INTRODUCTION

The population aged 65 years and older in the United States is currently 35 million, and this number is expected to increase to 70 million by the year 2030.¹ The average number of prescriptions dispensed per person annually in the United States increases with the patient’s age, from 13 for those between 50 and 64 years of age, to 22 prescriptions for those aged 80 years and older.² The burden of this population on the health care system is significant. To maximize patient outcomes, pharmacists and other health care professionals must be trained to meet the unique needs of geriatric patients. Typically, consultant pharmacy practice has focused pharmacy services for geriatric patients on those in the long-term care (LTC) setting. Federal law requires consultant pharmacists to review the medication regimen of each resident in a nursing home every 30 days. The percentage of elderly living in nursing homes does increase sharply with age, ranging from 1.1% of those age 65–74 years, to 4.7% of those between 75–84 years, and 18.2% of those over age 85 years.³ Nevertheless, only a small percentage (4.5%) of the senior population 65 years of age and older lived in nursing homes in 2000, with the majority living in their own homes or assisted living facilities.³ Therefore, the opportunity to provide pharmaceutical care to geriatric patients is more likely to occur in an outpatient setting.

Objective. To assess pharmacy graduates’ knowledge of geriatric pharmacotherapy and long-term care regulations for consultant pharmacy practice.


Results. The majority of 79 survey respondents were practicing in community or hospital pharmacy. Of the respondents, 70.5% reported that they were prepared for being a consultant pharmacist in a long-term care setting.

Conclusions. Didactic and experiential courses with an emphasis on geriatric pharmacotherapy are necessary to provide pharmacy students basic knowledge to meet the needs of our aging population.

Keywords: geriatrics, long-term care, consultant pharmacy

To effectively and efficiently meet the complex health care needs of geriatric patients, pharmacy students and practicing pharmacists should have instruction, practice experiences, and continuing education in the care of geriatric patients.⁴ Several studies from the past 20 years have examined the availability of pharmacy education in geriatrics.

In 1982, Simonson and Pratt conducted a survey of all 72 pharmacy schools in the United States to assess curricular content related to geriatric patient care. Sixteen of the 72 schools did not offer any geriatric-related coursework, 25 schools offered courses with partial (< 50%) content, 9 schools offered courses with primary (>50%) content, and 22 schools offered courses with both primary and partial geriatric-related content.⁵

These same researchers evaluated practicing pharmacists nationwide to determine whether they were adequately prepared by their entry-level programs for geriatric pharmacy practice.⁶ Their survey sample was randomly selected from the member lists of the Geriatric Special Interest Group of the American Society of Hospital Pharmacists and the American Society of Consultant Pharmacists. Of the 225 responding pharmacists, 80.6% reported that they were “not prepared” or “inadequately prepared” for geriatric pharmacy practice by their pharmacy education. Core topics the respondents identified as necessary to include in pharmacy education were clinical and administrative activities in long-term care facilities, medication compliance in the elderly, drug interactions, adverse drug effects, psychoactive medication use, age-related physiologic and pharmacokinetic changes, pharmacists’ responsibilities for

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elderly living in their own homes, and regulations affecting pharmacy practice in long-term care. Responding pharmacists also noted that the most difficult aspects of geriatric pharmacy practice included lack of adequate professional skills or knowledge related to geriatric patient care, difficulty communicating with the elderly, and little professional recognition by other members of the health care team. These characteristics could be linked to inadequate training in geriatrics during pharmacy school.

Pratt and colleagues again surveyed the 72 pharmacy schools to evaluate geriatric-related curricula during the 1985–1986 academic year. Fifty-three of the 72 responding schools required courses in pharmacology or clinical pharmacy providing 5 to 15 hours of geriatric-related content. Nine schools offered required geriatric-specific courses. Nineteen schools did not offer geriatric-related courses to their students.7

According to a report in 1987 from the American Association of Colleges of Pharmacy (AACP) Section of Teachers of Pharmacy Practice, only 7 of the 29 responding schools (24%) offering a doctor of pharmacy (PharmD) degree program had a required clerkship in geriatric practice or nursing home consultant pharmacy practice.8 However, 15 pharmacy programs offered a clerkship in geriatrics as an elective and 7 programs had no clerkship in geriatrics. In this report, AACP recommended that pharmacy students gain experience with geriatric drug therapy and that schools should offer elective clerkships in geriatrics.

