve drug-related problems on a patient-specific basis. The term *pharmaceutical care* was defined for this question to provide respondents with a common basis for comparison. Additional questions evaluated the students' perception of the impact of the course on two specific abilities for pharmaceutical care: (a) the ability to use a systematic process to recognize drug-related problems, and (b) the ability to formulate a pharmaceutical care plan. Students' responses to these three questions are shown in Table 17.

Table 17

Assessment by Students of Their Ability to Provide Pharmaceutical Care

Ability	Mean	SD
Ability to provide pharmaceutical care	4.42	.50
Ability to use a systematic process to identify problems	4.26	.59
Ability to formulate a pharmaceutical care plan	4.11	.51

The pharmacists believed that the course increased their ability to provide pharmaceutical care: 42.3% strongly agreed, 57.7% agreed, and no pharmacist was neutral or disagreed with the statement. Assessments of specific abilities to provide pharmaceutical care were slightly lower. All pharmacists, except two, agreed or strongly agreed that the course increased their ability to identify problems and formulate a care plan.

Self-directed learning is essential for practitioners to maintain their knowledge and skills (Jennett et al., 1994). Self-assessment is one component of self-directed learning. In the course, pharmacists were required to assess their level of knowledge and skill for the learning issues in each case, to identify what they individually needed

to learn, and to direct their self-study in these areas. Pharmacists assessed how well they thought that they were doing this by indicating their level of agreement, using a 5-point Likert scale, with the statement below in Table 18.

Table 18

Effectiveness of Self-Directed Learning

Statement	Mean	SD
Through my self-directed learning, I was able to acquire enough knowledge and skill to work up the cases.	3.93	.68

The level of agreement with the above statement was fairly high: 81.5% either agreed or strongly agreed, one pharmacist disagreed, and four were neutral.

Self-Assessment Instrument

Students evaluated their ability to identify problems or learning issues and to develop a therapeutic plan and a monitoring plan for cases in the course. A 10-point scale was used, ranging from a value of 1, which was *weak,* to a value of 10, which was *outstanding*. Table 19 shows the results of this self-assessment.

Table 19

Self-Assessment of Ability to Formulate a Pharmaceutical Care Plan

Ability	Mean	SD
Ability to identify problems or learning issues for cases in the course	7.74	1.10
Ability to develop a therapeutic plan and a monitoring plan for the cases	7.26	.96

With respect to the identification of problems and learning issues, 91.3% of the respondents gave themselves 7 or higher. The most frequently chosen value was 8. Self-ratings of the ability to develop a therapeutic and monitoring plan were somewhat

lower. The lowest assigned score was 6 and the most frequently chosen value was 7. These data reveal that the pharmacists believed that they had good abilities to formulate pharmaceutical care plans.

The design of the course enabled the pharmacists to assess whether their problem-solving skills were improving. Two cases from Level I, "Bill McGill" and "Hester Jacobson," were used for the joint Saturday morning workshop with the physicians. Pharmacists indicated whether they were able to identify, prevent, and resolve drug-related problems in these two cases better in Level II than in Level I, as shown in Table 20.

Table 20

Improvement in Problem-Solving Skills From Level I to Level II

Description	Mean	SD
When working up "Bill McGill" and "Hester Jacobson" for the second time, I was able to identify, prevent, and resolve drug-related problems better in Level II than in Level I.	4.0	.85

There was a strong level of agreement with this statement: 82.6% either agreed or strongly agreed. The most frequently chosen value was 4, on a 5-point scale. This statistic is meaningful because it demonstrates perceived growth in problem-solving skills from Level I to Level II.

Performance relative to the group. Pharmacists compared their individual performance with the performance of colleagues in their group; this provided another benchmark for self-assessment. Pharmacists assessed whether their pharmaceutical care plans for the cases were often similar to the final care plan of their group. This comparative assessment is shown in Table 21. Pharmacists indicated their level of agreement with the statement using a 5-point Likert scale.

Table 21

Comparison of Pharmaceutical Care Plans to Those of the Group

Statement	Mean	SD
At least two out of three times my plan was similar to my group's final plan.	4.26	.54

The results are remarkable: All but one pharmacist agreed or strongly agreed with this statement. These results suggest that there was a consensus on how best to treat the patient even before the group met to discuss the case. This leads to the conclusion that pharmacists thought that their individual plans were well done.

Observations by the Tutors

Observation and assessment by the tutors of the pharmacists' problem-solving skills provided further insights. Tutors changed groups halfway through the course; therefore, each student was evaluated by two tutors. The purpose of this was to increase the validity of the ratings and to determine whether students improved as they proceeded through the course. The results of the tutors' ratings are given in Table 22. A 10-point scale was used.

Table 22

Assessment by Tutors of Problem-Solving Skills

	First half		Second half	
Ability	Mean	SD	Mean	SD
Ability to identify problems or learning issues	6.81	1.80	7.79	1.15
Ability to develop a therapeutic plan and a monitoring plan	6.87	1.86	7.72	1.07

The means presented above indicate a good level of problem-solving ability, particularly at the end of the course. They also indicate that the tutors observed an improvement in problem-solving skills during the course. At mid-point in the course the scores of the students' ability to identify problems and learning issues ranged from 3 to 9. Over half of the students were assigned either 7 or 8. At the end of the course the range was 6 to 9, with 40% of the pharmacists receiving 9. A similar improvement was shown for the ability to develop therapeutic and monitoring plans. In the first assessment the range was 3 to 9, and 7 was the most frequently assigned value. In the assessment at the end of the course the range was 6 to 10, and the most frequently assigned score was 8.

Caution is advised before concluding, on the basis of the tutors' observations, that significant improvements in problem-solving abilities occurred during the course. Two tutors were replaced halfway through the course because of schedule conflicts, and the new tutors may have had lower expectations and therefore awarded higher ratings. It is unrealistic to expect significant growth in ability from mid-point in the course to the end of the course, a span of three workshops. A careful inspection of the data reveals that 13 pharmacists improved, 7 stayed the same, and 8 received a lower score at the end of the course than at the mid-point. Furthermore, a correlation of the two sets of tutor scores shows that the two are unrelated. The correlation coefficients for the ability to identify problems and the ability to develop a therapeutic plan were .005 and .006, respectively.

Tutor confidence in ratings. Tutors were concerned about how accurately they would be able to judge the various abilities. A 5-point confidence rating scale was added to enable tutors to indicate their level of confidence in each rating, with 1 being *low* and 5 being *high*, as shown in Table 23.

Table 23

Confidence Ratings of the Tutors

	First half		Second half	
Confidence in assessing ability	Mean	SD	Mean	SD
To identify problems or learning issues	4.00	.86	3.90	.82
To develop a therapeutic plan and a monitoring plan	4.13	.76	3.76	.74

Confidence ratings for each ability were good. The tutors had greater confidence in their assessment of students' ability to identify problems or learning issues than in their assessment of the ability to develop a therapeutic plan and monitoring plan. Tutors were more confident in their assessment after the first half of the course than at the end. This is likely due to the fact that there was a change in two tutors at midpoint in the course.

Comparison of assessment by tutors and by students. The scores assigned by students and tutors at mid-point in the course were compared by correlating paired samples. The mid-point tutor scores were used because they were completed at a similar point in the course. The results are as shown in Table 24.

Table 24

Comparison of Tutor and Student Assessment

Criterion	Correlation	*t*-value	Degrees of freedom	2-tail prob.
Ability to identify problems or learning issues	.219	-1.39	22	.179
Ability to develop a therapeutic and a monitoring plan	.410	.32	22	.753

There is no significant difference between the tutor assessment and self-assessment values. It can be concluded that there is a relationship between the tutor's assessments and the students' self-assessments.

Scoring of the Pharmaceutical Care Plan

The scoring of the care plans constituted a large portion of the energy and time in this study, and because this has not been done previously in continuing pharmaceutical education, extensive data are presented.

Each of the 28 care plans was initially marked by two scorers. Using their professional judgment, scorers first assigned a holistic score to measure how well the pharmacist had managed the patient. A scale of 1 to 10 was used. Scorers then analytically scored the assignment using a detailed answer key. There was a possible 165 points for the base analytical score, plus two additional problems worth an additional 44 points. Once all the scores were received, they were entered in a table (Appendix W). The data were carefully inspected and discrepancies identified. A total of nine care plans were rescored; this resulted in a total of 65 sets of scores.

The correlation between the holistic score, the analytical score, and the bonus score for each scorer was determined. All 65 scores were used and the results are as follows in Table 25.

Table 25

Correlation Coefficient of Holistic, Analytical, and Bonus Scores for Each Scorer

Comparison	Scorer A	Scorer B	Scorer C
Between holistic and analytic	.710	.869	.877
Between holistic and bonus	.147	.268	.186
Between analytic and bonus	.241	.183	.038

There is a strong correlation between the holistic score and the analytical score for each scorer; the correlation coefficient ranges from .710 to .877. There is no relationship between the holistic score and the bonus score, and with one exception, no relationship between the analytical score and the bonus score. On this basis, and

because the bonus problems were not integral to good management of the patient, the bonus scores were not used in subsequent calculations.

Because of the strong correlation between the holistic and analytical score for each of the three scorers, it can be concluded that they had the same view of the care plans. That is, the relationship of the holistic to the analytical score for each scorer was similar, although the numerical value assigned varied. This then provided a sound basis for eliminating discrepant scores.

Once the discrepant values were removed, scorers were compared using those care plans which the two scorers marked. The results of the correlation for paired samples are given in Table 26.

Table 26

Correlation of Scorers

Comparison	Correlation	2-tail prob.	*t*-value	Degrees of freedom	2-tail prob.
Holistic - Scorers A and B	.613	.026	1.87	12	.086
Analytic - Scorers A and B	.795	.001	.19	12	.853
Holistic - Scorers A and C	.844	.000	2.01	14	.064
Analytic - Scorers A and C	.936	.000	-1.44	14	.171
Holistic - Scorers B and C	.827	.000	.93	17	.366
Analytic - Scorers B and C	.886	.000	-.63	17	.536

The correlations between the analytical and holistic scores for each scorer were very strong. It can be concluded that there is no statistical difference between the holistic and analytical scores for each of the three scorers. This means that there was

consistency in scoring among all scorers for both the holistic and the analytical scores.

If we then ignore scorer identity, collapse scores into two sets, and correlate the two scores for each student, we get the following results, as shown in Table 27.

Table 27

Correlating Both Scores Assigned to a Plan

Comparison	Correlation	*t*-value	Degrees of freedom	2-tail prob.
Holistic	.795	2.04	27	.051
Analytic	.963	-.85	27	.402

These results show an exceptionally strong correlation between the analytical scores in each set of scores and good correlation between the holistic scores. This establishes the validity of the scorers as instruments. It can be concluded, with a high degree of confidence, that the scores are reliable indicators of performance on the care plan for the assigned case in the course. The descriptive statistics in Table 28 provide further information about the performance of the students.

Table 28

Assigned Values for the Two Sets of Scores

Score	Mean	SD
Holistic - first set	6.804	1.641
Holistic - second set	6.375	1.798
Analytic - first set	103.500	25.928
Analytic - second set	104.723	27.864

The mean for all 56 scores for the holistic was 6.589, with an *SD* of 1.719; and the analytical was 104.112, with an *SD* of 26.675. The correlation coefficient for all 56 scores between the holistic and the analytic scores was .824. These results are

similar to those comparing the scorers and again show a strong correlation between the holistic and analytic scores.

Relationship Between Time Spent and Scores Received

On the evaluation forms for each workshop, students were asked to indicate the number of hours which they had spent preparing for the workshop. The correlation between the numbers of hours spent preparing for Workshop E for which the assignment was a component, and the holistic and analytic score received was calculated. The correlation coefficient between hours and the holistic score was .415 ($p=.044$), and between hours and the analytical score was .430 ($p=.036$). These values are statistically significant, and it is possible to conclude that there is a relationship between time spent on the care plan and the scores received.

Learning as a Result of the Course

The scoring of the pharmacy care plan provided good insights into the ability of the pharmacists to identify drug-related problems and to formulate recommendations and a monitoring plan. However, it is important to know whether the course contributed to this ability.

To determine this, pharmacists were asked to circle either *Yes* or *No* printed in the margin on the assignment sheet beside each section, to indicate whether they were able to provide this answer as a result of the course, or if they knew it before the course. There was a total of 393 responses received. Of these, 158 were *Yes,* and 233 were *No.* This indicates that 40.4% of the answers provided on the assignment sheet were course related, and we can conclude that learning occurred in the course.

It is difficult to determine how accurate this assessment is; several pharmacists indicated that it was difficult to distinguish prior knowledge from knowledge acquired

in the course. Therefore, during the interviews the pharmacists were asked if it was easy for them to mark *Yes* or *No*. Below are some of the comments received:

> "It was just extremely difficult to separate—like you knew that but did you gain a different awareness of it during the course?"
>
> "I just felt that you couldn't identify that 'yes,' 'no'; that really gets complicated."
>
> "I think it would have been easier in Level I to determine what you knew and what you didn't know beforehand. I found it difficult to actually determine if this was new or not."
>
> "It would be easier to probably answer that question before we even looked at the references, maybe read the case and then say, 'Okay, do I know these things, and can I answer them without reading the references?"
>
> "After you've read the case, the first thing you do is, the way I do, is read all my information, and then hopefully I would know the answer. So then you think, Well, maybe I knew that anyway; the reading just jogged my memory."

Limitations of the approach. Asking pharmacists to complete the assignment before they met with their group negated the extensive learning that occurs in the groups. Therefore, the proportion of *Yes* to *No* answers is lower than it would have been had pharmacists completed the care plan after their groups met and then identified which answers were course related. As one pharmacist said:

> "Initially, when I filled this out I felt that 60% of this I had known previously. But then after we had met with the group we started talking about it, and then other people were adding different viewpoints. And I felt that 'yes' could have been brought down to 40%."

A second limitation of the assignment was that the pharmacists assessed prior knowledge only and not prior skills. Problem solving is more than knowledge; there are many skills involved. Therefore, the word *ability* instead of *knowledge* should have been used on the assignment sheet. One pharmacist expressed this point of view:

> "Separating what was knowledge versus did you apply your knowledge, . . . do you feel you have applied your knowledge any differently since you have taken the course versus how you might have applied your knowledge before you took the course?"

One pharmacist thought that the extent of prior knowledge depended on the category in the pharmacy care plan:

> "To develop a goal, well, that comes maybe with the philosophy of the course. . . . The recommendations, I seem to more often answer yes to this. There were changes in how I would intervene in the patient, based on things that I learned during the course. So I learned a lot in those areas. Monitoring parameters, quite often they are the things that were common sense or logical things, that I felt we know how to do. Whether what we took in the course helped to do that, I don't know."

One pharmacist indicated that it was difficult to separate learning in Level I from learning in Level II:

> "I think some of it came from the first geriatrics course, and then I think the remainder came from this one. But mind you, this geriatrics course is much fresher in my mind than the first."

Relationship of Tutor Assessment and Care Plan Scores

A Pearson correlation was calculated to compare the tutor assessment of the students' ability to develop a therapeutic and monitoring plan with the holistic and the analytical scores assigned to the care plan. The correlation coefficient with the holistic score is .295 and for the analytic is .299. This illustrates that there is no relationship between tutor assessment and performance on the assignment. Also see Appendix X.

Relationship of Self-Assessment and Care Plan Scores

A similar calculation was performed to compare how the students assessed their ability to develop a therapeutic and monitoring plan with their performance on the assigned care plan. The Pearson correlation coefficient with the holistic score was .082 and with the analytical score was .253. Neither of these values is statistically significant. The conclusion is that there is no relationship between how well the students thought that they could develop care plans and the score which they received on the assigned care plan.

