RESEARCH ARTICLES

Medication Management in Primary and Secondary Schools

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Objectives. To identify whether and how pharmacy faculty members are addressing the issue of medication management in primary or secondary schools in their teaching, research, and service activities, and to ascertain the extent to which they think the issue is an important one.

Methods. Four hundred ninety-nine faculty members completed a questionnaire inquiring about the research, teaching, and service activities in which they participated that related to medication management in schools.

Results. Only 33 subjects (6.6%) addressed the topic of medication management in schools in their courses; only 13 (2.6%) conducted research on the topic; and only 30 (6%) were involved in service in this area. On the other hand, 432 respondents (86.6%) believed that the issue of medication management in schools was either somewhat or extremely important.

Conclusions. There is a large gap between the number of subjects that think medication management in schools is an important topic and the number who actually include the topic in teaching, research, and or service.

Keywords: faculty, workload, school health, medication management

INTRODUCTION

Approximately 5% of children attending primary and secondary schools take medication during the school day.1 Not all doses are dispensed by nurses. Secretaries, health aides, teachers, parents, students, and others also assist with medication management.1-11 Medication management at the primary or secondary school level consists of the transfer of medication to school, the storage of medication in cabinets and refrigerators, the administration or dispensing of medication to children, the use of the medications by children, and disposal of the medication at the end of the school year or when it has expired. In addition to these issues, school personnel are responsible for documentation of medication storage and administration, the delegation of and liability for medication management duties, the therapeutic appropriateness of a medication as it pertains to a child’s disease state and other personal characteristics, and the availability of drug information.12 This situation exacerbates the risks associated with drug therapy.

Pharmacist Involvement

Pharmacists can play a potentially important role in improving medication management in schools. Pharmacists are likely to interact with prescribers, school personnel, parents, and possibly with the children, themselves. Unfortunately, little research has been done regarding the pharmacists’ role in medication management in primary or secondary schools. For example, an extensive search of the literature conducted by one of the authors in 199912 yielded only 2 articles that addressed the involvement of pharmacists in issues related to managing medications in schools.13,14 Both focused on medication education, and both were published in the early 1970s. Although institutional pharmacists have taken a more active interest in this problem in recent years,15-19 an extensive search of the MEDLINE database, the International Pharmaceutical Abstracts, and the Medscape database from 1966 until present identified only a few articles discussing the role of individual pharmacists in school health.20 None of these articles are empirical research studies, instead, they describe pediatric-focused pharmacy practices. These practices can be logically summarized in 3 categories:

(1) Taking steps at the pharmacy to make the safe use of medications by children at school easier. One pharmacist, for example, prepared 2 medication vials, 1 for home and 1 for school, when she has a pediatric patient who requires medication during the school day.21 This makes it less likely the patient will miss a dose at school because the medication was forgotten at home or vice versa. In addition, this pharmacist showed her pediatric patients the proper dosage of medication, and in the case
of liquid medications, how to measure the proper dose. This simple action made it more likely that the child would receive the proper dose, even in a school with sub-optimal medication administration procedures. Another effective way to assure proper drug therapy for patients attending school is to recommend sustained release products that are longer acting, thereby eliminating the need to take medication during school hours.

(2) Providing health education programs to school officials or directly to children themselves. In addition to providing information on drugs, pharmacists are also well qualified to provide information on general health and disease states. Their role in educating the public and school-aged children has generally been limited to patient counseling provided at pharmacies, and even this role is not always well promoted. In fact, pharmacists were not presented in health education books as health practitioners or even as providers of drug information according to an analysis published in 1971. Although pharmacists are still not widely recognized as a source of health information, there are several examples of pharmacists participating directly in children's health education by presenting school educational programs. The earliest example of a pharmacist visiting schools to provide health education was reported in 1971. In California, pharmacy students and faculty members are developing a free school health clinic to provide for a medically underserved student population within one elementary school. In another case, some pharmacy students are designing and implementing an educational program for high school students on the risks of cardiovascular disease.

(3) Consulting with school nurses and other school officials on medication management and general health. Pharmacists are well qualified to consult with school nurses on health issues, particularly those most common in children. However, there are few examples of pharmacists making recommendations to school nurses about health topics. One such report is a set of 2 articles in which the author discusses 3 to 4 common childhood ailments, such as head lice and minor sports injuries, and suggests nonprescription medications to remedy the conditions, including proper dosage and relevant side effects. Also, there are 2 books authored by pharmacists that appear to be aimed directly at school nurses and other school personnel, and both focus on medication management. McCarthy et al suggest implementing the advice of a pharmacist to help school nurses manage these issues, and there are, in fact, a few instances of this occurring.

