Outcomes of a Pharmacotherapy/Research Rotation in a Family Medicine Training Program

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Background and Objectives: The effects of a required pharmacotherapy/research rotation in family medicine residency programs, precepted by a clinical pharmacist, have not been documented in the literature. This study evaluated the effects that a focused pharmacotherapy/research rotation had on family medicine residents’ knowledge of pharmacotherapy and research topics. Methods: During the first year of a family medicine residency, 15 residents were required to complete 1 month in pharmacotherapy and research. They spent time observing a pharmacist-run clinic and discussing pharmacotherapy and research topics. Residents completed a 20-question pretest and a posttest consisting of 15 pharmacotherapy and five research questions while on the rotation. Higher scores on the tests indicated higher levels of knowledge. The differences in mean scores were evaluated using paired t tests. Results: Overall, the mean score on the pretest was 10.13 compared to 14.67 on the posttest. Mean scores on the pharmacotherapy and research components for the pretests and posttests were 7.27 compared to 10.47 and 2.87 compared to 4.20, respectively. Conclusions: A focused pharmacotherapy/research rotation, precepted by a clinical pharmacist, increases family medicine residents’ knowledge.

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and evidence-based medicine. The pharmacotherapy/research rotation was created around the six core competencies in the Accreditation Council for Graduate Medical Education (ACGME) requirements and the curriculum focused on adult and community medicine, resident research, and scholarly activity topics suggested by the Residency Assistance Program (RAP) and the Society of Teachers of Family Medicine (STFM) Group on Pharmacotherapy. The ACGME requirements state that additional faculty may be needed to teach about medications and their interactions, and in our situation the additional faculty member was a pharmacist.

This study evaluated the effect of a focused pharmacotherapy/research rotation, precepted by a pharmacist, on family medicine residents’ knowledge of the aforementioned topics. The study was granted an exemption from formal review by our institutional review board.

Methods
During the first year of residency, residents in our program are required to complete a 1-month pharmacotherapy/research/behavioral medicine rotation. The goal of the pharmacotherapy/research portion of the rotation was to provide learning opportunities that enabled residents to develop and/or refine the knowledge, skills, and attitudes necessary to provide pharmaceutical care with an evidence-based approach. The specific objectives for the pharmacotherapy and research components of the rotation are listed in Table 1.

From July 2004 through June 2006, residents on this rotation spent time participating in various activities related to pharmacotherapy and research. The clinical pharmacists facilitated the sessions for the residents and for the majority of activities, pharmacy students and a pharmacy resident were also present. A summary of the residents’ schedule and activities is listed in Table 2.

Topics of Education
During the rotation, each resident reviewed the safety, tolerability, efficacy, and pharmacoeconomics of selected medication classes related to primary care disease states addressed in the ACGME requirements for family medicine (anticoagulation, diabetes, hyperlipidemia, hypertension, immunizations, and pulmonary disorders). They also received current guidelines for use of these medication classes. When time permitted, residents selected additional pharmacotherapy topics of interest to them (eg, treatment of migraines, seizures, contraception, infectious disease, etc). During the rotation orientation, residents were provided a copy of a CD-ROM containing some of the current treatment guidelines and review articles of the pharmacotherapy topics listed above. In addition, they were provided with a 1-hour tutorial of effective search strategies and resources to obtain drug information.

The residents were required to obtain treatment guidelines on the additional pharmacotherapy topics of interest to them and review articles for two of the topic discussions to practice their searching skills. The topic discussions generally lasted about 3 hours and incorporated some aspects of active learning or hands-on demonstration (cases, “jeopardy,” glucometer education, insulin administration, and inhaler technique). This rotation accounted for the largest amount of pharmacotherapy information on common disease states encountered during residency training, though residents were also exposed to these topics throughout the year during conferences and while providing direct patient care in the clinic and on the inpatient service.

Pharmacy Clinic
The residents observed and participated in a pharmacist-run clinic throughout the month. The clinic provided care for patients within the family medicine practice (often referred to as “the clinic” by the residents) and used a collaborative drug therapy management protocol to adjust medications and provide education for patients with common chronic diseases encountered in primary care. Diseases that the pharmacist-run clinic managed included anticoagulation, diabetes, hypertension, hyperlipidemia, and travel medicine.

The residents applied the information they learned from pharmacotherapy discussions and in the pharma-

<table>
<thead>
<tr>
<th>Pharmacotherapy Objectives</th>
<th>Research Objectives</th>
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<tr>
<td>• Assess patient-specific disease states</td>
<td>• Describe the importance of research in patient care</td>
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<tr>
<td>• Evaluate patient-specific drug therapy and therapeutic problems</td>
<td>• Summarize basic research designs</td>
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<td>• Communicate with patients and health professionals</td>
<td>• Evaluate the components of a research article</td>
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<tr>
<td>• Collaborate with patients, caregivers, and health professionals</td>
<td>• Explain the findings of a research article</td>
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<td>• Select and recommend a comprehensive drug therapy plan</td>
<td>• Use appropriate resources to complete literature searches</td>
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<tr>
<td>• Monitor drug therapy</td>
<td>• Formulate a research question</td>
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<tr>
<td>• Educate patients and health professionals</td>
<td>• Collect and analyze data to answer a research question</td>
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Research Discussions

The residents participated in two 3-hour research discussions. During the first session, the discussion focused on ethical principles of research and the function of institutional review boards. The second session was about study designs. Residents were to read a case report, a case-control study, a cohort study, a randomized controlled trial, and a meta-analysis that were provided for them. The advantages and disadvantages of the various designs were reviewed. They also reviewed biostatistics, including basic concepts, descriptive statistics, sensitivity, specificity, predictive value, statistical inference techniques, correlation, and regression. The residents applied the information they learned during these discussions while presenting at journal club and writing a drug information paper on a topic that they selected and researched.