Acquiring Attitudes for Pharmaceutical Care

Adult education addresses knowledge, skills, and attitudes. One of the goals of the course was to help pharmacists acquire a positive attitude and motivation to provide pharmaceutical care to the older adult. Pharmacists during the interviews referred to a change of attitude:

> "The course has certainly given me a lot more confidence to know that there's many things I don't know, but they are not impossible to learn."
>
> "The real thing that makes a difference in your practice, I think, is the attitude and the philosophy that developed. I attribute a lot of my desire [to talk to patients] to the fact that I was involved in the two levels of the course, whereas I would be a lot more reluctant prior to that to want to spend time talking to people."
>
> "I know that I have, having taken the courses, changed my mind set a little bit as far as how I deal with a patient. It is not one order; it is the whole patient. It was really good. I think taking the courses made me think of those things. . . . It just gives me that extra incentive to take one more look and not just an awareness but the methodology to look at these things and identify what you don't know and go from there."
>
> "I have always had a soft spot for the elderly; the courses drove that point home a little bit more."

Awareness

> "[The course] made me more aware of the different way that diseases work on people over 65."
>
> "The course has made me aware of polypharmacy. The more you dispense, the more you make. And I'd be lying if I didn't say that I would prefer that. But for the benefit of the patient, now after the course, I mean, you say, is it going to disable the person, and they are going to end up spending x amount of time in the hospital to have this all sorted out."

Communicating With Other Professionals

Providing pharmaceutical care depends on the pharmacists' ability to communicate their recommendations to other health-care providers. Data to assess this ability were collected in two ways: (a) assessment by the students, and (b) assessment by the tutors.

Assessment by Students

On the self-assessment form pharmacists rated their communication skills using a scale of 1 to 10, with 1 being *weak* and 10 being *outstanding*. Table 29 presents these data.

Table 29

Student Assessment of Communication Skills

Ability	Mean	SD
Ability to communicate with other members of the group	7.96	.93
Ability to be a good team member	7.96	.93
Ability to discuss drug therapy with the physician who joined the group during the workshops	6.87	1.71

Pharmacists rated themselves highly on two of the three parameters. They considered themselves to be good team members; the range was from 6 to 10, and 43.5% chose 8. Ratings were similar for their ability to communicate with their group members. Eight was the most frequent value selected, with 65.2% of the pharmacists choosing this value and 17.3% choosing 9 or 10. Ratings of their abilities to communicate with the physician were lower. Here the range was from 2 to 9, with 30.4% indicating 6 or lower and 17.4% selecting 8 or 9. One pharmacist chose 2, one chose 4, and two chose 5. These results indicate that pharmacists are more comfortable communicating with each other than with physicians.

Ability to Communicate With the Physician

On the evaluation form completed during the last workshop, pharmacists were asked to indicate whether they felt that the course had increased their ability to communicate effectively with physicians. Using a 5-point Likert scale, pharmacists marked their level of agreement with descriptions of three abilities, as shown in Table 30.

Table 30

Ability to Communicate With the Physician

Ability	Mean	SD
My ability to communicate with physicians has improved as a result of the course.	3.56	.75
I am better able to choose convenient methods to contact the physician.	3.19	.74
I know more about the information required by physicians when modifying drug-therapy decisions.	3.93	.68

Assessment by the tutors. The tutors assessed the pharmacists on the same abilities, and this was completed halfway through the course and again at the end of the course. The results are shown in Table 31.

Table 31

Assessment of Communication Skills by the Tutors

	First half		Second half	
Ability	Mean	SD	Mean	SD
Ability to communicate with other members of the group	7.55	1.98	7.76	1.12
Ability to be a good team member	7.48	2.23	7.76	1.02
Ability to discuss drug therapy with the physician who joined the group	6.70	2.46	7.76	1.38

These data indicate that the tutors thought that the pharmacists were good team members and could communicate well with each other and with the physician. From mid-point to the end of the course there was a modest increase in ability to communicate with other members of the group and to be a good team member, and a fairly substantial increase in their ability to discuss drug therapy with the physician. However, the calculation of t-tests for paired samples reveals that there is no

statistical difference between the scores at midpoint and the scores at the end of the course. These data are presented in Table 32.

Table 32

Comparison of Tutors' Assessment at Mid-Point and at the End of the Course

Criterion	*t*-value	Degrees of freedom	2-tail prob.
Ability to communicate with group members	-.21	28	.837
Ability to be a good team member	-.34	28	.734
Ability to discuss drug therapy with the physician who joined the group	-1.64	28	.113

The Pearson correlation co-efficient statistic reveals that the scores assigned by tutors at mid-point in the course are not related to the scores assigned at the end of the course. The correlation coefficient-efficients for the above three variables are, respectively, .272, .126, and .135.

Comparison of tutor and self-ratings. The scores assigned by the students and those assigned by the tutors are very similar.

Confidence of tutors. Tutors showed a higher degree of confidence in rating the pharmacists in the first half of the course than in the second for the first two values, and a similar degree of confidence in rating their ability to discuss drug therapy with the physician.

Factors in Good Communication and Collaboration

To be good practitioners, pharmacists should be aware of factors which facilitate or impede communication with physicians. They should have an understanding of the information needs and perspectives of physicians with respect to drug therapy.

Awareness. Pharmacists reported that, as a result of the joint pharmacist-physician workshop, they were more aware of several factors (see Table 33).

Table 33

Awareness of Issues Influencing Communication

As a result of the joint pharmacist-physician workshop:	Rating	
	Mean	SD
I am more aware of the value of pharmacist-physician collaboration in practice.	4.49	.50
I am more aware of why physician-pharmacist collaboration in practice has been limited.	3.96	1.09
I am more aware of ways to facilitate physician-pharmacist collaboration in practice.	4.36	.58

Interviews

Pharmacists reported that having physicians involved in the course was a good learning experience. During the interview they indicated that they had learned in two areas: (a) understanding the different perspective of the physician, and (b) learning how and what to say to the physician.

Different perspectives. Pharmacists gained insights into how physicians think and how they make therapeutic decisions. The following comments from the interviews illustrate this:

> "I think it was useful to have an MD there as well—to see it from his end."
>
> "I think that by knowing how they think . . . I'm talking more about the gray areas and how they make those decisions in the gray areas. I think that gave me more insight into that because what we think is important and what they think is important can often be different because of how we perceive the patient."
>
> "In terms of interacting with the physicians in the course, it helps you get a better understanding of their way of thinking."

"I've always been able to interact with the physicians to some degree. But this gave me more of an insight as to what they are looking for."

"I think the one thing is that sometimes . . . we often have a narrow focus, where having the physicians in the course broadens the focus because he has to see all the aspects of the patient care, . . . so it gave us the big picture."

"If you have an idea of how physicians think or why they order the way they do, I think that we can make better suggestions and give better alternatives."

"I felt I gained insight into the physician's thinking and approach to problem solving."

Other comments were made on how to improve dialogue or appreciate the physician's perspective:

"It is like one of the doctors that was at the course said, 'It is hard to appreciate recommendations when you never asked for them.' . . . I thought of it, and that is true. And a lot of times when you are doing chart review and you are making your recommendation, the doctor did not ask for a pharmacy consult, but you are giving this advice. And I don't blame them."

"When we were discussing cases, one physician . . . suggested that pharmacists make suggestions in terms of patient perspective; i.e. the benefit of this for Mr. Jones would be . . . . In my practice, I will be more open to providing information from a 'how it will help the patient perspective' and tell the physician what I would recommend."

"I guess having the physicians in the course just made you know that you can't just say something that you want to say. . . . It was more, 'How should I approach a physician? . . . How can I develop a relationship with the doctor?"

"An advantage of the course.. is practice. Not as much specific skills or tips, but practice. . . . Every time that you consult with a physician, I think it brings you that much closer to doing it again."

Learning to Improve Access to and Use of Drug Information

Pharmacists were asked to indicate their level of agreement with various statements describing the value of the first workshop on drug information. Table 34 describes the distribution of their response.

Table 34

Evaluation of Workshop on Drug Information

Statement	Rating	
	Mean	SD
The workshop increased my ability to obtain an appropriate history before answering a drug-information question.	3.68	.67
The workshop increased my knowledge of drug-information sources.	3.68	.86
The workshop enabled me to identify textbooks and journals that would be useful for my practice.	3.57	.88
The workshop increased my ability to critically evaluate drug information.	3.43	.92

Over half the participants (57.1%) agreed or strongly agreed that the workshop increased their ability to obtain an appropriate history before answering a drug-information question; however, 42.9% were neutral. Of the respondents, 64.3% agreed or strongly agreed that the workshop increased their knowledge of sources of drug information; 25.0% were neutral. Three pharmacists, or 10.7%, did not think that the workshop helped them in this aspect.

One of the objectives of the workshop was to inform pharmacists of drug-information sources and actually show them samples of textbooks and journals that would be useful for their practice. Most pharmacists thought that the workshop helped them in this regard; however, clearly there is room for improvement, because 46.4% of the pharmacists were neutral or disagreed.

Pharmacists were less inclined to think that the workshop increased their ability to evaluate drug information critically. The median for this variable is 3.5, whereas it was 4 for all the other variables.

Summary

Analysis of the data reveals that participating pharmacists reported that the course improved their ability to provide pharmaceutical care and, more specifically, to identify problems and develop a therapeutic and monitoring plan. Students rated their ability to perform these functions fairly high. Observations of the tutors concurred with this assessment, and there is a relationship between the two measures. Students thought that their problem-solving abilities improved from Level I to Level II. Students also reported that their care plans were often similar to the final care plans of their group.

Analysis of the holistic and analytical scores for the care plan assignment show a very strong relationship between these two scores. There was also a strong relationship among the scorers for both the holistic and analytic scores. Correlations between both scorers assigned to a care plan were .795 for the holistic score and .963 for the analytical score. Therefore, it is possible to conclude, with a good level of confidence, that the holistic and analytical scores are representative of performance on the assignment. The mean holistic score was 6.6, and the average analytical score was 104.11, or 63.1%. Pharmacists reported that a significant proportion of the answers provided on the care plan which they submitted were acquired during the course, although this was often difficult to distinguish. There was poor correlation between the tutor assessment and the self-assessment with the analytical or holistic scores. However, problem-solving skills are case dependent, and scoring of many care plans is required to conclude confidently the correlation between tutor assessment, self-assessment, and the analytical or holistic scores.

Students highly rated their ability to communicate with pharmacists and physicians. Pharmacists reported that the course increased their awareness of how physicians think and make therapeutic decisions, which helps them to communicate more effectively with physicians.

Pharmacists reported that learning to improve access to and use of drug information was not substantial.

Chapter VII

The Results: Practice Outcomes

The previous chapter concluded that learning did occur during the course. The purpose of this chapter is to determine whether the pharmacists applied this learning to practice. Did the pharmacists change their professional behavior, either in unanticipated ways or in ways that the program planners intended? The goals of the course Pharmacy and The Golden Years, Level II, were (a) to enhance the provision of pharmaceutical care by increasing the pharmacists' abilities and confidence; (b) to increase collaboration with physicians by increasing the pharmacists' motivation, confidence, and ability to do this; and (c) to increase access to and utilization of drug information sources.

Two methods were used to determine whether these goals were achieved: (a) assessment and reporting by the pharmacists when completing the various evaluation instruments, and (b) a description by the pharmacists of the application of learning to practice during interviews with randomly selected participants.

Provision of Pharmaceutical Care

The pharmaceutical care model embodies a process for identifying, preventing, and resolving drug-related problems. Seven clearly defined steps have been defined for the pharmacist to follow when providing pharmaceutical care (Strand, Cipolle, & Morley, 1991). The worksheets in the course required the pharmacists to complete these steps; the pharmaceutical care plan is a written record of this process. During the workshops pharmacists practiced implementing the portion of the care plans that required dialogue with a physician. There were four home-study modules in the course with three cases each; therefore, the pharmacists wrote 12 pharmaceutical care

plans during the course and updated three care plans from Level I. Were the pharmacists following the steps or writing care plans in practice?

Modifications Made in Practice

Data from the evaluation forms. On the evaluation form completed during the last class, pharmacists were asked if they had modified the process that they used to obtain patient-specific information or to review the patient profile. Over half of the respondents (59.3%) reported that they had modified the way they gather patient-specific data and review drug regimen profiles as a result of the course. Of those who modified their practice, three pharmacists indicated that they were actually writing pharmacy care plans using worksheets from the course. Seven pharmacists indicated that they were now gathering more information through discussions with the patient, the physician, or other pharmacists. They indicated that they are also more efficient at obtaining information from the chart or are asking the patient more focused questions.

Two pharmacists stated that they could interpret laboratory values better as a result of taking the course. Three reported a change in attitude or awareness of drug-related problems, as expressed in the following statements:

> "I became more aware of drug-related issues."
>
> "The present problem may not be the real problem, so a thorough evaluation of all medication is essential."
>
> "I now look for a reason for each medication that the patient is on. I tend to look more for problems at the point in time when we are dispensing."

Data from the interviews. During the interviews the pharmacists were asked if they were writing pharmaceutical care plans for their patients. Of the 10 pharmacists interviewed, one was writing care plans for selected patients on a fairly routine basis. Three were not formally writing care plans using the steps in pharmaceutical care, but they were applying some of the principles on a fairly consistent basis. The remainder

were not using the steps in the pharmaceutical process at all or writing care plans, but they were applying what they learned in the course on a sporadic, cursory basis.

Of the 10 pharmacists interviewed, two pharmacists were practicing pharmaceutical care fairly consistently, and they reported that the course gave them ideas, confidence, and motivation to practice differently. The following are comments from one of the pharmacists:

> "I've started to write up what our concerns are and actually go into the pharmaceutical care process and leaving this on the chart for the physician to review, . . . and actually our physicians have been delighted. We have thirteen physicians, and through the course of the last probably three months, I've made sure that I've done at least three pharmacy care plans on every physician's chart."

This pharmacist also has support from the administration in the hospital:

> "So I've gotten them more on my side. I asked them, 'Well, how can you pay me twenty-five-plus dollars an hour to be bubble packing? This is outrageous; I'm overpaid to be counting tablets.' And they are saying, 'Oh my goodness! We're paying her twenty-five dollars an hour to be counting these pills when she can be doing this other stuff!' And I think that I'm putting together a project where I'll be able to demonstrate dollars and cents cost savings in terms of the whole process."

When asked if the course helped her do this, the response was:

> "I would probably have documented on the chart . . . very basic, basic things. . . . The course has helped me clarify how I can go about this."

Comments made by the second pharmacist, who routinely practiced pharmaceutical care for selected patients, were:

> "Now we start to look at therapy. I think the philosophy comes out of the course, that there is more—your responsibility doesn't end when you dispense the prescription."

> "We reviewed medications with a physician for patients in a community lodge, and the net result would usually be discontinuing twenty or twenty-five medications, and we would start two new ones."

The course helped pharmacists to identify the drug-related problem better:

> "We're able to cut to the heart of the problem. . . . The course has provided help in pinpointing and asking questions."

The course was helpful in teaching a systematic process:

> "When you are actually doing it, it just comes all in one big step, which is not the best way because there are a lot of things to think about. There are steps you miss. So I think the course approach makes you stop and think."
>
> "We've got these steps that are so lock-step, but when you get into practice, you just zip, zip; you go through all of those levels and sort of synthesize it very, very quickly."
>
> "Before the course we would take short cuts and arrive at something without really considering all of the options. Now this has sort of forced me to step back and start at the beginning and consider all of the options"

The course increased awareness of drug-related problems:

> "I am looking for different things than I was looking for before, . . . just constantly re-evaluating, which I had been doing before, but just more of an awareness of what we should look for."

Solving the Same Problems

On the evaluation form completed on the last day of class, pharmacists were asked if they had encountered a patient or patients with similar drug-related problems to those presented in the cases in the course. The number of affirmative responses to this question was very high: 88.9% of the pharmacists reported that they had encountered similar problems in their practice. Pharmacists were also asked which drug-related problems they had encountered and whether the course helped them resolve the problem. Not all pharmacists provided this additional information; 17 pharmacists (63%) listed the problem encountered. Of these, nine said the course helped them resolve the problem, and three said they were unable to resolve the problem because the physician would not change the prescription after they had explained the problem and presented recommendations.