The American Association of Colleges of Pharmacy (AACP) prepared a White Paper on Geriatric Education and Training in 1990.9 Key problems identified in pharmacy school curricula included:

- Information on geriatrics and the aging process is often not completely integrated into courses resulting in deficits of knowledge regarding the geriatric population.
- Students may graduate without having ever taken a course with a geriatric emphasis.
- There are limited resources for faculty to develop coursework with a geriatric focus.
- There are insufficient continuing education programs in geriatrics for pharmacists.

Kirschenbaum and Rosenberg surveyed 75 colleges of pharmacy accredited by the American Council on Pharmaceutical Education (ACPE) to assess information on the required and/or elective course offerings for entry-level pharmacy students and postbaccalaureate PharmD candidates.10 The 71 responding schools provided information about the current geriatric course offerings and courses expected to be offered within the next 2 years. Four entry-level degree programs and 4 postbaccalaureate PharmD programs offered a required didactic geriatric course, whereas 10 entry-level degree programs and 8 postbaccalaureate PharmD programs offered a required geriatric clerkship. Many schools offered a limited amount of geriatric content integrated throughout the curriculum and/or clerkships.

Beizer and colleagues described the results of a 2001 survey on geriatric-related topics in the curricula of colleges of pharmacy in the United States and Canada.11 Of the 47 responding colleges (out of 86 colleges of pharmacy), 48% reported integrating geriatric therapeutics into their therapeutic courses, 12% offered a separate section, and 40% did both. Elective geriatric courses were offered at 60% of the responding colleges of pharmacy. Clerkships in geriatrics were offered by 96% of the schools.

While there are a variety of studies that have evaluated geriatric-related content in pharmacy curricula, there have not been any published reports that have examined the effectiveness of pharmacy education in geriatrics and consultant pharmacy practice. Based on this, there is a clear need for studies that assess the adequacy of pharmacy education in geriatric patient care in both the outpatient and LTC settings. Only after these studies are done can it be determined whether more didactic coursework or clerkship experience in geriatrics and LTC should be implemented in pharmacy curricula.

The goal of this study was to assess pharmacy graduates’ knowledge of geriatric patient care and LTC regulations. Using a survey that tested graduates’ knowledge, we compared the scores of students completing the required LTC clerkship to those students completing the required LTC clerkship, elective LTC clerkship, and elective didactic course in consultant pharmacy practice. All students are required to complete a 4-week LTC clerkship in their fourth year of the PharmD program. They may also take an elective LTC clerkship and an elective 1-credit hour course titled Consultant Pharmacy Practice in Long-Term Care Environments.

**METHODS**

A 37-item questionnaire was developed to assess graduates’ knowledge in geriatric patient care and LTC regulations. The questionnaire was mailed to members of the 1998 and 1999 graduating classes and made available online to the class of 2000 in September 2000. Questions on the test could be categorized into either questions about federal regulations governing LTC or questions related to geriatric pharmacotherapy. The authors examined the ques-
vations and came to a consensus as to which items referred to regulations or geriatric pharmacotherapy.
The survey questions were also correlated to several of the LTC clerkship objectives. The LTC clerkship objectives are listed in Appendix 1. The 4 primary clerkship objectives correlated to the survey questions included:

- Recall state and federal regulations pertaining to the provision of pharmaceutical services in LTC facilities.
- Assess patient data to recommend changes in providing rational drug therapy.
- Integrate concepts learned in didactic courses to make appropriate recommendations for geriatric patient care.
- Identify adverse drug reactions, interactions, or allergies.