One relevant empirical study was recently published that observed the degree to which community pharmacists were aware of and involved in issues related to the use of medications in primary and secondary schools and to identify the interventions they used to deal with these issues. The researchers surveyed pharmacists licensed in the State of Illinois with community pharmacy experience. They found that almost all subjects reported that they had dispensed medications for use in school, and two thirds thought that taking medications at school created the potential for special problems (eg, missed dose, social stigma). Of 9 interventions that could minimize these problems, the pharmacists surveyed utilized an average of 3.3 interventions. The most common intervention was providing separate, labeled containers for use at/by the school. Respondents who thought medication use in school raised special concerns used significantly more interventions than pharmacists who did not think that was the case. This is the only quantitative study of pharmacist views and practices regarding this important area of drug therapy. The results showed that some of these pharmacists were aware of and involved in this phenomenon and made use of interventions available to all community pharmacists. Still, pharmacists could do more to resolve these issues, and further efforts to raise their awareness levels are warranted.

One way to address pharmacists’ lack of knowledge about medication management in schools is to observe the degree to which colleges and schools of pharmacy are involved in this potentially important and problematic area of drug therapy and the degree to which pharmacy faculty members think the area merits attention. The activities and judgments of pharmacy faculty members are likely to have a long-lasting impact on some students.

The objectives of this research were to determine the extent to which faculty members of US colleges of pharmacy think medication management in schools is an important issue and to observe how they are addressing that issue in the classroom via research activities and in terms of community service.

**METHODS**

We decided to use e-mail with a link to a server-mounted survey instrument to conduct our research. This method was chosen because it is easier and less time-consuming for subjects than a paper questionnaire and cheaper to conduct than mail or telephone surveys. In order to make sure we benefited from the experience of others conducting surveys of faculty activities, we reviewed all research articles published in the *American Journal of Pharmaceutical Education* between fall 2001 and spring 2005 to identify those that used a survey instrument to obtain their data. The articles were then examined to identify those whose population included pharmacy faculty members or administrators and their
duties or activities in teaching, research, or service activities. Of the numerous articles reviewed, 13 met the established criteria. In 7 of these surveys, the survey instrument was sent to one identified faculty member at each college of pharmacy; in 1 survey, the instrument was sent to all members of a specific discipline; in 4 others, the survey instrument was sent to administrators and/or deans; and in 1 other, the instrument was sent to a random sample of all college of pharmacy faculty. Most of the surveys questioned how a specific skill was being taught or the content of a specific curriculum. The other surveys focused on faculty development programs, student professionalism, mentoring, and faculty expectations. None addressed the topic of medication management in schools. Nine surveys specifically mentioned using the American Association of Colleges of Pharmacy (AACP) roster or list serve to identify their population group. Five of the survey instruments were sent via electronic mail; 6 via standard US mail, and 1 via fax and electronic mail. None made use of e-mail with a survey link. This review assured us that neither the substance nor the method of our research was redundant with previous work and that we were not missing any important lessons already present in the literature.

A survey on involvement in medication management in primary and secondary schools was constructed, tested for face validity, and placed on the University’s server. Face validity was assessed by having 2 faculty members review it and provide suggestions for revisions. One held a PhD and was a social and administrative science faculty member with considerable survey research experience, and the other was a PharmD clinician. Both provided useful feedback and the questionnaire was revised accordingly.

An e-mail was sent to the entire population of faculty members at US colleges of pharmacy (N = 4,569). This population was operationally defined as individuals at US colleges of pharmacy with the word “professor” in their title as listed in the member directory on the American Association of Colleges of Pharmacy website (www.aacp.org). Although not perfect, we reasoned that this criterion would reduce the number of faculty members missed and the number of non-faculty members included. A link in the e-mail connected subjects to the server-mounted questionnaire. Participants were provided with a definition of medication management in schools and then asked to complete the survey instrument, which contained 17 questions, mainly inquiring about the research, teaching, and service activities in which they participated that were related to this topic. In addition to questions regarding their medication management activities, the survey instrument included questions about the subject’s faculty status, discipline, and the ownership of their institution (public or private). It also included questions for suggestions on how medication management in schools could be improved and whether subjects thought this was an important topic. Finally, an optional question provided subjects an opportunity to identify the name of their college of pharmacy if they wished to do so. The survey was sent on July 22, 2004, and completed surveys were accepted until August 9, 2004. A copy of the survey instrument is available from the authors upon request.