During the interviews the pharmacists frequently commented that they had encountered the same problems in the course in their practice. Two pharmacists stated that they had encountered an identical problem and talked about it in great length. One pharmacist particularly was very enthusiastic about the experience:

> "I had one just picture perfect—out of our course, exactly. And it happened the week after I worked up the case. And I went in with not one suggestion but about six recommendations. And he went for every last one of them. It was great!"

The pharmacist was asked if she thought she would have picked up that problem if she had not taken the course, and the reply was:

> "I doubt it. I might have picked up a portion of it. I wouldn't have attacked it with such zest. No question, I would never have gone to a doctor and said, 'There are six things wrong with this, never!"

The second pharmacist shared a heart-warming story about an elderly couple who came into the store infrequently:

> "One day the husband came into the store alone and said his wife was in the hospital and that she's not doing very well. So we went into the counseling room and we talked for probably half an hour, and I got a list of drugs she was on because he had a little list of the drugs, and he asked me, 'Do you think any of this could be causing her mental confusion and her problems?' And it was almost straight out of the book, of a case that we had looked at. And I wrote five recommendations for him to take back to his doctor. A while later he was in again, and he said he took my list and gave it to the doctor, and she's so much better. He said her mind is back, and she is really clear. That's worth more, you know; not everything revolves around the economics of this business."

Collaborating With Physicians

On the evaluation forms completed on the first day and on the last day of the course, pharmacists were asked to indicate how many times they had discussed a patient's drug therapy with a physician during the previous week. The objective was to determine whether pharmacists had increased the frequency with which they were interacting with physicians during the span of the course (see Figure 5).

Each of the categories was assigned a value from 1 to 5, and a mean was calculated to determine the frequency of interaction with physicians. For the week prior to the first day of the course the mean was 2.62 and for the last week of the course it was 2.56. This reveals that there was a slight decrease in the frequency with which pharmacists discussed patient-specific drug therapy with a physician at the

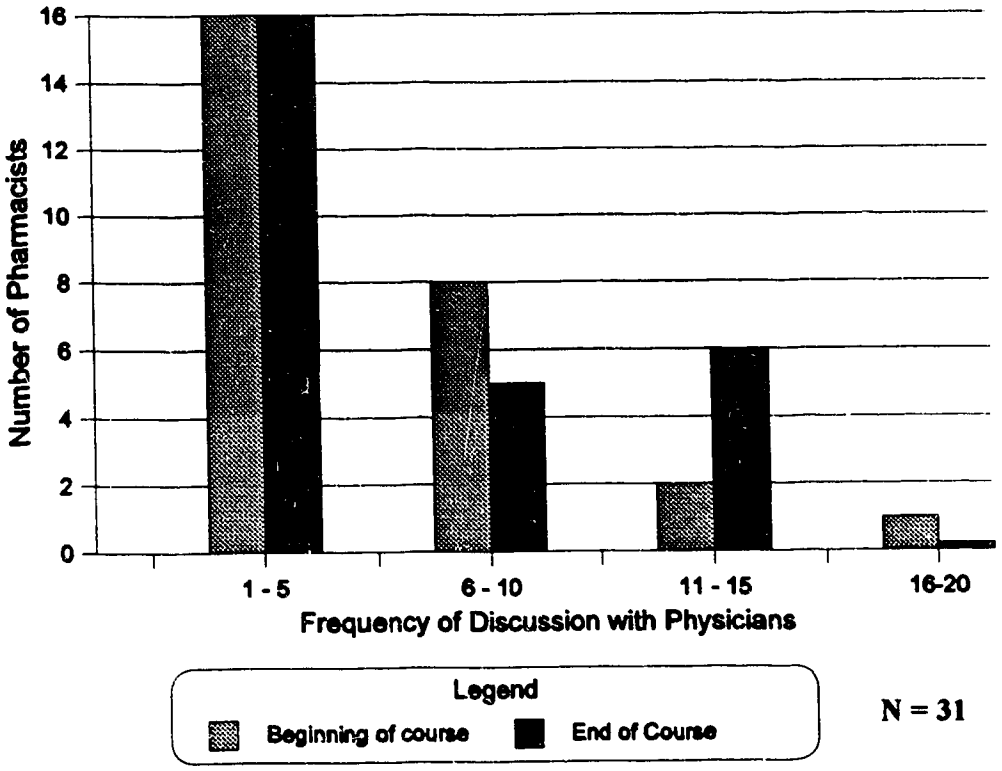


Figure 5. Frequency of discussions with physicians.

end of the course as compared to the frequency at the beginning of the course. Furthermore, the number of interactions was low, with over half of the pharmacists (59.3%) indicating that they had discussed a patient's drug therapy with a physician between one and five times only during the last week of the course.

Extent to Which Pharmacists Are Making Specific Recommendations

Data on the frequency of pharmacist-physician interaction were collected in another way because of concerns that pharmacists could not accurately remember the number of interactions for one week and because the weeks chosen to report may have been atypical. On the evaluation form several reasons for making a recommendation to a physician about a patient's drug therapy were listed. Pharmacists were required to check either *yes* or *no* to indicate whether the course

increased the extent to which they were discussing this aspect with physicians. The results are presented in Table 35. The value for *yes* is 1, and the value for *no* is 2.

Table 35

Increase in Discussing Specific Problems With the Physician

Recommendations	Mean	St. dev.	Percent with *yes*
Prescribed drug is too expensive.	1.44	.51	55.6
Another dosage regimen would be more appropriate.	1.46	.51	53.8
Recommend another drug due to a drug interaction or adverse effect.	1.26	.48	74.1
Obtain patient-specific information in order to monitor or counsel.	1.39	.50	61.5
Recommend discontinuing a drug.	1.36	.49	64.0
Recommend lab test be done.	1.59	.50	40.7
Recommend another drug because it is the drug of choice in this situation.	1.48	.51	51.9

These data show a modest increase in the extent of interaction with the physician. More that half the pharmacists indicated that the course had increased the extent to which they were making recommendations for seven of the eight reasons listed.

Interviews

During the interviews a few pharmacists commented on how they are interacting with the physician differently:

> "I am phoning on important things, and I think I have a different confidence level when calling physicians. And maybe I'm also asking questions a little differently. I'm giving them an alternative, where I know that before I might not have always had an alternative right at my fingertips. I would have said, 'Here is the problem,' and I would have stopped at that point."

> "What it has really done is speed up the process. What I may have deliberated over-should I or shouldn't I call the doctor on this—I don't; I just do it. And I just get my literature together and go for it rather than,

> you know, kind of tiptoeing around all of the various people, which I think I had done in the past."
>
> "The course was a confidence builder within the department as well. . . . The people who haven't taken the course, they have fallen a step behind."
>
> "And you realize that pharmacists think in one direction, they [physicians] think in another direction. So I found that extremely interesting."

Two pharmacists reported that a physician with whom they worked attended the joint session on Saturday morning, and they noticed a significant change in the attitude of these physicians about pharmacists:

> "I think that it was an added benefit when two of the physicians in our building attended the Saturday seminar. . . . In fact, they have told their respective clinics that if there is a problem or if there is a question, phone the drugstore and they will deal with you immediately, or they'll give you the information immediately. And it has been great. We have been getting more calls from them requesting information. . . . One physician told her colleagues, 'I take one course in pharmacology and medication, and these people spend probably two or three years focused on that.' She is encouraging them that they should be calling the pharmacy."

The other pharmacist commented:

> "After completing the workshop, one physician who also participated from our hospital said he finally understood what pharmacists have to offer. I have always assumed that physicians knew what we could offer in terms of drug information, medication suggestions, etc. And he was very excited about this. And he has been very much encouraging me along the way."

Access to and Use of Drug Information

A third outcome that the course planners hoped to achieve was an increase in access to and use of drug-information resources.

Access to Drug Information

On the evaluation form completed on the last day of class, pharmacists were asked whether they had increased their access and use of drug-information sources as a result of the course. Nineteen pharmacists (73.1%) reported that they had increased their access to drug information as a result of the course. Of these, 14

purchased one or more texts and one pharmacist reorganized the drug-information files at work.

Frequency of Obtaining Drug Information

To determine whether participants had actually increased the frequency with which they referred to drug-information sources, pharmacists were asked to indicate on the evaluation form completed during the first and last workshops how often they had obtained drug information during the previous week. Figure 6 shows a small increase in the frequency with which pharmacists obtained drug information in their practice during the last week of the course compared to the week prior to starting the course. A value from 1 to 5 was assigned to each of the categories above, and the mean was calculated. The mean of the frequencies reported during the first workshop was 3.41, and the mean of the frequencies reported during the last workshop was 3.7. There was a slight increase in utilization of drug information during the week prior to the last workshop.

Transferring Learning From the Course Into Practice

There are several factors which influence the application of acquired knowledge and skills in practice. Professional performance is dependent on the practice environment and the intrinsic abilities and attitudes of the individual (Nowlen, 1988).

External Environment

Pharmacists often look to their external environment for reasons that they cannot make significant changes in the way they practice.

Barriers to applying learning to practice. On the evaluation forms completed during the first and last workshops, pharmacists identified factors which impact the transfer of learning to practice. At the first workshop they were specifically asked to

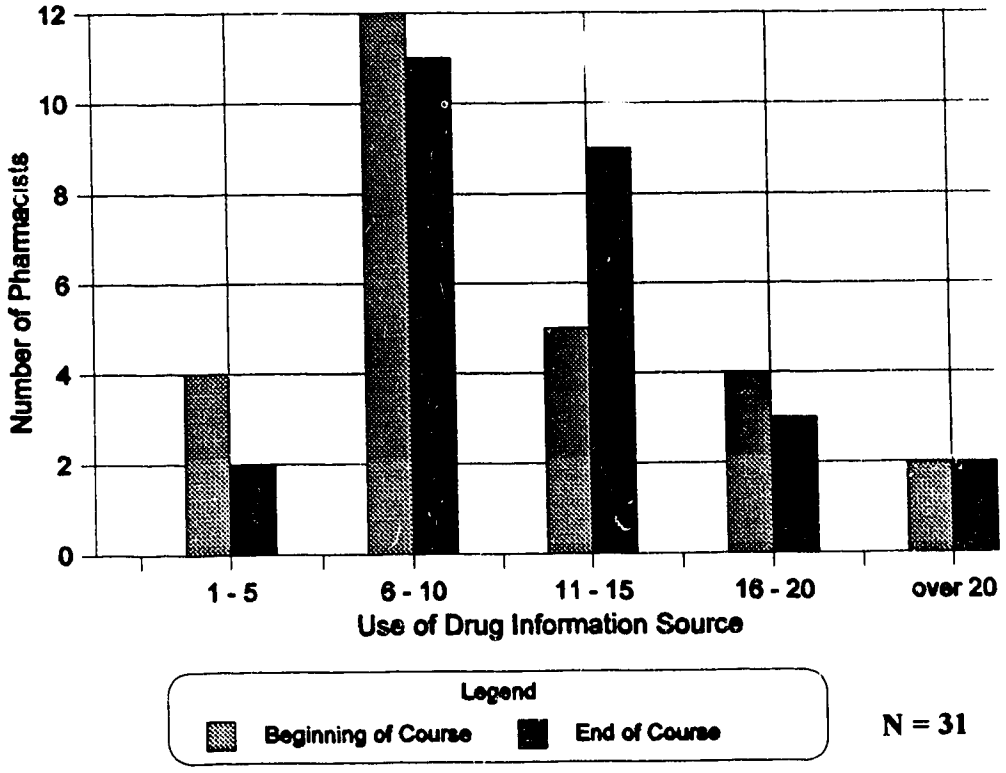


Figure 6. Frequency of obtaining drug information during the past week.

indicate barriers which they encounter to working with physicians and accessing drug information.

Barriers to working closer with physicians. Over half the pharmacists (53%) indicated that the greatest barrier to working closer with physicians was the inaccessibility of the physician. Pharmacists have difficulty contacting physicians in their offices. In the institutions many physicians are not on site, and they see their patients irregularly or at times when the pharmacist is not working. The second barrier was a lack of receptiveness by the physician to involvement by pharmacists; 30% thought this was a barrier. Other barriers included lack of time (27%), lack of access to patient data (6%), and lack of abilities of the pharmacist (6%).

Barriers to obtaining drug information. At the beginning of the course the greatest barrier reported was lack of accessible drug-information sources; 60% of the pharmacists listed this as a barrier. The next largest barrier was a lack of time, with 36.6% listing this and 10% indicating that cost was a barrier to accessing drug information. However, 13% said that there were no barriers to accessing drug information in their practice.

Barriers in general. On the form completed at the last workshop pharmacists were asked to list barriers in general which they encounter. The questionnaire did not ask specifically for barriers to working with physicians and accessing drug information, as had been done on the first questionnaire. However, many of the same barriers were identified. Table 36 indicates the percentage of pharmacists who thought that each of the following was a barrier. There were 26 respondents; some respondents listed more than one barrier.

Table 36

Factors in Practice Which Impede Transfer of Learning

Barrier	Pharmacists who indicated
Time	57.7%
Physician not easily accessible	19.2%
Nonreceptiveness of physician	15.4%
Lack of patient data	7.7%
Miscellaneous	7.7%

The same barriers were raised during the interviews. Some of the comments are provided below:

Time

> "It takes time; counseling takes time. If you happen to be one pharmacist dispensing and maybe you have a technician, but you sit down and spend twenty minutes out of the afternoon, you know how far behind you are for the rest of the afternoon trying to catch up."

Physicians

> "They don't have time, and they can't be bothered with these little nuisance phone calls, and the pharmacist's input in patient therapy isn't that appreciated."

The lack of access to the physician was also raised:

> "We need a better communication system, because right now you can write on the chart, and when the physician comes in, then it is seen, and then maybe you can get it done."

> "One day there was a problem with a medication, and the doctor never called back for two hours."

Lack of information about the patient in the community. This was a prevalent concern; it was expressed by three of the four community practitioners interviewed.

> "There is something sacred about the patient's chart in private practice and I think that must be difficult to overcome. In hospital it is not so bad, but here it is a little bit different."

> "I find it really difficult, retailwise, to get the whole picture of a patient. I mean, you don't see their lab results, you don't know what they are being treated for."

Two barriers were raised during the interviews that were not previously identified: (a) expectations of patients, and (b) reimbursement for professional services.

Expectations of patients. This issue was not identified by the researcher, but it was raised voluntarily by three pharmacists during the interviews. The following comments were made:

> "It is not only saying, 'I don't have time,' but when a patient is like this [tapping fingers] and says, 'I've got only five minutes left in that meter. I've got to call a cab. I want out. . . . So I think that we have to try to have the commodity ready to be able to spend that other ti

Not all patients want to know about their medicines:

> "I'll ask when I hand out a prescription, 'Do you have any question about this medication?' And a lot of time they'll just say no or 'I have had it before,' or 'My doctor explained it.'"
>
> "A lot of them aren't ready to listen to all the wonderful things I want to tell them, or for me to do the whole history."
>
> "And the general public, a lot of them really don't want to know a lot. And so it's frustrating that you want to be this pharmacist who explains everything. But honestly, the public sometimes—I think it is a matter of their education—need to learn more about what we do."
>
> "You have to educate the patient on the value of waiting a half hour. Because, you know, they are so demanding—they want it now, they want it quick, and they want it explained. The consumer wants it all."

One pharmacist thought patients are more intelligent than before:

> "And it gets scary because just a few days ago a couple of patients—the same day—came in and asked if such and such a drug was an ACE inhibitor, and I thought, Oh my gosh, now they know what an ACE inhibitor is. You know, there are some of them out there that are going to become very sophisticated."

Reimbursement for Professional Services

Two pharmacists thought that part of the problem was that pharmacy is the only profession in which there is a transfer of a product:

> "Our problem is that we have a product that changes hands, and so it becomes a business. No other profession that we can think of handles a hard product; . . . for all the others, it is knowledge."
>
> "I think where pharmacy has difficulty compared to other professions, like law, medicine, accounting, is you pay these people for what they know. If our Valium® is two dollars versus five dollars, this is how our worth is judged. And that is where we have a problem."
>
> "We should be funded for the interventions that we do and the things that we stop and the orders that we phone doctors about and get changed."
>
> "There is absolutely zero reimbursement for it. . . . We should be reimbursed a consultation fee, something when we are going in and we are the driving force to discontinuing medication."