To ensure that the survey was current and to establish content validity, 2 practicing consultant pharmacists evaluated the survey instrument. Returned surveys were assessed and given a cumulative score as well as subscores for regulations and clinical questions.

Pharmacy students at the University are required to take 1 LTC clerkship during their fourth year of pharmacy school, and they may take an additional elective LTC clerkship. Students also have the option of taking an elective course in their third year entitled, Consultant Pharmacy Practice in Long-Term Care Environments. Thus, each individual student’s educational experience was categorized by the extent of their participation in the courses as follows:

1. required LTC clerkship;
2. required LTC clerkship and elective course, Consultant Pharmacy Practice in Long-Term Care Environments;
3. required LTC clerkship and elective LTC clerkship;
4. required LTC clerkship, elective course, and elective LTC clerkship.

Frequency distributions were calculated by gender, experience, and graduation year. Analysis of variance was used to examine any difference between educational experience and the students’ knowledge of federal regulations and geriatric pharmacotherapy.

RESULTS
We analyzed a total of 79 student responses from the 3 classes surveyed in the study. The average age of the respondents was 29 years. As shown in Table 1, close to two thirds of the respondents were female (65.8%), and the majority worked in either community pharmacies (44.3%) or hospitals (24.1%). In terms of educational background, all respondents were required to take the LTC clerkship; however, 20% also took the elective class Consultant Pharmacy Practice in Long-Term Care Environments, 8% took an additional elective LTC clerkship, and 2.7% took both the elective class and clerkship.

Of the respondents, 70.5% reported that they were prepared for being a consultant pharmacist in a LTC setting. Those who reported being more prepared had a higher mean score on the questionnaire than their counterparts who did not feel as prepared, (19.0 ±0.41 to 17.9 ±0.61, respectively, p > 0.05).

As noted above, the LTC educational experience for most of the respondents (69.3%) consisted only of the required clerkship in LTC. The other educational opportunities included taking an additional elective class, taking an additional elective clerkship, or taking both (see Table 2). For this sample, however, the variations on their test scores were minimal. Students who took only the required LTC clerkship had a mean score of 18.6, while the mean score for those who took the additional elective class or clerkship was 18.1 and 20, respectively. Finally, students who took both the elective class and clerkship had a mean score of 18. However, the differences in these scores did not meet the statistical threshold of 0.05. Scores also did not signif-
DISCUSSION

Students who completed the elective LTC clerkship or elective course did not score significantly better on the questionnaire for proficiency in consultant pharmacy practice than those who completed only the required LTC clerkship. Scores did not significantly vary based on graduation year, gender, or current practice site. The majority of the respondents obtained a total mean score of 74.4% based on their required LTC clerkship experience. Mean test scores relating to federal regulations ranged from 14.5 to 17 out of the 19 questions. Students taking the required and elective LTC clerkships had higher overall mean test scores (20) and higher mean test scores (17) related to the federal regulations. Mean test scores relating to geriatric pharmacotherapy ranged from 4.8 to 5.5 out of the 6 questions. Those with the highest mean test score of 5.5 were those graduates who had completed the required LTC clerkship, the elective LTC clerkship, and the elective course.

We recognize several limitations are inherent within the study design. Due to the nonrandom study design and relative low response rate, we recognize that an unobserved difference may exist between those who responded and those who did not. Also, the limited number of questions, especially the relatively few clinical geriatric pharmacotherapy questions limits our ability to perform in-depth analyses to determine more precisely deficiencies in geriatric pharmacotherapy knowledge. Nonetheless, this study sheds light on student educational experiences in LTC and their knowledge and readiness to care for geriatric patients in LTC or other settings.