The research was approved by the University’s Institutional Review Board. The e-mail was sent with all addresses in the blind copy field so that no individual could be identified by others who received the invitation to participate in the survey. E-mail addresses of those completing the questionnaire were not recorded or made available to the researchers.

RESULTS
Six hundred and thirty-four subjects never received the e-mail because their institutions’ computer security systems blocked it before it could reach them. Completed survey instruments were obtained from 499 faculty members. This is a response rate of 10.9% based on the original N of 4,569, or 12.7% if the 634 subjects who did not receive the e-mail are excluded from the total. Data were automatically entered into an Excel spreadsheet, which was then converted to and analyzed with SPSS 12.0 for Windows. Because the initial response was so positive (presumably because the survey instrument was short and easy to complete in this electronic fashion), a follow-up e-mailing was not done.

Sample Profile
In order to ascertain the nature of our sample, we included some background questions. One hundred forty-nine (29.9%) subjects worked at private colleges and 350 (70.1%) at public schools. Most subjects classified themselves as regular (versus adjunct) faculty members (84.6%) and the majority as full-time faculty members (59.5%). About one third was assistant professors; one fourth, associate professors; and the remainder, full professors or administrators. Most subjects characterized their discipline as clinical/pharmacy practice (65.5%), followed by social and administrative pharmacy (15.0%), pharmacology (7.0%), pharmacuetics (5.2%), medicinal chemistry (4.0%), and other (3.2%).

Work Being Done in the Area of Medication Management in Schools
Table 1 shows the number and percent of subjects reporting that they conducted research, taught, provided
service, or advised student groups that provided service in the area of medication management in schools. Table 1 also shows the percent of total activity devoted to the topic. For example, for the 13 subjects conducting research in this area, less than one fourth of their total research activity was devoted to the topic on average.

Thirty-three (6.6%) subjects stated that they covered the topic in the classroom. Six of them taught the topic in 2 different courses, and 2 covered the topic in 3 different courses. In total, these 33 subjects covered the topic in 43 separate courses. Thirty courses were identified as required, 10 as elective, and 3 were not designated in this regard. The average percent of course material devoted to the topic is shown (17.5%), but the standard deviation is not, because, as opposed to the results for research and teaching, the average is across courses (43) rather than across subjects (33). The topic tended to be covered/was primarily covered in courses devoted to therapeutics, pediatrics, or applied pharmacy skills, although it was also taught in several social science courses.

Most service activities were in the form of providing drug information on an as-needed basis, followed by providing educational programming for school nurses and/or others, then providing consultation or advice on how to best manage medications. Of the 154 subjects who reported they served as advisor to a pharmacy student organization, 38 said their groups had performed a community service project involving medication management. Poison prevention was the most common form of service provided to schools by student organizations. Providing information on diabetes and/or asthma also tended to be a common activity.

Of all the subjects that stated they conducted research, taught, and/or provided services on medication management, 10 conducted research and taught, 4 conducted research and provided service, 10 taught and provided service, and 3 were involved in all 3 activities. Fifty-four other professors said that they had future plans to conduct research, teach, and/or organize service activities related to this topic.

Eighteen subjects (3.6%) reported that their college used schools as APPE sites and/or school nurses as preceptors. Three hundred twenty-three (64.7%) reported their college did not do this, and the remainder did not know. Slightly more than 10% of the respondents reported they knew of some individual or organization in their college that engaged in activity related to medication management in schools. Because an optional question allowed subjects to write in the name of their college or university, we were able to conclude that many of these referred to the same subjects whose activities are described earlier in this section.

Who is Doing the Work and Where

Of the 13 professors who conducted research in this area, 11 identified themselves as clinical/pharmacy practice faculty members, and the other 2 as social and administrative pharmacy faculty members. Of the 33 who taught the topic, 21 were clinical/pharmacy practice faculty members, 10 were social and administrative pharmacy faculty members, and 2 were pharmacology faculty members. In the area of service, 22 were clinical/pharmacy practice faculty members, and the remaining subjects were employed in social and administrative pharmacy, pharmacology, and other disciplines not specified. While professors of all disciplines served as advisors to student organizations that had performed a community service project around this issue, most of them worked in clinical/pharmacy practice.

In terms of conducting research or service related to medication management in schools, no difference was found between faculty members at private and public colleges. On the other hand, Chi-squared tests showed that subjects at public colleges were significantly more involved in teaching and student services related to medication management than those at private schools ($p < 0.03$ in both cases).

When asked to assess the importance of the issue of medication management in schools, subjects responded as shown in Table 2. An overwhelming majority (86.5%) believed that the issue of medication management in schools is either somewhat important or extremely important.