Factors Which Facilitate Transfer in Practice

On the final form pharmacists were asked to list the factors in their practice which facilitate the application of the knowledge and skills which they acquired in the course to their practice setting. There were 26 respondents. Table 37 provides the percentage of pharmacists who indicated each facilitating factor.

Table 37

Facilitators in Practice

Facilitator	Percentage who indicated
Good practice site	39
Participate in patient-care conferences	32
Good physician interaction	25
Good drug information available	4

Statements made that were grouped under the good practice site included "I work in a geriatric facility," "We have computer drug profiles," "We have a counseling area," "I work for a good company," "I have good staff support," and "We have a large number of geriatric patients."

Encouragement in Practice

At the last workshop pharmacists were asked to indicate whether they received encouragement from their colleagues, supervisors, or administration to implement what they have learned in the course in their practice. Of the 26 respondents, 80.8% said yes, 7.7% said no, and 11.5% did not answer or were sole practitioners.

The Individual

The second factor that influences transfer of learning to practice is the individuals themselves: their abilities to practice differently; but equally important is their intention to do so.

Intention to Apply Learning

On the evaluation form for the joint pharmacist-physician workshop, pharmacists were asked to indicate one idea which they intended to implement in their practice. Of the evaluations returned, 61.5% intended to increase interaction with the physician, either verbally or in written format. This was articulated in various ways. Two pharmacists indicated that they would be less hesitant to call the physician as a result of the workshop. Other ideas presented were using a work-up sheet, writing a drug-information newsletter, and increasing ward or clinical time.

On the evaluation form completed on the last night, pharmacists were asked to reflect on what they had learned during the course and to describe what they planned to implement in their practice. These intentions are listed in Table 38, as well as the percentage of pharmacists who listed a particular implementation idea. Some pharmacists indicated more than one intention.

Intentions were expressed rather vaguely. Anything that would reflect an intention to improve patient care, with the exception of better patient counseling, was listed in this category. Better patient counseling was reported alone because is was a specific element which was identified several times. Generally, participants intended to do what they were doing better and not to make significant changes. This is reflected in the following statement:

> "I doubt I will implement anything new as a result of this course, but I feel that I will have a more efficient way of reviewing patient's medications. I think I have more confidence in making suggestions/ interventions with both medical staff and nursing staff."

Table 38

Intention to Apply

Practice element	Percentage who indicated
Improve pharmaceutical care process	30.8
Improve p[illegible] t care	23.1
Better in[illegible] with physician	19.2
Better patient counseling	15.4
Improve drug-information sources	15.4
More frequent interaction with physician	3.8

Several pharmacist reported that they planned to improve their pharmaceutical care process. An example of this is:

> "The format we used in our discussion will be used in preparing for care conferences."

Reflection During the Course

On the self-assessment form completed two thirds of the way through the course, the pharmacists were asked to indicate their level of agreement with the statement that they occasionally reflect on how they can apply what they are learning in the course to their practice. All the pharmacists agreed with this statement: 52.2% agreed, and 47.8% strongly agreed. The mean was 4.48 (.51). Therefore, pharmacists occasionally considered how they could apply their learning to practice, but there did not appear to be an eagerness or intensity to implement change in practice.

Summary

Over half the pharmacists reported that they had modified the way they gather patient-specific data and review drug-regimen profiles. During the interviews it was apparent that 2 pharmacists of the 10 interviewed practiced pharmaceutical care; and of these, only 1 routinely wrote pharmaceutical care plans. Generalizing this to the whole population of the course, we can conclude that 20% of students practiced pharmaceutical care routinely; of these, 10% wrote care plans. An additional 30% applied some of the principles of pharmaceutical care on a random basis. A large proportion of participants encountered the same drug-related problems in practice, and it seems apparent that they handled these problems efficiently.

The course had little impact on increasing physician-pharmacist dialogue, although the efficacy of their interactions with physicians was likely better. Access to drug information was increased; however, the frequency with which drug information was obtained increased only marginally.

Several factors in practice deterred the transfer of learning to practice, the main factors being lack of time and inaccessibility of the physician. However, 39% reported that the practice site was conducive to the transfer of learning. The "intention to implement" statements reveal that most pharmacists planned only minor modifications in practice.

Chapter VIII

Discussion and Conclusions

This study thoroughly evaluated the development, delivery, and impact of the course Pharmacy and the Golden Years, Level I. The evaluation revealed that the course was of high quality and that learning and outcomes in practice could be expected. This was also the conclusion of the external evaluator.

Course Evaluation

There are several aspects of the course evaluation and the assessment of learning and practice outcomes that warrant further discussion.

Problem-Based Learning

There was evidence throughout the course that the pharmacists liked the problem-based learning format and considered it to be an effective way to learn. These findings are congruent with studies of PBL conducted in Faculties of Medicine which report that data on student attitudes, class attendance, and student mood were consistently more positive for PBL curricula than for traditional programs (Norman & Schmidt, 1992; Vernon & Blake, 1993).

Course Materials and Content

Participants were satisfied with the course materials and course content. They thought the knowledge which they gained in the course was useful and pertinent to practice. Many pharmacists encountered in practice the same problems which they solved in the course. This is a strong motivator for pharmacists to take subsequent PBL courses. The selection of problems for the cases in the course is very important. They need to be realistic and should occur fairly frequently. Students thought that the

cases in this course were the right degree of difficulty. This is a difficult criterion to meet because students come into the course with varying degrees of abilities. However, this is also an advantage of PBL because students with less expertise in the content area can improve to a greater extent if they do more intensive self-directed learning.

Working in Groups

The participants especially liked working in groups and learning from each other. They highly rated the sharing atmosphere in the groups and the widespread participation of all members. Participants seemed to enjoy the social interaction. Pharmacists, particularly in the community or a small hospital, often work as sole practitioners, so they appreciated the opportunity to interact with colleagues who are experiencing the same challenges, successes, and frustrations in their work lives.

Having both hospital and community practitioners in the same group enhanced the learning because perspectives from both practice disciplines were valuable. However, this interaction must be carefully managed so that one group does not dominate.

Performance of the Tutors

The students were very pleased with the performance of the tutors throughout the course. The skill of the tutors is essential to success in PBL because these individuals are responsible for facilitating student learning in the small groups (Barrows, 1994). There is considerable debate in the literature about whether tutors should be experts in the particular area of study because their role is one of facilitating, not teaching. During both Level I and II, it was clearly explained to both tutors and students that the role of the tutors was not to provide information. Their role was to facilitate discussion and guide the students in their self-study.

Barrows (1988) recommended that the tutor be an expert in both the tutoring process and the content. The tutors in this course had expertise in geriatric pharmacy. Skills in facilitating group learning varied because tutors had varying levels of experience. However, the pharmacists thought that all the tutors did an excellent job. In continuing professional education it may be advisable initially to have tutors who are experts in the content area. According to Eagle (1991), expert tutors can more efficiently guide the identification of the learning issues and prevent side-tracking. Although PBL should be completely self-directed, in CPE there is an overriding concern about time constraints and participant satisfaction. Adult learners have little time or patience and expect efficiency.

Workload

The one aspect of the course that students expressed strong dissatisfaction with was the workload. It could be assumed that the greater the work, the greater the learning, and therefore the greater the value of the course. However, this needs to be balanced with work and family demands, which are prevalent in adults' lives. This negative response to workload is due, in part, to previous conditioning in continuing pharmacy education where, typically, there are no commitments or expectations beyond the class time. In order for PBL to be successful in continuing education, this prior conditioning will need to be overcome. The fundamental underpinning of PBL is self-directed learning, and the more independent study accomplished, the more beneficial the course will be.

Another contributory factor is the mandatory continuing education environment in which this course operates. Pharmacists in Alberta are required to obtain 30 continuing education units in one year. A minimal number of continuing education units were assigned to this course, and additional units were not credited for hours over and above this minimum. Even though the primary reason for taking the course

for participants was not to get CEUs, there is still an extensive history of accumulating units

Pharmacists would be more motivated to put in sufficient time if these courses were required for a credential such as a certificate or advanced degree.

Knowledge From an Authoritative Source

The fact that pharmacists still want lectures in the course requires further exploration. The obvious explanation is that this is the way that pharmacists have previously "learned" because it is the most prevalent method in both undergraduate and continuing education programs. Pharmacists are accustomed to receiving information passively from a knowledgeable authority, and they have had little or no experience in self-directed learning and lack the requisite skills.

Furthermore, pharmacists have had little experience with collaborative group learning and may have difficulty giving credence to ideas developed collectively with their peers. Evidence of this is the fact that several pharmacists indicated that they would like a review of the case by an expert or a care plan written by an expert provided for each case. Pharmacists wanted to be sure that they were on the "right track." A further explanation of this is that pharmacists have a positivistic science background and expect one "right answer." They are uncomfortable in the "swamp of professional practice" referred to by Schön (1990), where "problems are messy," rational technical information is insufficient, and professional judgment is required. One of the advantages of problem-based learning is that it raises an awareness of the ambiguities of practice and the limits of knowledge (Barrows, 1994).

Another explanation for why pharmacists want a lecture by an expert is that many pharmacists do not learn from practice. Many have not interacted with their patients sufficiently to learn from experience. Therefore, they want someone who has done this, either a pharmacist practicing at an advanced level or a physician, to share

their experiences and to give insights into their clinical judgment. In order to improve abilities continuously to provide pharmaceutical care, pharmacists will need to learn from practice, to listen to their patients, and to reflect about these experiences.

Learning and Practicing Pharmaceutical Care

The study thoroughly assessed whether the course Pharmacy and the Golden Years, Level II, increased the ability of the pharmacists to identify, prevent, and resolve drug-related problems and to provide pharmaceutical care.

Self-Reporting of Learning

The students firmly believed that the course increased their ability to provide pharmaceutical care. Specifically, they indicated that the course increased their ability to use a systematic process to identify problems and increased their ability to formulate a pharmaceutical care plan. Participants highly rated their ability to provide pharmaceutical care.

The pharmacists reported an increased ability to formulate care plans in Level II as compared to what they achieved in Level I. It is unclear how much of this improvement can be contributed to learning achievement in Level II. If Level I increased the extent to which pharmacists were identifying and resolving problems in practice, improvement from Level I to Level II could be a result of practice and nonformalized learning in the workplace.

Assessment by Tutors

The assessment by the tutors indicated that the pharmacists had a good ability to problem-solve and formulate care plans and that this ability improved from the mid-

point of the course to the end of the course. There was a correlation between the tutor and student assessments.

Scoring of the Pharmaceutical Care Plan

There are no measures to test problem-solving skills, so it is necessary to test the outcome of this skill rather than the process (Swanson et al., 1991). The outcome used in this study was the pharmaceutical care plan.

The test committee spent a great deal of time developing the answer key. All three scorers served on this committee, so they were well versed in scoring parameters. Each plan was scored by two markers; each marker assigned a holistic score, an analytical score, and a bonus score. The correlation between the holistic and the analytic score was very strong for all three scorers. This indicated that they each viewed the plans in the same way; they may not have assigned similar values, but the ratio of the two scores was similar. There were nine discrepant scores, and these plans were rescored by the third marker. There was no correlation between the bonus scores and the holistic and analytic scores, and they were not used for subsequent calculations. Once discrepant scores were removed, there was a strong correlation among all three scorers. Correlation of the analytical score for each care plan was exceptionally good (.953).

We can conclude that the holistic and analytic scores are reliable and that they are good measures of student performance for the specified case assigned. The holistic and analytical scores did not correlate with the tutor or self-rating of the ability to formulate a therapeutic and monitoring plan. Approximately half the students received a holistic score of 7 or better and an analytical score of 70% or higher. This suggests a good level of competence at writing pharmaceutical care plans; however, the scores are somewhat less than expected. The average holistic

score on the assignment was 6.6, and the average analytical score was 104.11, or 63.1%.

There are several competing explanations for these scores. The most significant is that the expectations of the scorers were very high. The answer key had been developed by four excellent practitioners. They identified more problems than the course writer identified, so it would be difficult for students to meet this standard. One of the problems incorporated into the answer key was addressing the issue of noncompliance issue had not been dealt with in previous cases in the course. The experts were divided on whether it should be one of the four required problems on the answer key. There was also a wide range in time spent preparing for this workshop, and there is a correlation between hours spent and scores received. Another factor which could account for some of the lower scores is that pharmacists completed the assignment before their group discussions, thereby negating the extensive learning that occurred in the groups.

Caution should be exercised when drawing conclusions from the scores on the pharmaceutical care plans. Problem-solving skills are content specific, and only if an individual is knowledgeable in the content is he/she good at problem solving in that area. The study design assumed that through self-directed learning pharmacists would acquire sufficient knowledge to adequately work up the case. Reference materials were provided to augment this self-directed learning. To measure proficiency in problem solving and in geriatric pharmacy reliably, it is necessary to score pharmaceutical care plans for a wide range of problems. Time and resources precluded this in the study. The results of scoring more care plans are also required to determine conclusively if there is a correlation between the tutor assessment or the student assessment and the analytical or holistic scores.

Because the pharmacists indicated that 40% of the answers provided were course related, it can be concluded that significant learning occurred as a result of the

course. The fact that 60% of the responses were attributed to prior knowledge is good. Norman (1991) stated that learning is greater if there is already previous knowledge. An advantage of PBL is that it allows the learner to build on previous knowledge.

There are many advantages of PBL that the assignment did not measure, such as skills for critical appraisal, lifelong learning, and interdisciplinary learning. However, there are no meaningful, reliable, and valid methods to assess these components (Norman, 1991).

The process of scoring the plans also is a valuable exercise as it demonstrates how this can be done in continuing education or undergraduate courses. It further illustrates that both the analytical and the holistic scoring methods are reliable measures of performance. Because there is a good correlation between the holistic and the analytical score, it may be adequate for experts to assign scores to pharmaceutical care plans using their professional judgment and not to undertake the arduous task of developing a scoring key and analytically marking the assignment. However, finding experts with time to commit to extensive marking is difficult. A more viable option may be having nonexperts score the assignment analytically using a detailed key. Further study should be undertaken to see if analytical scoring by a nonexpert compares with that of an expert.

Practicing Pharmaceutical Care

Over half of the respondents indicated that they had modified the process they use in practice to obtain patient-specific information or to review the patient profile. Of the 10 pharmacists interviewed, two were providing pharmaceutical care on a routine basis, one of whom was writing pharmaceutical care plans. A further three were applying some aspects of pharmaceutical care on an occasional basis. The remainder were not using the steps in pharmaceutical care and were applying what

they had learned on a sporadic basis. Because care was taken in randomly selecting a representative sample, these results can be generalized to the general population of the course. We can therefore conclude that 20% were practicing pharmaceutical care, 30% were occasionally applying some aspects of pharmaceutical care, and there was little change for 50% of the students.

It appears that pharmacists are recognizing and solving course problems when encountered in practice. It can be concluded that most patients who have these problems will receive good pharmaceutical care from the pharmacists who have taken this course, but we are not able to conclude that pharmacists are transferring problem-solving skills to different problems.

It can be concluded that the course resulted in significant learning and affected practice for about half the students.

Interacting With Physicians

The pharmacists liked having physicians involved in the course. They thought that the discussion went well, and the tutors reported that this interaction was positive. This would be expected, because pharmacists indicated during the first workshop that they were fairly confident in discussing drug-related problems with physicians.

A few concerns were expressed that during the evening workshops the physicians assumed an authoritative tutoring role rather than a collegial, collaborative role. There are several explanations for why this could occur. The physicians who participated have a specialty in family medicine and are members of the Faculties of Medicine at the University of Alberta and Calgary. They are advanced practitioners. Secondly, the physicians in the course teach and mentor family-practice residents and easily slipped into a teaching mode. The ratio of one physician to five or six pharmacists further reinforced taking an expert position by the physician.

Assessment by the tutors indicated that the pharmacists demonstrated good abilities to discuss drug therapy with physicians. Self-assessments by the students were similar to the tutors' assessments. Both these assessments indicated that the ability of the pharmacists to communicate with physicians improved during the course.