CONCLUSIONS

In its Policy Statement of Inclusion of Geriatrics in the Pharmacy School Curriculum, the American Society of Consultant Pharmacists (ASCP), states the following:

[The American Society of Consultant Pharmacists] supports a greater emphasis on the study of geriatrics in pharmacy schools to meet the growing demand for pharmaceutical care in the geriatric population. The organization strongly recommends that pharmacy schools immediately incorporate more geriatric-focused information into their current didactic and clinical courses. Pharmacy schools must identify and develop additional geriatric clinical experiences to prepare pharmacy students for the challenges of these changing demographics.12

Specific examples provided by ASCP include:

- "Geriatric-focused information in the core curriculum,"12
  - Age-related changes
  - Disease-related changes
  - Drug therapy management
  - Physical assessment
  - Counseling and communication

- "Clinical experiences across the continuum of care"12
  - Clerkships/Externships
  - Residencies
  - Fellowships
  - Traineeships

A recent study by Rojas-Fernandez and colleagues of pharmacists practicing in Texas identified that an improvement in geriatric pharmacotherapy knowledge was needed particularly with pharmacokinetics, aging demography, and medications that are inappropriate for those older than 65 years of age. These researchers suggest, “the amount of formal education regarding geriatrics in the classroom be increased” as well as increasing postgraduate opportunities in geriatrics.13

Pharmacy programs should continue to strive to provide both didactic and experiential courses in geriatrics. While it might be beneficial to add a didactic course in geriatric pharmacotherapy to optimize students’ educational experiences, it may not be possible to add a required course to an already full curriculum. Most experiential offerings are based in LTC facilities. Adapting geriatric experiential programs in other practice settings such as

<table>
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<th>Educational Experience</th>
<th>Overall Mean Test Scores (25 questions)</th>
<th>Mean test score R sub questions (19 questions)</th>
<th>Mean test score C sub questions (6 questions)</th>
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<tr>
<td>Required clerkship only</td>
<td>18.6</td>
<td>15.4</td>
<td>4.8</td>
</tr>
<tr>
<td>Required clerkship + elective class</td>
<td>18.1</td>
<td>15</td>
<td>4.6</td>
</tr>
<tr>
<td>Required clerkship + elective clerkship</td>
<td>20</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>Required clerkship + both electives</td>
<td>18</td>
<td>14.5</td>
<td>5.5</td>
</tr>
</tbody>
</table>

R sub questions = survey questions about federal regulations governing long-term care
C sub questions = survey questions about geriatric pharmacotherapy
ambulatory care, home health care, adult daycare centers, and other community-based settings would be beneficial to pharmacy students. New graduates must recognize that extensive knowledge of geriatric pharmacotherapy may not be obtained through an entry level PharmD curriculum, and that they may need to consider alternative methods for gaining experience in geriatric pharmacotherapy through continuing education, residencies, or traineeships.

In order to meet the growing needs of the geriatric population, pharmacy schools should continually review and update their curricula so that graduates are prepared to handle the diverse pharmaceutical needs of this age group.

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REFERENCES


Appendix 1. Clerkship objectives.

The following clerkship objectives as listed in the University long-term care clerkship syllabus prior to 2000 include:

1. Recall the major types of extended care facilities (ECFs) and distinguishing features of each.
2. List the consultant pharmacist's responsibilities in long-term care facilities.
3. Recall state and federal regulations pertaining to the provision of pharmaceutical services in ECFs.
4. Discuss age-related physiologic changes that occur in the elderly patient relative to drug therapy.
5. Recall physical, psychological, and economical barriers to medication compliance in the elderly.
6. Gather patient data and assess patient parameters necessary to recommend changes and monitor the effectiveness of rational drug therapy in acute and chronically ill patients. The student will obtain/utilize a medication history, physical findings, laboratory tests, and serum drug concentrations.
7. Integrate didactic concepts in physiology, pharmacology, pharmacokinetics, and therapeutics with clinical experience to make appropriate recommendations for geriatric patient care.
8. Retrieve information concerning current drug therapy from the clinical literature and support recommendations based on this literature.
9. Anticipate, identify, prevent or evaluate the clinical significance of potential or encountered adverse drug reactions, overlap, interactions, or allergies.
10. Effectively communicate with other members of the health care team.
11. Develop computer skills that can enhance the consultant pharmacist's performance.