Evaluation

Residents completed a 20-question test on the first day (pretest) and the last day (posttest) of the rotation to assess their knowledge. The test consisted of 15 pharmacotherapy questions (anticoagulation, n=1; diabetes, n=3; hyperlipidemia, n=4; hypertension, n=3; immunizations, n=2; pulmonary, n=2) and five research questions. Sample questions are shown in the Appendix. The full list of questions is available from the author.

Analysis

The paired t test was used to determine overall differences in mean scores between the pretests and posttests. The paired t test was also used to determine the differences in scores on the individual topics between the pretests and posttests. One subanalysis was conducted to compare the pretests of residents completing the rotation during the first 6 months and the second 6 months of the residency year. The unpaired t test was used to determine overall differences in mean scores between the pretests and posttests for the subanalysis.

Results

Fifteen family medicine residents were included in the study. Out of 20 total possible correct answers, the mean score on the pretest was 10.13 compared to 14.67 on the posttest (P<.0001), with higher scores indicating more correct answers. Mean scores on the pharmacotherapy and research components for the pretests and posttests were 7.27 out of 15 compared to 10.47 (P<.0001) and 2.87 out of 5 compared to 4.20 (P=.0006), respectively. Resident performance in the specific pharmacotherapy topic areas improved (Figure 1), though this improvement was not significant for questions relating to hypertension (P=.054).

Six residents completed the rotation during the first 6 months of the residency year, and nine residents completed the rotation during the second 6 months. The mean score on the pretests for those in the first 6 months was 9.67 compared to 10.44 for the second 6 months (P=.5162).

Discussion

A required pharmacotherapy/research rotation, precepted by a clinical pharmacist during the family medicine residents’ first year, significantly increased their knowledge about subjects taught during the rotation. Additionally, there was no difference in pretest performance if the rotation was completed in the first 6 months of the year compared to the second 6 months of the year, suggesting that baseline knowledge was not significantly influenced by other residency experiences throughout the year.

The findings from this study are important for several reasons. First, they suggest that residents may have learned more from the pharmacotherapy rotation than from their regular clinical rotations. Second, the pharmacotherapy rotation offers a way to teach residents about the growing amount of pharmacotherapy information, appropriate medication use, evidence-based medicine, and research-related principles. Many family medicine residency programs already have a clinical pharmacist on faculty. The pharmacist’s responsibi-
ties could be adapted to offer an experience similar to the one described in our program within the residency curriculum. Offering a pharmacotherapy/research rotation creates opportunities to meet the ACGME core competencies and fulfill curricular topics suggested by RAP and the STFM Group on Pharmacotherapy for family medicine resident education.

**Limitations**

Our study has several limitations that should be considered when interpreting the results. First, the findings of our study apply to residency programs that have a pharmacist on faculty. It has been suggested that family medicine residency programs that do not have a clinical pharmacist involved might collaborate with departments of pharmacy in local hospitals or universities, but we do not know if this approach would produce similar outcomes.

Second, while our results show there was a significant improvement in knowledge of pharmacotherapy and research topics when pretest and posttest results were compared, the test was written by the clinical pharmacy preceptors of the rotation and the possibility that preceptors were “teaching to the test” exists.

Third, while there was a significant improvement in test scores, residents only had average scores despite completion of the rotation. Residents still could not answer all questions correctly after the rotation, so knowledge acquisition was not maximal.

Fourth, this study was performed in a single family medicine residency program with no control group, and the sample was relatively small. It is unclear if these positive findings regarding this required pharmacotherapy/research rotation would translate across a larger resident population or in other programs. Further, this study only evaluated residents’ knowledge base of pharmacotherapy/research while on the rotation. It did not evaluate whether their increased knowledge translated into better clinical performance or whether improved knowledge was retained over time.

**Conclusions**

Our results suggest that a focused pharmacotherapy/research rotation, precepted by a clinical pharmacist, significantly increases residents’ knowledge of these topics. The ACGME requirements suggest that additional faculty may be needed to teach residents about medications and interactions. Collaborations between
family medicine programs and departments of pharmacy in hospitals or colleges of pharmacy can help provide these structured pharmacotherapy/research rotation opportunities for family medicine residents.

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References


Appendix

Sample Questions From Knowledge Test

1. According to the National Cholesterol Education Program (Adult Treatment Panel III) Treatment Guidelines, when should a fasting lipid panel be checked after starting your chosen therapy?
   A. 3 weeks
   B. 6 weeks
   C. 3 months
   D. 6 months

2. A 49-year-old patient with diabetes is started on lisinopril 10 mg daily for hypertension and microalbuminuria. His baseline serum creatinine is 1.2 mg/dl. As recommended by the guidelines, you recheck the serum creatinine in 1 week. Based on the increase in serum creatinine from baseline, at what threshold should you discontinue the lisinopril?
   A. > 10%
   B. > 15%
   C. > 35%
   D. > 50%

3. Which of the following medications decreases a patient’s international normalized ratio when coadministered with warfarin?
   A. amiodarone
   B. rifampin
   C. ciprofloxacin
   D. erythromycin

4. Which of the following trial designs is good for studying rare diseases or if an exposure occurred long ago?
   A. Case-control study
   B. Cohort study
   C. Randomized controlled trial
   D. Meta-analysis

5. Which of the following statistical tests is most appropriate when comparing three or more groups from one experiment?
   A. t Test
   B. Mann-Whitney U Test
   C. Wilcoxon Test
   D. Analysis of Variance