Satisfaction with the joint pharmacist-physician workshop was extremely high, and a large number of pharmacists indicated that they would attend more joint education programs. The joint workshop increased the awareness of physicians of the abilities of pharmacists. Breaking down traditional barriers and building collaboration can be fostered in the safe environment of an educational activity.

The pharmacists thought that the course moderately increased their ability to communicate with physicians and to a greater extent increased their awareness of how physicians think and what information they require when modifying drug-therapy decisions. This may result in more effective interaction with physicians. On the last day of the course pharmacists reported that the course had increased the extent to which they were making recommendations with respect to specific drug-related problems. There was no measure of the extent of this interaction. On the same form pharmacists indicated the number of times that they had discussed a patient's drug therapy with the physician in the previous week. This number was less than that reported for the week prior to the course starting and in general was low. This result could possibly be attributed to inaccuracy in reporting because pharmacists do not document their activities, and one week is a fairly long time to remember activities at work accurately. It is likely that the participants had only slightly increased their interaction with physicians. During the interviews pharmacists indicated that they were interacting with physicians more effectively.

It can be concluded that pharmacists increased their ability to communicate with the physician by gaining a greater understanding of the physician's perspective and by practicing in the class, but they did not appear to be doing this more often in practice.

The Drug-Information Component

Evaluation of the drug-information workshop showed moderate support for the value of this workshop; about 42% were neutral with respect to the benefit derived. Having pharmacists use various drug-information sources during the workshop was useful. The course increased access to drug information, with 73.1% reporting that they improved access, usually by purchasing one or more reference texts. A large number of the pharmacists said that they obtained drug information during the course from sources other than the references provided.

The course did not appear to increase the frequency with which pharmacists obtained drug information. There was only a slight increase from the first workshop to the last workshop in the number of times course participants consulted a drug-information source. There are several explanations for this. There were no provisions in the course to help pharmacists obtain drug information in addition to the references provided. The course design of teaching participants how to access information and then requiring them to do so in order to work up the cases simply did not work. Pharmacists were not prepared to do this for various reasons: (a) lack of time, (b) poor access to libraries, (c) references were provided in Level I and therefore were expected in Level II, and (d) participants wanted a self-contained course that was portable. The expectation was that if they sought drug information on their own for problems in the course, they would more readily do so for problems encountered in practice.

Transferring Learning to Practice

It was not the purpose of this study to investigate thoroughly factors which will influence transfer of the learning to practice. A few questions were asked on the evaluation forms and pharmacists often discussed this during the interviews.

Barriers

The most frequently identified barriers were lack of time in practice and inaccessible or nonreceptive physicians. Other barriers in the community were lack of patient data, patients not wanting to take time to discuss their medicines, and no reimbursement for professional services. Pharmacists did not appear to be trying to find solutions to these barriers.

There were a significant number of participants who reported that they worked in a good practice site, which could suggest that transfer of learning from this course to practice may be higher than for other courses.

Individual

A key factor in changing practice is the individual. Pharmacists need to have the drive and the commitment to apply learning, despite the barriers, and of those interviewed, there were only two who had these. There seems to be a "readiness factor" which determines application to practice. Pharmacists who were ready to change, who wanted to practice differently, seemed to do so as a result of the course. The course gave them a new way of thinking and a process to use which they then modified for their practice.

Pharmacists were asked to write on the final evaluation form what they had learned in the course that they intended to implement in practice. These intentions were very vague, such as improved patient care or better interaction with the physician. It is worthwhile to request that participants write what they intend to apply

to practice because research shows that this can encourage the transfer of learning to practice. To improve effectiveness, pharmacists need to be coached on how to choose something that is incremental and that can be clearly explained and measured.

The majority of the participants enrolled in the course to increase their knowledge and skills, but few indicated that it was to change their practice. This did not change significantly as they proceeded through the course, as the "intentions to implement" statements revealed. Participants seemed to be more interested in "fine-tuning" what they were already doing. For those practicing at a 'good' level, this would be expected. For others, a fundamental change in thinking and doing was necessary, and they did not intend to change.

Recommendations for Course Improvement

The study revealed several ways in which the course Pharmacy and the Golden Years, Level II, could be improved.

1. The workload issue should be addressed, and time commitments required should be explicit on the program brochure. The workshops were rushed; therefore, it is advisable to decrease the number of cases from three to two for each module. This would reduce workload between workshops to write up cases and would allow more time to discuss the cases and reflect on learning and pharmaceutical care during the workshops.

2. It should be explained to students at the beginning of the course that there is no one right answer for each case; there are several approaches, and good patient care depends on carefully monitoring.

3. Short 20- to 30-minute lecturettes should be given after the pharmacists have completed their own self-directed learning to address the students' need for assurance that what they had learned was accurate and complete. Once pharmacists

become more skilled at self-directed learning and learning from colleagues, there will be less desire for a lecture.

4. Tutors, whenever possible, should have expertise in the content area for courses with learners doing problem-based learning for the first time. This can improve the efficiency and quality of the learning, which is important when adults are exposed to a new method of learning.

5. Tutors should be sensitive to the hospital-versus-community pharmacy issues and should not let the concerns of one group interfere with learning. Time needs to be found at other times to address these concerns.

6. Physicians who join the groups should not be specialists but should be generalists so that learning is more cooperative. If possible, the number of physicians who join the group should be increased to decrease the tendency for physicians to assume a teacher role. The process of the pharmacist-physician interaction should be clearly explained to all participants.

7. Electronic access to drug information should be facilitated. Once pharmacists have completed an entry level where they become familiar with the problem-solving process, subsequent courses should teach students to obtain, evaluate, and apply drug information on their own; and they should be required to do so during the course.

8. The quantity of paper used for course materials should be reduced by decreasing the references and forms provided and by printing on both sides of the page. The worksheets for review of systems could be laminated; students would review these, and this would serve as a triggers for identifying potential problems which would then be written on the worksheets.

9. The workshops need to be improved to encourage participants to reflect and dialogue on how they learned, how they worked up the case, and how they obtained and evaluated information. The process of completing the pharmaceutical care plan

needs to be discussed as much as the plan itself. This meta-analysis may encourage transfer of skills to other problems.

10. Improvement to the "commitment to change" component is required; specifically, the wording of a commitment should be explained to students. Time should be provided in their groups to discuss this. It is advisable to have a form for this that makes two copies so that the pharmacists can submit one to the program planners and keep one for their own records. The program planners should follow up in two to three weeks to see how students are doing with their commitment and to encourage and advise them.

Evaluation Methodologies

This study provided insights into evaluation methodologies. The process used for scoring the pharmaceutical care plan is described in detail. This will be of value to evaluators when using this method. Results in this study suggest that care plans can be reliably scored either holistically or analytically and that an expert can reliably assign an holistic score based on professional judgment. Further study is required to determine if a nonexpert could reliably assign an analytical score to a pharmaceutical care plan using a detailed key.

The interviews were the most useful component of the evaluation. Through discussion, the researcher was able to assess the extent to which participants were practicing pharmaceutical care. This naturalistic approach revealed more than the evaluation forms with respect to the value of the course and the extent to which learning was transferred to practice. Evaluation in the health professions places an emphasis on providing evidence of the value of the course through the use of pre- and posttest, practice audits, or other experimental designs. This study suggests that asking the participants is a means of obtaining the most useful data.

Conclusions

It can be concluded that problem-based learning is of value in continuing education. Participants liked the PBL approach; it simulates practice and is realistic and motivating. Pharmacists were effective in solving the problems in the course when they encountered the same problems in practice.

The learning and practice outcomes for the course include (a) increased abilities to solve drug-related problems; participants varied widely on the extent to which they were doing this in practice; (b) increased understandings of how to communicate effectively with physicians, but there was no significant increase in the frequency that this was done; and (c) slight improvement in drug-information skills and information access, but participants did not significantly increase the frequency that drug-information resources were used in practice.

These findings are congruent with those of previous studies (McLaughlin & Donaldson, 1991). Davis (1991) stated that continuing education works well in improving ability to perform and less well in changing performance. The pharmaceutical care model requires a new philosophy of practice resulting in a new way of practicing. It may be unreasonable to expect a 12-week course to change behavior to this extent.

Many factors which influence professional performance are beyond the purview of continuing education. Green (1988) described three factors that influence practice: predisposing factors, enabling factors, and reinforcing factors. The predisposing factors include the knowledge, skills, and attitudes of the professional. Educational activities influence predisposing factors. The enabling factors include supportive elements such as practice aids, policies, and sufficient time which make it possible to perform optimally. The third group are the reinforcing factors, which include reimbursement and performance review that directly influence the professional's income and security. This course addressed predisposing factors only.

Complex interprofessional relationships cannot be adequately established in an educational activity. Education can provide a safe environment for developing understanding, dispelling misconceptions, and developing abilities for interprofessional collaboration. Therefore interprofessional continuing education should be encouraged. However, collaborative workplace relationships are not established only through education. They must be developed and nurtured in practice.

How professionals learn and change is complex, and CPE organizers will need to rethink their craft (Baskett, 1993). The classroom application of experiential learning using PBL will need to be augmented by field-based experiential learning, with an emphasis on collaborative learning, reflection, self-analysis, coaching, and mentoring. Pharmacies will need to become learning environments with supportive tools such as electronic access to information, to enable pharmacists to learn and improve continuously.

During the last decade significant progress has been made in understanding how professionals learn and change, but there is a pressing need for further research to illuminate how to improve current practice in the field. The professions need to reorient how learning is encouraged, valued, and provided in order to help practitioners improve continuously throughout their professional lives.

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Appendix A

Pharmacist's Consent Form

PHARMACIST'S CONSENT FORM

PROJECT TITLE: Assessment of learning outcomes and practice outcomes of a problem-based learning course in continuing pharmacy education.

INVESTIGATOR: Arlene Ponting,
PhD Candidate

This is to certify that I, _____, hereby agree to participate in the research project investigating the quality and effectiveness of the geriatric course, Pharmacy and the Golden Years, Level II.

I consent to participate in the self-assessment exercises, completion of questionnaires, assessment by participants of group and tutor functioning, assessment by tutors of the participants, evaluation of specific workshops, and completion of a written case assignment. I also consent to having my photograph taken for inclusion in the final report. I understand that I am free to withdraw from the study at any time if I choose.

I further understand that my name will not be disclosed at any time. All participants will be given a personal indentification number. The list matching pharmacists and numbers will be kept under lock and key; only the researcher has access to the key. The number identification list and all the instruments will be destroyed after the study.

I have been given the opportunity to ask whatever questions I desire and all such questions have been answered to my satisfaction.

Copies of the results of the study will be available. Please indicate below if you would like to borrow a copy.

_____ _____

Signature of Pharmacist Date

Appendix B

Letter to Course Participants

University of Alberta
Edmonton
Canada T6G 2N8

Division of Continuing Pharmacy Education
Faculty of Pharmacy and Pharmaceutical Sciences
4118 Dentistry/Pharmacy Centre, Telephone (403) 492-2393
Fax (403) 492-9117
Arlene J. Ponting, B.Sc.(Pharm.), Director

April 8, 1993

Dear Course Participant:

Thank you for participating in the evaluation study of the Level II course on Pharmacy and the Golden Years. It is important to know the types and characteristics of C.E. programming that are of value in preparing pharmacists to meet the challenge of providing pharmaceutical care. I am writing this letter to explain the evaluation of this course a little further. I described the various aspects of the study at the first class but I would like to explain them to you in writing as well.

Participating in the study will not require a large amount of your time. You will be asked to complete several short evaluation forms. Completion of each form will not take more than five minutes. We will distribute these at the end of class, please take them home and complete them when you have more time. Please be sure to bring them back to the next workshop where they will be collected. The pharmacist in the group who you have designated as the group leader will circulate a large envelope to the group; you will put your form directly into the envelope. Put only your Pharmacist Identification Number on the form.

At the last workshop we distributed evaluation forms for workshops A & B. Please complete this form and bring it to class on April 14, 1993. You are also free to mail any of the evaluation forms directly to the Division office, care of my attention.

We are asking you to evaluate your facilitator (tutor) and group functioning. Enclosed with this letter is the evaluation form. Look over it, think how your facilitator and your group have performed to date and keep these questions in mind during the workshops. After Workshop C, complete the form at home and bring to the next class. After April 14, you will have a different facilitator for the rest of the course, therefore you will be evaluating two people. You will have time to complete the evaluation form for the second half of the course, during the last class on May 19. This is the first time we have evaluated facilitor and group functioning; your input is important. We can use this information during our training sessions with the facilitators to make improvements. The role of the facilitator is to facilitate your group understanding of how you and your group are doing in the problem solving process and in designing a pharmacy care plan.

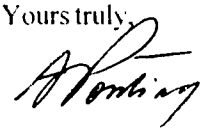
You will also be asked to complete a self-assessment form in which you evaluate your own problem-solving skills and group skills. A portion of the form will be similar to the one which the facilitators use to evaluate course participants. This self-assessment form will be distributed mid-April and you are asked to return it at the last class on May 19. You are receiving the form early so you can read the questions and contemplate how you are doing as you proceed through the course.

Details about the written case assignment will be distributed at Workshop D or mailed to those who are unable to attend. One of the cases for Workshop E has been chosen for this assignment. It does not require substantially more work than any other case. Please complete the case work-up sheets as usual. Pages 1 and 2 of the worksheets (the summary sheet and the pharmacy care plan sheet) have been modified to give you more space to write and to obtain slightly more information from your worksheets. Therefore these two sheets have been expanded to seven sheets with lots of blank space for writing. Mail these seven assignment sheets to the Division before your group meets. A stamped envelope is provided for this purpose. If you wish a copy for yourself, photocopy these sheets first and send the originals to the Division office. If you do not have access to a photocopier, an extra set of sheets and some carbon paper has been provided. A page explaining the assignment in further detail will be included with the assignment sheets.

I plan to evaluate each workshop and a final evaluation form will be complete at the last class. I am also planning to discuss the course with several pharmacists in order to obtain further information about the course and its value to practitioners.

Thank you for your involvement in the project.

Yours truly,



Arlene I. Ponting

Appendix C

Letter to Course Facilitator

University of Alberta
Edmonton
Canada T6G 2N8

Division of Continuing Pharmacy Education
Faculty of Pharmacy and Pharmaceutical Sciences
4118 Dentistry Pharmacy Centre, Telephone (403) 492-2393
Fax (403) 492-9117
Arlene I. Ponting, B.Sc.(Pharm.), Director

April 8, 1993

Dear Course Facilitator:

Thank you for helping with the evaluation study of the Level II course of Pharmacy and the Golden Years. Please find enclosed the form for you to use when assessing the pharmacists in your group. I have modified the form in accordance with the input which I received from all the facilitators.

There are seven aspects which I would like you to evaluate. Please rate on a 10 point scale with one being the lowest and ten the highest. There is also a scale for you to indicate your level of confidence for each rating. For some of the elements you will not have observed enough to feel very confident in our rating.

There is a form for each member in your group. Please read it, think about how the individual pharmacists have performed to date, and continue to observe the pharmacists in the workshops. After Workshop C, complete the form, indicate your facilitator identification number and write the pharmacists name on the paper stapled in the corner. Mail the forms in the envelope provided. I will open them and put the pharmacist identification number on the form.

You will be assigned to another group after Workshop C so you will have two groups of pharmacists to assess.

To assist you in judging #1 & #2 on the assessment form, I have written out descriptors for each characteristic showing elements of a weak rating and an outstanding rating. Judge on a continuum of 1 to 10 where the pharmacist falls in the range between the two descriptors.

Ability #1 Communication Skills:

Weak	Outstanding
Does not express self well. Comments are repetitive or contradictory or off-topic, disorganized.	Comments are concise, focused, well organized.

Ability #2 - Good Team Member

Weak	Outstanding
Dominates, interrupts, irritates others in the group OR does not participate or contribute at all.	Is respectful of others' opinions, listens to others, is tactful, is respected by other members of the group.

I have also sent you a copy of the letter which I sent the pharmacists so you know what information they received about the evaluation.