<table>
<thead>
<tr>
<th>Importance</th>
<th>n (%)</th>
</tr>
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<tbody>
<tr>
<td>Extremely important</td>
<td>121 (24.2)</td>
</tr>
<tr>
<td>Somewhat important</td>
<td>311 (62.3)</td>
</tr>
<tr>
<td>Not very important</td>
<td>63 (12.6)</td>
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<tr>
<td>Not important at all</td>
<td>4 (0.8)</td>
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Table 2. Pharmacy Faculty Members’ Assessment of the Importance of Medication Management in Primary and Secondary Schools (N = 499)
Eighty-one respondents provided suggestions for how medication management in schools could be improved. Education clearly emerged as the most popular suggestion (19 respondents mentioned it), including education of school nurses, as well as teachers, administrators, staff members, students, and parents. Several respondents also suggested the development of clear and consistent medication guidelines. Other suggestions included allowing children to carry rescue inhalers on their person, providing more coverage of medication management in schools in the professional pharmacy curriculum, conducting research on the topic, and cultivating better relationships between schools and the pharmacy community in general.

DISCUSSION

The purpose of this survey was to determine the extent to which pharmacy professors are involved in teaching, research, and/or service activities related to medication management in primary and secondary schools. The results show that few professors were involved in activities related to medication management compared to the number of professors who found it extremely or somewhat important. This suggests that faculty members at colleges of pharmacy might want to consider deeper involvement in this potentially important area of drug therapy.

Some professors might be reluctant to get involved with primary or secondary schools, because it is often difficult to gain access to them. Many primary and secondary schools are understandably hesitant to put their medication management practices under a microscope. We know this from our own work and from considerable literature that addresses conducting research in schools and the difficulties it presents. Even when access is achieved, considerable time is required to obtain permission from school boards, school officials, school employees, and children’s parents. Also, it is difficult to assist with guideline development since uniform guidelines are not available nationally.

Because few colleges of pharmacy are involved with medication management in schools in spite of its perceived importance, perhaps there is a need to provide guidelines to colleges on how they can address this topic. Colleges that already do have programs implemented in this area could provide a menu of opportunities for other colleges. In the end, all such activities (research, teaching, and/or service) should contribute to making medication use in schools safer and more effective.

For example, essential topics that should be covered when teaching medication management are: (1) medications that are usually brought to school and their uses, side effects, and storage requirements; (2) common chronic diseases that school children may have, such as asthma or diabetes; (3) ways for school employees and parents to improve medication management; (4) extended release products that would allow for less-frequent dosing, perhaps making it unnecessary for the child to take doses at school; and (5) proper packaging/labeling.

Although it was unintended, comments from subjects suggest that this survey might have raised the level of awareness among pharmacy faculty members of this important issue. Perhaps, as a result, more faculty members will turn their attention to it via research, teaching, and/or service activities. Finally, we received several unsolicited comments on the user-friendliness and clarity of the server-mounted survey.

Limitations

This study had several limitations. First, there were over 600 people who did not receive the e-mail with the link to the survey instrument either because their schools’ servers blocked the e-mail or their e-mail addresses were no longer valid. Since the survey responses were completely confidential, there was no way of knowing how many individuals from a particular school completed the survey instrument. It was necessary to conduct the survey during the summer due to University scheduling and resource constraints. The timing probably meant that fewer faculty members were able to complete the survey instrument since some faculty members were not available due to vacations or 9-month contracts. Also, we were so gratified by the number of responses received so quickly that we decided not to conduct a follow-up e-mailing. In retrospect, a follow-up e-mailing might have given us a better idea of whether initial responders were unique in some way. Also, a 10% response rate limits the statistical validity of our findings. Finally, even though the professors were provided with a definition of medication management in primary and secondary schools, some professors could have responded that they were involved in the teaching, research, or service levels when in actuality their activities did not fall under those categories as they were defined for this study.

CONCLUSION

Since there will always be children that need to take medication at primary and secondary school, it is important that pharmacists be aware of implications surrounding medication management. The college of pharmacy faculty members who responded to our survey overwhelmingly thought this was an important issue; however, there was relatively little involvement in this area in terms of research, teaching, and service. There is an
immediate need to better understand and improve medication management in schools, so perhaps more faculty members will turn their attention to this important area of drug therapy in the future.

ACKNOWLEDGEMENT

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REFERENCES

17. APhA to assist the National Association of School Nurses develop a training program for school nurses about the care and management of students with asthma. APhA media release. 2002 (April 18).