The Clinical Pharmacist As a Preceptor
in a Family Practice Residency Training Program

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**Background:** According to a recent survey, 27% of 579 family practice residency programs in the United States employ a full-time clinical pharmacist. The majority of pharmacists’ time is spent teaching, usually at the point of care either on inpatient rounds or precepting in the outpatient clinic. This paper describes the precepting activity of a full-time clinical pharmacist in a community-based family practice residency training program. **Methods:** A computer program written in Microsoft Access® captured the following data on each pharmacist-physician encounter: date, time, requestor, topic, therapeutic category, type of question, summary of question and answer, resources used to answer the question, and time spent answering the question. The database was updated daily to include all encounters. **Results:** Between February 1, 1999, and January 31, 2001, we documented 2,260 precepting encounters. Almost half of the questions related to general pharmacotherapeutic management of chronic or acute diseases. The most common therapeutic categories encompassed cardiovascular, psychiatric, infectious disease, and neurologic disorders. Seventy-six percent of questions were answered using clinical knowledge and experience, while 24% were based on published resources. **Conclusions:** Based on more than 2,000 precepting encounters between a faculty pharmacist and family practice residents, most encounters represented requests by residents for information on general drug management of diseases. The pharmacist answered most questions based on clinical knowledge and experience. Evaluations of the pharmacist by the residents indicated that she is an effective teacher and useful in helping take care of patients.

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With the increasing numbers of medications brought to the US market every year and the publication of numerous studies on those medications, attainment and application of succinct pharmacotherapeutic information is a challenge. Clinical pharmacists are in a unique position to complement physicians in the application of evidence-based pharmacotherapy and cost-effective prescribing.

The contribution of clinical pharmacists in ambulatory clinics has been described. Hatoum et al reported on 199 pharmacotherapeutic interventions made by four clinical pharmacists in 1 month. Types of recommendations included adding or changing a drug, changing a dose, educating the prescriber, suggesting or discontinuing laboratory orders, discontinuing a drug, clarifying or correcting a prescription, and changing a drug regimen. Positive patient outcomes were documented in 49% of the interventions, and there was an average cost avoidance of $1.54 per intervention. Mason and Colley, in a study involving two general medicine clinics, showed that the number of potential drug problems identified per patient was significantly greater in a clinic without pharmacist intervention, while the number of beneficial interventions implemented was significantly greater in a pharmacist-staffed clinic. A cost savings of $185 per intervention was calculated. Finally, a randomized, controlled trial of elderly outpatients taking five or more chronic medications demonstrated that inappropriate prescribing decreased significantly in patients whose regimens were reviewed by and intervened on by a clinical pharmacist, and the patients experienced fewer adverse drug events. In all three of the aforementioned studies, physicians accepted the majority of the pharmacist’s recommendations. Indeed, in a study by Haxby et al, family physicians found 97% of pharmacist consultations useful, and 77% of the physicians believed that the consultation enhanced the clinical outcome of their patients.
In the early 1980s, involving clinical pharmacists in family practice residency programs was an innovative trend. Pharmacists spent the majority of their time teaching via formal lectures and providing drug information. They also provided direct patient care services such as patient counseling, diabetic teaching, or patient monitoring. Since that time, clinical pharmacists have continued these roles with family practice residency programs and now also develop comprehensive pharmacotherapy curricula. According to a recent survey, however, only 27% of 579 family practice residency programs in the United States employ a full-time clinical pharmacist. The typical pharmacist in a residency training program holds a doctor of pharmacy degree and has completed a clinical pharmacy residency program. The survey indicates that, on average, pharmacists spend 43% of their time teaching, 37% in patient care, and 12% in research activities. Point-of-care teaching takes place in the outpatient setting 59% of the time and during inpatient rounds 38% of the time.

None of the aforementioned publications specifically describe the role of clinical pharmacists as preceptors. This paper describes the precepting activity of a full-time clinical pharmacist in the ambulatory setting of a family practice residency training program.

Methods
Setting
Our program is a community-based family practice residency training program, with 12 approved positions in each of the 3 postgraduate years. The full-time family medicine faculty consists of nine family physicians, one clinical pharmacist (PharmD), one clinical psychologist, and one substance abuse counselor.

The full-time clinical pharmacist in our program is responsible for teaching family practice residents and medical students about rational and cost-effective drug therapy. This is accomplished via formal lectures, participation in daily teaching rounds on the inpatient service, small-group discussions on pharmacotherapeutic topics, and precepting in the residency program’s outpatient clinic, the Center for Family Medicine (CFM). Residents in the CFM come to the pharmacist’s office during their assigned clinic hours with questions regarding patient management as it relates to drug therapy. Each resident makes the decision about whether to review cases with or ask questions of the pharmacist, depending on whether the resident deems it beneficial to do so. The pharmacist’s office is located in the patient care area of the CFM and is readily accessible to residents as they see their patients.

In addition, the pharmacist provides drug information to the CFM faculty, residents, medical students, and nursing and laboratory staff; serves as a resource for patient education; and is an intermediary for professional pharmaceutical sales representatives. She also participates in scholarly activity and coordinates the faculty’s research efforts.