For the assessment of the pharmacists-physician interaction, we will do things a little more informally. Cheryl will talk to you about the skills, attitudes and confidence which we want the pharmacists to acquire in this regard. I have designed a short form for you to check off after the workshop. You can return it with these assessment sheets.

Thanks for your help. See you on April 14th.

Sincerely,

Mrs. Arlene Ponting, B.Sc.(Pharm)
Director

Appendix D

Letter to Group Leader

University of Alberta
Edmonton
Canada T6G 2N8

Division of Continuing Pharmacy Education
Faculty of Pharmacy and Pharmaceutical Sciences
4118 Dentistry/Pharmacy Centre, Telephone (403) 492-2393
Fax (403) 492-9117
Arlene I. Ponting, B.Sc.(Pharm.), Director

April 8, 1993

Dear Group Leader:

Thank you for agreeing to be group leader and assist in organizing matters with respect with respect to your group. Would you please assist in collecting the various evaluation instruments?

Enclosed are four stamped brown envelopes to collect the forms at each workshop and to mail to the Division office. Groups in Edmonton. . may give the envelope directly to me at the workshop. At the beginning of each workshop pass the envelope around. Have the pharmacists put their forms directly in the envelope. It is important that the replies are confidential. Only the pharmacist identification number is on the forms.

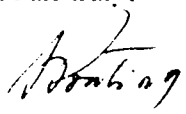
Because there is so little time during the workshops. we are giving the pharmacists the forms to take home and complete and bring back to the next workshop. If a pharmacist forgets for one workshop, s/he can put that form in the envelope at the next workshop.

The following is a schedule of the forms to be collected;

Date	Workshop	Form
April 14	C	Evaluation of Workshops A & B
April 24	D	Assessment of tutor and group functioning Evaluation for Workshop C
May 05	E	Evaluation of Workshop D
May 19	F	Evaluation of Workshop E Self-assessment Form Assess of tutor and group functioning (Complete in class) Questionnaire 2p (Complete in class)

Thank you for your assistance.

Yours truly,



Arlene I. Ponting, BSc(Pharm)
Director

Appendix E

Questionnaire A

QUESTIONNAIRE A

Pharmacist Identification Number: _____

Instructions: Please answer **All** questions. Put a check mark in the box beside the descriptor that best represents your choice.

Section A: Demographics

1. Which one of the following best describes your employment setting? Choose only one.

   ☐ Hospital
   ☐ Long Term Care
   ☐ Other, please specify: _____
   ☐ Community chain
   ☐ Community Independent

2. If you practice in a community pharmacy, do you service a nursing home or long term care facility?

   ☐ Yes ☐ No

3. Which of the following best describes your employment position? Choose one only.

   ☐ Owner, Co-owner (Community)
   ☐ Employee (Community)
   ☐ Manager - Institutional (Hospital Dir. or Asst. Dir.)
   ☐ Staff (Institution)
   ☐ Other, please specify: _____

4. How many years have your practiced pharmacy?

   ☐ 1-10
   ☐
   ☐ 11 - 20 years
   ☐ over 20 years

What percentage is spent serving the older adult?

   ☐ 25 - 49%
   ☐ less than 25%

Section pharmaceutical care

1. Please indicate the extent to which you agree with the following statements:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Pharmacists should formulate recommendations to revolve or prevent a drug-related problem.	☐	☐	☐	☐	☐
Pharmacists should communicate these recommendations to the physician or the patient.	☐	☐	☐	☐	☐

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Pharmacists should monitor the patient in order to identify drug-related problems.	☐	☐	☐	☐	☐
Pharmacists should prevent *potential* drug-related problems.	☐	☐	☐	☐	☐
Pharmacist should work on a team to assist in the design of patient-specific therapeutic goals and regimens.	☐	☐	☐	☐	☐
Pharmacists should assume responsibility for recommendations and should share responsibility for drug therapy outcomes.	☐	☐	☐	☐	☐
Pharmacists should document any interventions or recommendations which they make.	☐	☐	☐	☐	☐
Pharmacists should be a source of drug information for the physician.	☐	☐	☐	☐	☐

Section C: Working with physicians

1. When working with physicians, which of the following functions are you willing to perform in your practice? Check as many as is appropriate.

   ☐ speaking to the physician because the prescribed dosage form is not available.

   ☐ speaking with the physician to recommend another drug because the prescribed drug is too expensive.

   ☐ speaking to the physician to discuss appropriateness of the prescribed dosage regimen.

   ☐ speaking with the physician to recommend another drug because of a possible drug interaction or adverse effect.

   ☐ speaking with the physician to obtain patient data in order to better monitor or counsel the patient.

   ☐ speaking with the physician to recommend discontinuing a drug

   ☐ speaking with a physician to recommend lab tests or drug levels.

   ☐ speaking with the physician to recommend another drug because it is the drug of choice in this situation.

C. Current practice elements

1. In the past week, how often have you obtained drug information either by using a reference or asking a colleague?

   ☐ 0 ☐ 1 - 5 ☐ 5 - 10 ☐ 10 - 15 ☐ 15 - 20 ☐ over 20

2. In the past week, how many times have you discussed a patient's drug therapy with a physician?

   ☐ 0 ☐ 1 - 5 ☐ 5 - 10 ☐ 10 - 15 ☐ 15 - 20 ☐ over 20

3. What barriers are there in your practice to obtaining drug information?

4. What barriers are there in your practice which prevent you from working closer with physicians?

5. What was your primary reason for enrolling in this course?

Appendix F

Evaluation of Workshops A and B

Pharmacist Identification Number: _____

Workshop A - Drug Information

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The workshop increased my ability to obtain an appropriate history before answering a drug information question.	☐	☐	☐	☐	☐
The workshop increased my knowledge of drug information sources.	☐	☐	☐	☐	☐
The workshop enabled me to identify textbooks and journals that would be useful for my practice.	☐	☐	☐	☐	☐
The workshop increased my ability to critically evaluate drug information.	☐	☐	☐	☐	☐
The workshop was well organized.	☐	☐	☐	☐	☐

Workshop B - Urinary Problems

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The knowledge which I gained is useful and pertinent to my practice.	☐	☐	☐	☐	☐
The cases were the right degree of difficulty.	☐	☐	☐	☐	☐
I was able to obtain sufficient information to work up the cases.	☐	☐	☐	☐	☐
The workload was about right.	☐	☐	☐	☐	☐
Working with my group prior to this workshop was worthwhile.	☐	☐	☐	☐	☐
The discussion with the physician during the last portion of this workshop, went well.	☐	☐	☐	☐	☐

Please indicate the approximate number of hours which you spent on this course during the last two weeks - do not include class time on March 10th or 24th. _____

On the reverse side of this sheet, please make any comments which you would like about these two workshops, and ways in which they could be improved.

Appendix G

Memo to Group Leaders

University of Alberta
Edmonton
Canada T6G 2N8

Division of Continuing Pharmacy Education
Faculty of Pharmacy and Pharmaceutical Sciences
4118 Dentistry/Pharmacy Centre, Telephone (403) 492-2393
Fax (403) 492-9117
Arlene I. Ponting, B.Sc.(Pharm.), Director

March 22, 1993

Dear Group Leaders:

Re: Evaluation of Pilot II

Please find enclosed two evaluation forms to be completed at Workshop B this Wednesday.

At approximately 9:20 p.m. of the class, the group facilitators will lead a brief discussion of how the interaction between pharmacist-physician went. This is a time to step back to reflect and share preceptions about what was worthwhile and what needs to be improved. Please have one of the pharmacists in the group record opinions expressed for the form provided (yellow page).

Also at the end of class all the pharmacists complete the evaluation form for Workshop A & B (green form).

Sincerely,

Mrs. Arlene Ponting, B.Sc.(Pharm)
Director

AIP/cah

Appendix H

Pharmacist/Physician Dialogue About Value of Discussion

Pharmacist/Physician Dialogue About Value of Discussion

Complete after Workshop B

After each case, discuss informally the value of the pharmacist-physician discussions. Discuss what was good about the process and what needs improvement.

Identify a pharmacist in the group to briefly write below the points of view expressed.

Appendix I

Evaluation of Workshop C

Return April 24th

Pharmacist Identification Number: _____

Workshop C -

Cases: Marjorie Fisher, Hank Grayson, Marsha Makin

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The knowledge which I gained from this module is useful and pertinent to practice.	☐	☐	☐	☐	☐
The cases were the right degree of difficulty.	☐	☐	☐	☐	☐
The workload was about right.	☐	☐	☐	☐	☐
Working with my group prior to this workshop was worthwhile.	☐	☐	☐	☐	☐
The discussion with the physician during the last portion of this workshop, was productive.	☐	☐	☐	☐	☐

Did you obtain information, in addition to the references provided, to assist you in writing up the cases? Yes: _____ No: _____

Please indicate the approximate number of hours which you spent on this course during the last three weeks - do not include class time on March 24 or April 14. _____

In the following space, please make any comments which you would like about this workshop, and if possible, suggest ways in which it could be improved.

Appendix J

Observation of Pharmacist/Physician Interaction

Return April 14 or 24

Facilitator Identification Number: _____

Workshop C

Observation of Pharmacists/Physician Interaction

---

1. On average, did the pharmacists in the group appear to be comfortable discussing drug therapy with the physician? Yes _____ No: _____

   Comments:

2. Did you have a sense that the pharmacists were looking to the physician for the answers or considered the physician to be the drug expert?
   Yes _____ No: _____

   Comments:

3. Do you think the pharmacists granted power and authority to the physician and hence put themselves in a subordinate position? Yes: _____ No: _____.

   Comments:

4. Did you get the impression that the physician respected the knowledge of the pharmacists and that the physician considered this to be a learning experience for himself/herself? Yes: _____ No: _____

   Comments:

Appendix K

Evaluation of Joint CPE/CME Workshop

Complete April 24th

Physician _____
Pharmacist _____

Joint CPE/CME Workshop

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The information presented by the following speakers was of value to my practice:					
Peter McCracken	☐	☐	☐	☐	☐
Jean Triscott	☐	☐	☐	☐	☐
Chris Lord	☐	☐	☐	☐	☐
Sheila Kelcher	☐	☐	☐	☐	☐
2. The knowledge which I gained from the cases is useful and pertinent to my practice.	☐	☐	☐	☐	☐
3 The small group discussion based on the cases was an effective way to learn.	☐	☐	☐	☐	☐
4. Discussion of the cases with another member of the health care team was useful.	☐	☐	☐	☐	☐
5. I would attend more joint educational programs.	☐	☐	☐	☐	☐
6. As a result of the workshop I am more aware of the benefits of pharmacist/physician collaboration in practice.	☐	☐	☐	☐	☐
7. As a result of the workshop, I am more aware of why physician/pharmacist collaboration in practice has been limited.	☐	☐	☐	☐	☐
8 The workshop provided me with ideas on how to facilitate physician/pharmacist collaboration in practice.	☐	☐	☐	☐	☐

10. Please rank the various components of the workshop according to value to you, with #1 being the most valuable and #4 being the least valuable.

_____ lectures

_____ cases

_____ physician/pharmacist discussion of cases

_____ pharmacist/physician discussion of benefits, barriers, and solutions to collaboration

11. Please indicate one idea which you intend to implement in your practice.: _____

_____

_____

_____

_____

_____

12. Please indicate ways in which this workshop could be improved: _____

_____

_____

_____

_____

_____

Pharmacists please complete:

Pharmacist Identification Number _____

Indicate the approximate number of hours which you spent on this course during the last ten days - do not include class time on April 14 or April 24. ___ ___

Appendix L

Pharmacist Assessment of Facilitator and Group Functioning

Pharmacist Identification Number: _____

Group Facilitator Identification Number: _____
(leave blank)

PHARMACIST ASSESSMENT OF FACILITATOR AND GROUP FUNCTIONING

Your assessment of how your group functioned and how your group facilitator performed are important in order to help improve this portion of the course. All replies are confidential. Please rate each of the following statements on a 10-point scale from **1** which is **disagree** to **10** which is **agree**)

	Disagree									Agree
1. The atmosphere of the group meetings during the workshops was permissive and informal.	1	2	3	4	5	6	7	8	9	10
2. Each member of the discussion group participated in the discussion.	1	2	3	4	5	6	7	8	9	10
3. The facilitator regularly posed questions stimulating the discussion.	1	2	3	4	5	6	7	8	9	10
4. Based on the facilitator's own expertise, the facilitator made corrections whenever we proceeded in the wrong direction.	1	2	3	4	5	6	7	8	9	10
5. The facilitator was well prepared and well organized.	1	2	3	4	5	6	7	8	9	10
6. The facilitator provided good direction regarding the activities of the course.	1	2	3	4	5	6	7	8	9	10
7. The facilitator was able to handle dynamics of the group well.	1	2	3	4	5	6	7	8	9	10

Please write any comments which you may have below or on the back of this form, with regard to how your group functioned, how your facilitator performed and how you think this aspect of the course could be improved.

Appendix M

Assessment of Pharmacists by Tutors

ASSESSMENT OF PHARMACISTS BY TUTORS

Pharmacist Identification Number: _____

Facilitator Identification Number: _____
(leave blank)

Abilities

Rate each area of competence on a 10-point scale (1 = weak to 10 = outstanding). Rate the confidence which you have in your rating (1 = little to 5 = great).

	Rating: Weak									Outstanding	Confidence: Little				Great
1. Ability to communicate with other members of the group.	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
2. Ability to be a good team member.	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
3. Ability to identify problems or learning issues.	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
4. Ability to develop a therapeutic plan and a monitoring plan.	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
5. Ability to discuss drug therapy with the physician who joins in the group.	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5

Effort and Interest

Rate each area on a 10-point scale (1= low and 10 = high). Rate the confidence which you have in your rating (1 = little to 5 = great).

	Low									High	Little				Great
6. Pharmacist's level of preparation for each workshop.	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
7. Pharmacist's initiative to obtain information from other sources.	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5

Appendix N

Evaluation of Workshop E

Return May 5th or 19th

Pharmacist Identification Numb

Workshop E

Olivia Jacobs, Fred Thompson, and Bob Smithers

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
At the end of this workshop, I preferred summarizing the learning issues for these cases, to identifing learning issues for the next cases as we did during the previous workshops.	☐	☐	☐	☐	☐
The knowledge which I gained from this module is useful and pertinent to my practice.	☐	☐	☐	☐	☐
The cases were the right degree of difficulty.	☐	☐	☐	☐	☐
The workload for this module was about right.	☐	☐	☐	☐	☐
Working with my group prior to this workshop was worthwhile.	☐	☐	☐	☐	☐
The discussion with the physician during the last portion of this workshop, was productive.	☐	☐	☐	☐	☐

Did you obtain information, in addition to the references provided, to assist you in writing up the cases? Yes: _____ No: _____

Please indicate the approximate number of hours which you spent on this course during the last three weeks. Include time discussing the cases with your group between classes but do not include class time on May 5th _____

In the following space, please make any comments which you would like about this workshop, and if possible, suggest ways in which it could be improved.

Appendix O

Self-Assessment Form

Return on May 19

Pharmacist Identification Number: _____

Self-Assessment

Reflect on your abilities for each of the following competencies and then rate yourself on a 10-point scale with #1 being weak to #10 which is outstanding.

Abilities in the Course

	Weak									Outstanding
1. My ability to communicate with other members of my group.	1	2	3	4	5	6	7	8	9	10
2. My ability to be a good team member.	1	2	3	4	5	6	7	8	9	10
3. My ability to identify problems or learning issues for the cases in the course.	1	2	3	4	5	6	7	8	9	10
4. My ability to develop a therapeutic plan and a monitoring plan for the cases in the course.	1	2	3	4	5	6	7	8	9	10
5. My ability to discuss drug therapy with the physician who joins in the group during the workshops.	1	2	3	4	5	6	7	8	9	10

Rate yourself for each area identified below on a 10-point scale with #1 being low and #10 being high.

	Low									High
6. My level of preparation for each workshop.	1	2	3	4	5	6	7	8	9	10
7. My initiative to obtain information from other sources.	1	2	3	4	5	6	7	8	9	10
8. My commitment to maintain my own drug information resources to obtain the information that I need to provide pharmaceutical care.	1	2	3	4	5	6	7	8	9	10

To assist you in assessing yourself for #1 and #2 above, the following describes elements of a weak rating and an outstanding rating. On a continuum of 1 to 10 decide where you are in the range between the two descriptors.

#1. Communication Skills:	**Weak**	**Outstanding**
	I do not express myself well. My comments are repetitive, off topic, contradictory, disorganized	My comments are concise, focused, well organized.
#2. Good Team Member:	**Weak**	**Outstanding**
	I dominate, interrupt, irritate others in the group OR I do not participate or contribute at all	I am respectful of others' opinions, listen to others, am tactful, I respect other members of my group.

Please indicate your level of agreement or disagreement with the following statements:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. When working up Bill McGill and Hester Jacobson for the second time, I was able to identify, prevent and resolve drug related problems better in Level II than in Level I	☐	☐	☐	☐	☐
2. My pharmacy care plans for the cases were usually (at least 2 out or 3 times) very similar to the final care plans that our group decided upon at the workshop.	☐	☐	☐	☐	☐
3. I occasionally reflect on how I can apply, in my practice, what I have learned in this course.	☐	☐	☐	☐	☐

Appendix P

Written Case Assignment

WRITTEN CASE ASSIGNMENT

Olivia Jacobs

The Olivia Jacobs case has been chosen for the written case assignment. It is important to know how well this course has enhanced your ability to formulate a pharmacy care plan. This assignment will enable us to provide feedback to you on how you are doing on an individual basis as you will be informed privately of your overall score on the assignment.

Little work, in addition to that which you have done for the other cases, is required. You are required to clearly write out your pharmacy care plan, problem by problem using the separate assignment sheets provided. For each problem: (a) identify what evidence there is in the case that the problem exists, (b) define the desired outcome for the problem, (c) identify what recommendations or interventions that you would make and explain in detail why, and (e) identify how you would monitor the patient.

For each of the above items you are asked, on the assignment sheet, to identify if you knew the information previously or if you were able to complete this section on the form as a result of what you learned in the course. It is important to distinguish the knowledge acquired during the course from knowledge that you possessed previously. Please circle the *Yes* or *No* on the right hand side of the form to so indicate.

Please complete and photocopy the written case assignment sheets. You are provided with five assignment sheets. This may be more than or less than the number you require. If you have identified more than five problems, add an additional page for each problem. Bring your two sets of the sheets to your group meeting between the workshops. The group leader will collect the original set **before** the cases are discussed and will send the assignments to the Division office. This is important. The assignment, which you submit to the Division office, must be what you have completed, on an individual basis.

The case sheets will be scored. A committee of pharmacists with expertise in geriatric pharmacy will identify appropriate answers for each portion of the sheets. Your assignment will be marked to determine if you have included the information identified by the committee. Points will be assigned to each item. Answers will be weighted according to importance. For example, if it is essential that a particular drug-related problem be identified, then this problem will be worth more points than a problem that is of minor significance.

Caution: Do not write excessive amounts of information; just strive to include the essential information. Points will be subtracted if the replies are too lengthy. It is important in practice, to be succinct and focused.

A final score will be obtained by totaling the points. Your score will be confidential. Do not put your name on the case assignment sheets, use only your pharmacist identification number.

Happy problem solving.

PHARMACY CARE PLAN **Pharmacist Identification No.**

Knew as a result of this course:

Problem #1: _____ **Yes No**

_____

(State the problem and the drug(s) implicated.)

Please specify what evidence there is in the case, that this is a problem: _____

_____

_____

Desired Outcome or Goal: **Yes No**

(Describe the end-point that you are working to achieve in this patient with respect to symptoms, disease process and/or laboratory values.)

_____

_____

_____

Recommendations or Interventions: **Yes No**

(a) Identify a drug regimen that you would recommend be instituted, or specify changes that are required to existing therapy - Include dose, route, dosage formulation, regimen, duration of therapy
(b) Defend why you are making this recommendation by listing the advantages.

_____

_____

_____

_____

_____

_____

_____

Monitoring Parameters: **Yes No**

Identify how you will determine if your drug therapy recommendation is producing the desired effect (end-point) or causing an undesirable effect, how often will you check and for how long?)

_____

_____

_____

Appendix Q

Questionnaire B

QUESTIONNAIRE B

Pharmacist Identification Number: _____

Section A: Practice Outcomes

1. Please take a few minutes and reflect upon what you have learned in this course. Decide what you plan to implement in your practice and describe below.

_____

_____

_____

_____

_____

_____

_____

2. List the factors in your practice which impede the transfer of learning from this course to your practice setting:

_____

_____

_____

_____

3. List the factors in your practice which facilitate the application of knowledge and skills which you acquired in this course to your practice setting.

_____

_____

_____

_____

4. Do you receive encouragement from your colleagues, supervisor or administration to implement what you learned in the course in your practice?

_____

_____

Section B: Course Elements

Please indicate the extent to which you agree with the following statements:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
5. The course has increased my ability to providepharmaceutical care to patients in my practice (to provide drug therapy to achieve definite outcomes which are intended to improve a patient's quality of life)	☐	☐	☐	☐	☐
6. The course has increased my ability to					
(a) use a systematic process to recognize drug-related problems.	☐	☐	☐	☐	☐
(b) to formulate a pharmacy care plan.	☐	☐	☐	☐	☐
7. The drug-related problems were relevant to my practice.	☐	☐	☐	☐	☐
8. I am satisfied with the amount of learning which I did in this course.	☐	☐	☐	☐	☐
9. The problem-based learning approach is an effective way to learn.	☐	☐	☐	☐	☐
10. The course materials were of high quality.	☐	☐	☐	☐	☐
11. The provided references were useful.	☐	☐	☐	☐	☐
12. Through my self-directed learning, I was able to acquire enough knowledge and skills to work-up the cases.	☐	☐	☐	☐	☐
13. The workload for the course was about right	☐	☐	☐	☐	☐

C. Current practice elements

14. In the past week, how often have you obtained drug information either by using a reference or asking a colleague?

☐ 0 ☐ 1 - 5 ☐ 6 - 10 ☐ 11 - 15 ☐ 16 - 20 ☐ over 20

15. In the past week, how many times have you discussed a patient's drug therapy with a physician?

☐ 0 ☐ 1 - 5 ☐ 6 - 10 ☐ 11 - 15 ☐ 16 - 20 ☐ over 20

16. Have you modified the process that you use to obtain patient-specific information or to review the patient profile? Yes ____ No ____. If Yes how have you done this:

_____

_____

17. In the past few weeks have you encountered patient(s) with similar drug-related problems as those presented in the cases in the course? Yes _____ No _____ If yes, what was the drug-related problem and did taking the course help you resolve the problem?

_____

_____

18. Have you improved your access to and use of drug information sources as a result of the course - i.e. purchased text(s), etc.? Yes ____ No ___ If yes, what have you done?

_____

_____

Section D: Working with physicians

19. As a result of taking the course, did you increase the extent to which you regularly perform the following tasks?

Make a recommendation about a patient's drug therapy to the physician:	**Yes**	**No**
(a) if the prescribed drug is too expensive.	☐	☐
(b) if another dosage regimen would be more appropriate.	☐	☐
(c) to recommend another drug because of a possible drug interaction or adverse effect.	☐	☐
(d) to obtain patient-specific information in order to better monitor or counsel the patient.	☐	☐
(e) to recommend discontinuing a drug.	☐	☐
(f) to recommend lab tests be done.	☐	☐
(g) to recommend another drug because it is the drug of choice in this situation.	☐	☐

Please indicate:	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
20. My ability to communicate with physicians has improved as a result of the course.	☐	☐	☐	☐	☐
21. I am better able to choose convenient times and methods to contact the physician.	☐	☐	☐	☐	☐
22. I know more about the information required by physicians when modifying drug therapy decisions.	☐	☐	☐	☐	☐

E. Course Improvements

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
23. The workload for the course was about right	☐	☐	☐	☐	☐
24. For each of the modules, I would like to to learn more about:					
(a) pathophysiology	☐	☐	☐	☐	☐
(b) pharmacokinetics	☐	☐	☐	☐	☐
(c) biochemistry, medical chemistry	☐	☐	☐	☐	☐
(d) laboratory values and interpretation	☐	☐	☐	☐	☐
(e) applied therapeutics	☐	☐	☐	☐	☐
24. I would like to do:					
(a) one case per workshop.	☐	☐	☐	☐	☐
(b) two cases per workshop.	☐	☐	☐	☐	☐
(c) three cases per module but spread over two workshops. Therefore the number of workshops would be double.	☐	☐	☐	☐	☐
25. I would occasionally like a lecture in the course	☐	☐	☐	☐	☐
26. I think it is important to retrieve drug information on my own, in addition to that which the course supplies, so the course is more representative of a real practice situation.	☐	☐	☐	☐	☐
27. I liked meeting with members of my group between workshops and recommend that this aspect of the course be continued.	☐	☐	☐	☐	☐
28. I would like more skill building exercises on interacting with physicians.	☐	☐	☐	☐	☐

F. Additional Comments

Please feel free to make any additional comments about the course that you would like to:

_____

_____

_____

Appendix R

Process for Test Committee

PROCESS FOR TEST COMMITTEE

JUNE 7, 1993

1. Identify all drug-related problems on flip chart.
2. Work up each problem:
   (a) How problem should be worked and what we will also accept
   (b) Evidence - list absolutely all the evidence possible
   (c) Desired outcomes or Goals
   (d) Recommendations or Interventions
   (e) Defend Recommendations
   (f) Monitoring, Follow up
3. Assume equal weighting for all and go through and total.
4. Prioritize problems.
5. Weight answers according to importance.
6. Decide on summary, using weighting as guide.
7. Include means for scorer to mark final judgment of quality of care.

Appendix S

Scoring of Written Case Assignment

Pharmacy and the Golden Years, Level II

Scoring of Written Case Assignment
(Pharmacy Care Plan for Olivia Jacobs)

Pharmacist Identification Number _____

A. Holistic (Global) Scoring

Please read through the entire case assignment and the summary which presents implementation of the recommendations. Using your clinical expertise and professional judgement, assess the quality of the student's pharmacy care plan and the student's clinical judgement. Assign a value from 1 to 10, with 1 indicating serious mismanagement of the patient and 10 representing optimal management of the patient. Information which could appear in the summary as discussed by the test committee is as follows:

Physician Interaction	**Patient Interaction**
ISSUES:	ISSUES:
NSAID	discuss plan/goals, build rapport
cytoprotection	pain control
Prednisone/COPD	prednisone
incontinence	compliance - aids and self-med program
calcium	calcium intake
	incontinence
	smoking cessation
HOW:	HOW:
team conference	patient counseling (knowledge)
note in chart	frequent visits (rapport)
physician rounds	empathy, caring
phone	pain diary
	review chart

Holistic (global score) _____

B. Analytical score:

Problem #1 _____

Problem #2 _____

Problem #3 _____

Problem #4 _____

Total: _____

Percentage (Perfect score: 165 points): _____

Problem #5 (Bonus) _____

Problem #6 (Bonus) _____

Total Bonus Points _____

Problem #1:	**Points Possible**	**Points Awarded**
Ineffective pain control for osteoarthritis with inflammation due to PRN status of Entrophen® and Tylenol®.	Problem: 3 Drug: 2	
Evidence:		
_____ back pain, _____ decreased mobility, _____ decreased ADL, _____ morning stiffness, _____ physical evidence (joints in hands swollen and tender) _____ abnormal gait, _____ urinary incontinence _____ hip discomfort _____ regular dosing of Tylenol did not help and Entrophen helps	Any 2; 1 point each for total of 2 points	
Outcomes:		
Positive:		
_____ decreased pain in back, hands and foot _____ decreased inflammation in back, hands and foot _____ improved mobility or whatever wording which suggests this (e.g., increased activities of daily living)	Any 1 for 2 points OR any 2 for 3 points	
Negative:		
_____ minimize GI risk and/or bleeding, and/or constipation _____ minimize renal cardiovascular adverse effects	Any one for 2 points	
Recommendations:		
_____ recommend an NSAID (accept any NSAID) at correct dose OR _____ acetaminophen regular dosing, no NSAID OR _____ NSAID at correct dose with acetaminophen PRN	5 points 2.5 points 5 points	
Monitoring:		
Effectiveness:		
_____ assess pain control _____ monitor progress of mobility _____ look for signs of reduced inflammation in hands _____ look for improvement in gait _____ watch for improvement in incontinence _____ monitor for increased interest in social activities	Any 3; 1 point each for a total of 3 points	
Side Effects:		
_____ monitor BUN, creatinine, calculate cr. cl., CBC _____ look for improved GI _____ monitor bowel movements _____ monitor blood pressure _____ look for signs of bleeding	any 2; 1 point each for total of 2 points	
Comments:	**Sub-total** **Weighting**	2.5
	Sub-score	

Problem #2:	**Points Possible**	**Points Awarded**
Potential risk for NSAID-induced gastropathy (ulcer) (bleeding).	Problem: 3 Drug: 2:	_____ _____
Evidence: _____ age _____ patient has dyspepsia _____ patient taking prednisone _____ patient on Entrophen® _____ patient has previously used alcohol _____ disease state: potential (COPD), osteoarthritis	Any 2: 1 point each for total of 2 points	_____
Outcomes: _____ minimize ulcer risk	5 points	_____
Recommendations: _____ maintain NSAID, add misoprostil _____ at correct dosage of 400 - 800 μg/day OR _____ smoking cessation program	Drug: 4 points Dose: 1 point 1 point	_____ OR _____
Monitoring: Monitor for : _____ signs of GI bleeding, gastropathy _____ stool - occult blood, _____ CBC _____ epigastric pain (heart burn) _____ diarrhea	Any 1: 4 points	_____
_____ side effects of misoprostil (diarrhea)	1 point	_____
Comments:	**Sub-total** **Weighting** **Sub-score**	_____ 2.5 _____

Problem #3:	**Points Possible**	**Points Awarded**
Potential risk for poor compliance	Problem: 5	
Evidence:		
_____ poor attitude to drug therapy _____ lack of understanding of medications _____ poor vision _____ decreased manual dexterity.	Any 2; 1 point each for total of 2 points:	
Outcomes:		
_____ Patient is taking medications as directed	5 points	
Recommendations:		
_____ counsel patient about meds and use of inhaler aids _____ follow-up with community pharmacy _____ establish professional relationship, build rapport _____ establish regular contact _____ involve patient in drug-issues decisions _____ set up self-medication program	Any 1 for 3 points or any 2 for 5 points	
Monitoring		
Outpatient:		
_____ homecare nurse assess medication compliance and medical condition OR	5 points	
_____ community pharmacist assess compliance and improvement OR	5 points	
Inpatient:		
_____ check for better knowledge and better attitude of patient to medications	5 points	
Comments:	**Sub-total**	
	Weighting	**1.5**
	Sub-score	

Problem #4	**Points Possible**	**Points Awarded**
Prednisone potentially causing adverse effects. OR prednisone may not be indicated	Problem 3 Drug: 2	_____ _____
Evidence:		
_____ lack of symptoms _____ CO_2 is normal _____ patient has dyspepsia _____ patient has osteoporosis _____ adding NSAID therefore minimize other risks _____ cataracts _____ previous course of therapy for acute bronchitis complete _____ physician exam does not support presence of asthma _____ no evidence of reversible airway component to COPD _____ patient is a smoker	Any 2, 1 point each for a total of 2 points	_____
Outcomes:		
_____ eliminate potential for adverse effects while maintaining optimal lung function	2.5 points 2.5 points	_____ _____
Recommendations:		
_____ discontinue prednisone (tapering dose is optional) OR _____ add inhaled steroid	5 points OR 5 points	_____
Monitoring		
_____ watch for changes in patient following withdrawal of prednisone _____ electrolyte imbalance _____ confusion. _____ assess COPD therapy (monitor Ventolin®) _____ assess proper inhaler technique if Ventolin® is needed	Any 1 for 2.5 points	_____
_____ monitor lung function (more difficult breathing (CO_2, O_2)	2.5 points	_____
Comments:	**Sub-total**	_____
	Weighting	**1.0**
	Sub-score	_____

Problem #5:	**Points Possible**	**Points Awarded**
Possible ineffective calcium replacement for osteoporosis due to inappropriate dosage	Problem: 3 Drug: 2	

Evidence:

_____ history of hip fracture _____ hysterectomy _____ age _____ complicated possibly by corticosteroids	Any 2, 1 point each for total of 2 points	

Outcomes:

_____ minimize future bone loss OR _____ without rebound acid hyperacidity or aggravating constipation.	5 points 5 points	

Recommendations:

_____ hospital: discuss with dietitian at next team conference; community: discuss diet - food high in calcium. OR _____ if intake is low, increase calcium using: a therapeutic dose of any salt given in divided dosage to maximize absorption. OR _____ discuss with patient the benefits of Ca supplementation, and other factors such as smoking, exercise and alcohol	5 points 5 points 5 points	

Monitoring

_____ monitor diet if patient is not on calcium. OR _____ If patient is on calcium, monitor for constipation, stomach upset, renal function, renal stones OR _____ check compliance	5 points 5 points 5 points	

Comments:	**Sub-total**	
	Bonus Sub-score	

Problem #6	**Points Possible**	**Points Awarded**
Potential lack of drug therapy for urinary incontinence	Problem: 5	_____

Evidence:

_____ patient is incontinent; condition has recently become worse	2 points	_____

Outcome:

_____ improvement of incontinence	5 points	
OR		
_____ increased mobility to enable patient to get to toilet	5 points	
OR		
_____ increased attendance at social events	5 points	_____

Recommendations:

_____ assess incontinence and discuss with team the use of non-drug measures and drug measures.	Any 1 for 5 points	_____
_____ do a urolog		
_____ post-voidal residual		
_____ incontinence aids		
_____ counseling		

Monitoring:

_____ monitor episodes of incontinence	Any 1 for 5 points	_____
_____ monitor social activity		
_____ see if there is a correlation between mobility and incontinence.		