The pharmacist provides direct patient care by physician consultation only—ie, when specifically asked to do so by one of the physicians.

Data Collection
To document the precepting activity of the pharmacist, we collected data and entered it into a Microsoft

![Figure 1](https://example.com/figure1.png)

**Figure 1**

Questions by Therapeutic Category

- Cardiovascular
- Psychiatry
- Infectious Disease
- Neurology
- Endocrinology
- Pulmonary
- Miscellaneous
- OB-Gyn
- Allergy/Immunology
- Rheumatology
- Gastroenterology
- Nutrition
- Herbal/Supplements
- Dermatology
- Urology

n=2,260

Note—The categories run clockwise on the pie chart, ie, cardiovascular 29%, psychiatry 14%, infectious disease 11%, neurology 11%, etc.
### Table 1

#### Classification of Questions

<table>
<thead>
<tr>
<th>Question Type</th>
<th>Frequency</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacotherapeutic management</td>
<td>46%</td>
<td>Patient with NYHA IV heart failure and renal insufficiency with a SCr=3.9 mg/dl who presents with major fluid overload and pulmonary edema. Help with medication management.</td>
</tr>
<tr>
<td>Drug information</td>
<td>12%</td>
<td>How are formoterol (Foradil®) and salmeterol (Serevent®) different?</td>
</tr>
<tr>
<td>Dosing</td>
<td>9%</td>
<td>What is the dose of oral acyclovir (Zovirax®) for oral herpes?</td>
</tr>
<tr>
<td>Side effects</td>
<td>8%</td>
<td>Can valproic acid cause an increase in transaminase levels (LFTs)?</td>
</tr>
<tr>
<td>Drug interactions</td>
<td>6%</td>
<td>Does grapefruit juice decrease amiodarone (Cordarone®) metabolism?</td>
</tr>
<tr>
<td>Availability</td>
<td>4%</td>
<td>Is there a generic enalapril/HCTZ combination?</td>
</tr>
<tr>
<td>Cost</td>
<td>3%</td>
<td>Is it true that Glucotrol XL® is the same price as generic glipizide?</td>
</tr>
<tr>
<td>Identification</td>
<td>3%</td>
<td>What is a white, round scored tablet with 5601 on one side and Dan on the other?</td>
</tr>
<tr>
<td>Pregnancy/lactation</td>
<td>2%</td>
<td>I have a patient on bupropion (Wellbutrin SR®), fluoxetine (Prozac®), and valproic acid (Depakote®). She discovered that she is pregnant. Are any of these drugs teratogenic?</td>
</tr>
<tr>
<td>Medical assistance programs</td>
<td>2%</td>
<td>Do you know who makes Premarin® and if they have a medication assistance program?</td>
</tr>
<tr>
<td>Monitoring therapy</td>
<td>2%</td>
<td>After beginning warfarin therapy in a patient with atrial fibrillation, when should I check in INR?</td>
</tr>
<tr>
<td>Patient education</td>
<td>1%</td>
<td>Please teach this patient how to use a metered dose inhaler.</td>
</tr>
<tr>
<td>Physician education</td>
<td>1%</td>
<td>Discussion of over-the-counter drugs for cold symptoms</td>
</tr>
<tr>
<td>Other*</td>
<td>1%</td>
<td>How much lidocaine should be used to dilute ceftriaxone (Rocephin®) for pediatric use?</td>
</tr>
</tbody>
</table>

* Pharmacokinetics, toxicology, stability/compatibility

NYHA IV—New York Heart Association classification system (functional class IV)

SCr—serum creatinine
LFT—liver function test
HCTZ—hydrochlorothiazide
INR—international normalized ratio

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Access 97® computer file (Microsoft Corporation, Redmond, Wash). Data included the following information on each encounter between the pharmacist and health care providers: date and time, requestor name and type (eg, resident, faculty physician, nurse, etc), topic of the precepting encounter, therapeutic category, type of question, summary of the question and its answer, resources used to answer the question, and time spent answering the question. Data on topics of precepting encounters were usually classified as a drug (listed by generic name), a drug class, or a disease state. Therapeutic categories were classified as shown in Figure 1. Questions not falling into one of these categories were labeled as “miscellaneous.” Question types were summarized and classified in one of 16 types (Table 1).

The content of the precepting questions was documented by examining whether the pharmacist reviewed the patient’s underlying conditions and current medications, made recommendations for medication additions/deletions or adjustments, and discussed monitoring parameters. Information about pharmacotherapeutic management that was not related to a specific patient was categorized as a drug information question. Simpler questions on a side effect or drug interaction were documented separately. The summary of the question and its answer were entered into the database using a free-text format. Resources used to answer the questions were categorized as books, journal articles, and on-line electronic databases.
Evaluation by Residents

An evaluation of all family medicine faculty members, including the clinical pharmacist, was distributed to the residents for completion on a quarterly basis. All evaluations were anonymous. Residents gave their completed evaluations to a faculty secretary, who entered the scores into a computer file. The cumulative report did not have any resident identifiers. Residents scored the pharmacist on four characteristics (Table 2). The possible total score was 30 points.