Comments:

Sub-total	_____
Bonus Sub-score	_____

Appendix T

Interview Consent Form and Format

INTERVIEWS

PHARMACIST'S CONSENT FORM

PROJECT TITLE: Assessment of learning outcomes and practice outcomes of a problem-based learning course in continuing pharmacy education.

INVESTIGATOR: Arlene Ponting.
PhD Candidate

This is to certify that I, _____, agree to participate in an interview which is part of a research project investigating the quality and effectiveness of the geriatric course, Pharmacy and the Golden Years, Level II.

I understand that my name will not be disclosed at any time. I have been given the opportunity to ask whatever questions I desire and all such questions have been answered to my satisfaction.

_____ _____

Signature of Pharmacist Date

INTERVIEW FORMAT

1. General discussion

2. Explanation of the interview:

   purpose of the interview
   consent form
   chosen by random selection
   interview will be audiotaped but all responses will be confidential and reported anonymously

3. I have some questions which I would like to ask you but before I do that, do you have any thoughts which you would like to share about the course?

4. Can you think of any benefits that you have received as a result of taking the course?

5. Are there things that you are doing differently as a result of taking the course?

6. Do you feel more comfortable working with physicians after taking the course?

7. Are you working with physicians more frequently?

8. Was it beneficial having physicians participate in the course?

9. Assignment - was is easy for you to determine what you knew as a result of the course?

10. Do you formulate a pharmacy care plan in your practice or follow the pharmaceutical care process?

13. Have you increased your access to drug information a result of the course?

14. Discuss their commitment to change (if they made one), and whether they have achieved it?

Appendix U

Letter to External Examiner

University of Alberta
Edmonton
Canada T6G 2N8

Division of Continuing Pharmacy Education
Faculty of Pharmacy and Pharmaceutical Sciences
4118 Dentistry/Pharmacy Centre, Telephone (403) 492-2393
Fax (403) 492-9117
Arlene I. Ponting, B.Sc.(Pharm.), Director

March 29, 1994

Dr. Rene Day
Associate Dean
Faculty of Nursing
3-102 Clinical Science

Dear Dr. Day:

I am writing to confirm our meeting date and to describe the evaluation which we require of our problem-based learning course, Pharmacy and the Golden Years, Level II. I am pleased that you have agreed to be an external evaluator for this course. Our meeting date is Thursday, April 7, 9:00 a.m., in room 4118, Dentistry/Pharmacy Building.

The evaluation will be the pilot of this continuing education course. We are evaluating the course in order to make improvements for delivery of the course around the province and to discover ways that we can improve our planning and development methods for future courses. We require you to (a) determine quality of all components of the course, and (b) using your professional judgement, assess whether the course could realistically result in learning achievement and practice outcomes.

Would you please review the planning, development and implementation of the course, and the design and production of all course materials. I will have the following materials for your review: (a) minutes of the Planning Advisory committee, (b) needs assessment instruments, methods and reports, implementation processes, (e) student materials, (f) tutor's manual, and (g) physician's manual.

During the first half of our meeting I will explain the planning and delivery of the course and then Cheryl Cox, course developer, will join our meeting. I have asked Cheryl to describe (a) how she identified the drug-related problems, (b) worked with the authors to develop cases and modules around these problems, (c) identified any who worked with physicians who were involved in the course, and (d) designed the workshops to achieve the goals of the course.

We require a short evaluation report of approximately three to four pages and request that your evaluation be completed by May 15, 1994. I look forward to our meeting and discussing the course further with you.

Sincerely,

Mrs. Arlene Ponting, BSc(Pharm)
Director

AIP/ef

Appendix V

Report of the External Evaluator

EVALUATION REPORT

PHARMACY AND THE GOLDEN YEARS LEVEL II

May 17, 1994

In preparing this evaluation report of Pharmacy and the Golden Years Level II course I have reviewed the minutes of the Planning Advisory Committee, needs assessment reports, course goals and objectives, documents describing the planning, development and implementation phases, and materials for the participants, tutors and physicians. My comments will be organized in two sections: the quality of all components of the course and whether learning and practice outcomes could result from participating in the course.

1. Quality of Course Components:

   a) Planning Activities: The Planning Advisory Committee had appropriate representation and appears to have functioned well. Planning for the course was grounded in a needs assessment of those who completed the previous Level I course and a review of current trends and changes needed in both pharmacy practice and education as identified in recent literature.

   In reporting the results of the Needs Assessment, I would suggest adding the actual percentage somewhere on Figure 4 (willingness to enrol) and Figure 5 (most suitable evening).

   In reviewing the goals and objectives as cited in the planning materials, the meaning of objective 4.0 under Goal C - communication with the patient was unclear to me - "Communicates effectively making relationships out of explicit frameworks from at least three major areas of knowledge". In communicating with the physician and other health care professionals, objectives 2.0 and 3.0 were unclear as to what were the two theoretical frameworks - are these the two communication models? Depending on the intent, these could be reworded - "analyze behavior of....as observed in physician-pharmacist consultations in hospital or community". In the end, it appears that only the five course goals (slightly modified from the planning document) were included in the manual for the participants. Was there some reason why the more detailed objectives were not included? The Course Goals as they appear on p. viii could be changed slightly by adding the word "the" to the stem - "The purpose of the course is to facilitate the development of the: skills .... ability, etc. Goal #3 could be changed to read "Ability to communicate effectively using an interdisciplinary practice model". Only one of the goals refers directly to the geriatric patient.

   b) Course Delivery Package: This package included detailed plans of what needed to be done, by whom, and by what date.

Evaluation Report

c) Course Manual - Participants: In the beginning of the manual I was unable to find any description of the course, i.e., that small group would be used, problem-based, etc. Were the participants given any information like the one page summary (description, objectives, schedule, location, course developers, writers and consultants) found in the planning material?

i) Workshop A: This workshop was well laid out. Excellent reference articles were included.

ii) Workshop B: On the schedule on p. 16 under "Small group work" it would be helpful to list the 3 cases. The same would apply for all the workshops. On p. 19, and in a few other cases, the directions begin with "the following case tries to depict...". While the 'case' can't try to do anything since it is not alive, I'd suggest a more positive tone - "In the following case, interactions you might have if you were... setting are depicted." In the first patient related workshop it would be useful to introduce the participants to the worksheets they will be using in the course. Is the Case Study Worksheet as mentioned on p. 19 in relation to Mr. Kyle the same thing as the Case Worksheets - Ambulatory or Hospital patient? I was not sure how or where the Worksheet Summary page was to be used. I also have a question about the order of the patients. It seems to me that the most complex situation was presented first. One can probably argue for both ways - simple to complex or complex to simple. The three cases were interesting and were well put together.

iii) Workshop C: Case #1 included considerable detailed information. Case #2 and #3 are an innovative approach to focusing attention on pertinent questions to be asked and relevant observations to be made. Being able to calculate one's own problem solving score does provide useful feedback. Reference lists and several pertinent journal articles were included.

iv) Workshop D: The idea of having a joint workshop with physicians is an excellent one. Before discussing this course I was not aware that pharmacists experience difficulties in talking with physicians in the same way nurses do.

v) Workshop E: Cases were well developed. I liked the additional assignment of developing a multidisciplinary seminar on "Living with Arthritis".

vi) Workshop F: The two cases in this workshop can be used by the participants to further refine questioning and making observations, to show

how health care professionals can work together, and how to conduct a medication history and prepare a pharmacy consultation for presentation at a team conference.

d) Course Manual - Physicians: This manual was fine. My only question was whether the goals of the course should have been included. I don't remember seeing the Communications Models found in this manual also included in the manual for participants - it should be. A description of the course should also be included. I did react to item [illegible] under Role of Physician (p.4) - "Discuss pharmacist's role in monitoring.....". If I was a pharmacist I'm not sure I'd want the physician telling me what my role was.

e) Course Manual - Facilitator: I assumed that the facilitators had both their own manual and the same one as the participants. Did they complain about two binders? I think that the two could be combined. In the facilitator's manual I would like to see some written information on problem-based learning, the role of the tutor, etc. I understand that the facilitators were prepared for their roles in preliminary sessions. Identification of expected learning issues and the summaries for all the cases were likely quite useful for the facilitators. I had a few thoughts about some of the recommendations. On p.19 it was recommended that the patient take warm milk at bedtime. Some of the literature I've seen suggests that the protein in milk keeps people awake - what they need is carbohydrates like dry cereal. In the case of D. Brown (p.28) other suggestions include bone density studies to determine bone loss, use of more natural products such as herbs and natural progesterone (Pro Gest cream) which some studies report actually builds new bone. While there may in fact be very good indications for hormones for this patient (fractures, etc.) I'm not sure how she will feel about an increased risk of cancer and the potential of having menstrual periods again. A balanced picture to the medicalization of menopause needs to be considered. My last point is about constipation and the reliance on pharmaceuticals as opposed to more focus on foods, increasing fluids and activity and natural supplements like Fruitlax. Laxative consumption by older patients is of concern.

In relation to the three course manuals my one question is whether or not each should be able to stand alone? In summary, my review of all the planning materials and course materials leads me to the conclusion that great care and attention was given to the development of the course. While I have mentioned minor points to be considered, my overall impression is of a high level of quality in all the course components.

Evaluation Report

2. Achievement of learning and practice outcomes:

To begin with, the cases come from practice. By working through the cases, the participants are learning more about real life situations that a pharmacist may see in relation to the older adult client. The problem based approach, and small group work greatly facilitate further development of critical thinking, problem solving and decision making skills. All of these were identified as necessary for pharmacists in one of the journal articles included in the planning materials. The course definitely provides an opportunity for the participants to experience the new role of the pharmacist and pharmaceutical care. Given the quality of the cases, the use of problem-based learning and tutors, and interactions with physicians, in my judgement the participants should have met the goals of the course. It would be interesting to do some follow-up later to have the participants evaluate the impact the course has had on their practice, particularly with the older client. A final comment is in relation to p.11, Item II of the Community Case Worksheet - "Which problems are you going to solve for this patient?" In nursing these days we are moving more towards the goal of working with the patient as partners in their care. I'd like to see more of this approach reflected in the statement above.

Thank you for the opportunity to review this interesting course. I am very impressed with the course. Humor is used appropriately throughout to add a bit of a lighter touch. The process of reviewing all the materials was most informative for me.

Respectfully submitted,

Rene A. Day, R.N., Ph.D.
Professor & Associate Dean
Undergraduate Education

RAD:sr

Appendix W

Results of Scoring of Pharmacy Care Plan

RESULTS OF SCORING
PHARMACY CARE PLAN

Pharmacist PIN	SCORER A		SCORER B		SCORER C	
	Holistic	Analytical	Holistic	Analytical	Holistic	Analytical
103	7.5	122.5	8.0	132.75 (7.5)		
104	6.5	52.5 (26)	6.0	72.0 (24.5)	6.0	70.75 (21)
105			9.0	126.5 (44)	7.5	117.0 (27)
106	5.0	39.5 (39.5)			3.0	46.0 (36)
108			7.0	104.5 (19.5)	8.5	106.0 (30)
109	6.5	103.0	6.0	103.5 (33)	*4.0*	*88.5 (36)*
112	9.0	123.5 (29)	6.0	112.0 (19)		
113	7.0	83.5 (35)	6.0	91.0 (33)		
115			6.0	102.0 (22)	4.5	97.0 (18)
116	7.5	121.0 (27)			8.5	134.5 (25)
117			6.0	102.0 (10)	6.0	98.0 (2)
118	7.5	119.5			7.0	130.0 (0)
119	6.5	*88.5 (27)*	8.0	117.0 (25)	8.0	107.5 (30.5)
120	7.5	121.5	*6.0*	*90.75*	7.5	132.5 (0)
1			9.0	139.5 (16)	9.0	137.0 (32)
	6.5	*71.5 (16)*	4.0	59.5 (20)	3.0	60.5 (13)
124			9.0	127.0 (22)	7.5	132.0 (15)
125	4.0	61.0 (17)			3.0	49.0 (15)
126	5.0	92.5 (15)	6.0	85.5		
127	7.5	105.0 (22)	*8.0*	*127.0*	7.5	117 (22)
128			7.0	124.5 (7.5)	6.0	121.0 (13)
129	6.0	121.0 (28)			6.0	120.0 (10)
130			5.0	101.(22)	6.5	100.5 (22)
131	9.0	124.0 (44)	9.0	130.5 (34)	*9.5*	*145.0 (34)*
132	*6.0*	*111.0*	4.0	95.0	5.0	98.5 (0)
133	5.0	53.0 (18)	*3.0*	*22.5*	3.0	48.75 (18)
134			9.0	131.5	7.5	134.5 (18)
135	7.5	105.5 (37.5)			7.0	118.0 (39)

Appendix X

Scores of Ability to Develop a Care Plan

ABILITY TO DEVELOP A THERAPEUTIC PLAN AND A MONITORING PLAN FOR CASES IN THE COURSE

Pharmacist's PIN	TUTOR (AV)	SELF ASSESSMENT	ASSIGNMENT Holistic (Av)	ASSIGNMENT Analytical (Av %)
102	9	7		
103	6	6	7.9	74.4
104	7	6	6	43.1
105	8		8.25	73.4
106	7.5	6	4	25.9
108	7	6	7.75	63.8
109	6.5	6	6	62.6
110	8			
112	8.5	9	8	71.4
113	8.5	7	6.5	52.9
115	7.5	7	5.25	60.3
116	7.5	7	8	77.4
117	8	7	6	60.6
118	8.5	8	7.25	75.6
119	7.5		8	68.0
120	8	8	7.5	77.0
121	8.5	9	9	83.8
122	5	8	3.5	36.4
124	7.5	8	8.25	78.5
125	7.5		3.5	33.3
126	7.5	7	5.5	53.9
127	7	6	7.5	67.3
128	7.5		6.5	74.4
129	8	7	6	73.0
130	5.5	7	5.75	61.1
131	7.5	7	9	77.1
132	8	9	4.5	58.9
133	7	8	4	30.8
134	7.5	8	8.25	80.6
135	6	7	7.25	67.7