Data Analysis

Data analysis was performed via queries within the Access program to document activity and look for trends. Descriptive statistics are reported.

Results

Numbers and Types of Encounters

Between February 1, 1999, and January 31, 2001, 2,260 precepting encounters were documented. Close to one third of questions asked by residents fell into the cardiovascular therapeutic category (Figure 1). The most common question type was about pharmacotherapeutic management (Table 1).

Family practice residents asked 84% of the 2,260 questions. Faculty physicians, registered nurses, and students asked 11%, 3%, and 1% of questions, respectively. Licensed practical nurses and employees made up the remainder of the requestors. The proportion of questions asked by residents increased in a linear fashion with postgraduate year, with first-, second-, and third-year residents asking 14%, 34%, and 52% of the questions, respectively. The busiest times of the day for the pharmacist were between 11 am–12 pm and 4–5 pm.

The average length of time spent per encounter was 7 minutes (range 5–90 minutes). Questions asked by residents that took the pharmacist ≥ 30 minutes to answer were typically those categorized as pharmacotherapeutic management or drug information. The pharmacist spent between 30 and 90 seconds entering each encounter into the database or about 10–15 minutes per day.

Table 2

Residents’ Evaluation* of the Clinical Pharmacist

<table>
<thead>
<tr>
<th>Element</th>
<th>Possible Points**</th>
<th>Mean Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to teach</td>
<td>0–10</td>
<td>9.58</td>
</tr>
<tr>
<td>Usefulness</td>
<td>0–10</td>
<td>9.68</td>
</tr>
<tr>
<td>Availability</td>
<td>0–5</td>
<td>4.72</td>
</tr>
<tr>
<td>Politeness</td>
<td>0–5</td>
<td>4.77</td>
</tr>
<tr>
<td>Total possible score</td>
<td>30</td>
<td>28.75</td>
</tr>
</tbody>
</table>

* n = 94
** A higher number indicates a more desirable performance.

Resources Used

The most commonly used resource used by the pharmacist to answer questions was personal clinical knowledge and experience. Seventy-six percent of encounters relied on such personal knowledge. Micromedex® Healthcare Series (MICROMEDEX, Greenwood Village, Colo) and Drug Facts and Comparisons (Burnham TH, Noval KK, Schwein SL, eds) were the next most common information sources, used in 13% of encounters, primarily for questions dealing with side effects or drug interactions. The National Library of Medicine was used 4% of the time for questions requiring literature searches. Various other resources were used to answer the remaining questions (7%).

Resident Evaluation

Of a possible 288 evaluations, 33% were completed during the study period. Residents’ evaluations of the clinical pharmacist, conducted every 3 months, yielded a total average score of 28.75 out of a possible 30 points (Table 2).

Discussion

This paper describes the precepting role of a clinical pharmacist in a family practice residency program. The pharmacist serves as an on-site, evidence-based knowledge advisor to guide the residents in making decisions about drug therapy. Based on 2,260 encounters over 2 years, the majority of advice related to pharmacotherapeutic management (i.e., how to manage medications in patients with multiple disease states, taking into account effectiveness, safety, and cost). This finding points to the residents’ need for learning the practical application of pharmacology on a daily basis. Cardiovascular therapeutics dominated the residents’ precepting encounters. This is not surprising, since essential hypertension and heart disease are among the top 20 reasons for visits to physician offices in the United States, and heart disease is the leading cause of death in patients >45 years of age. Other prominent therapeutic categories of questions in this study, including psychiatry, infectious disease, neurology, and endocrinology, are also among patients’ most important reasons for ambulatory care visits.

The analysis of the data also showed an increased number of questions as the residents matured into the third year of training. The higher number of patient contacts in the PGY-III year explains part of this increase. The increase in encounters may also, however, suggest the development of professional relationships between the resident physician and the clinical pharmacist or a greater awareness of the need for pharmacotherapeutic information.

The clinical experience and personal knowledge of the pharmacist were the source of information for the largest number of precepting encounters. While this may
make the pharmacist appear to be a non-evidence-based source of information, reading and analyzing original research articles, evidence-based clinical practice guidelines, and systematic reviews and attending continuing education seminars continually enhance personal knowledge. This is likely similar to faculty physicians who rely on their accumulated knowledge and practice experience when supervising and teaching family practice residents.

Limitations
This study has limitations. Although every attempt was made to document each encounter, it is possible that not all were entered into the database. In addition, the results in our program may not predict results in another residency program. Lastly, not all residents completed evaluations of the pharmacist every quarter, which may have affected the cumulative score.

Conclusions
Based on more than 2,000 precepting encounters between a faculty pharmacist and family practice residents, most encounters represented requests by residents for information on general pharmacotherapeutic management of diseases. The pharmacist answered most questions based on clinical knowledge and experience. Evaluations by the residents indicated that a pharmacist can be an effective teacher and useful in the care of patients.

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REFERENCES