LETTERS

The Fifteen Year Thank-You

To the Editor. Oftentimes as educators, we wonder what impact we have on our students. Through our passion and enthusiasm to inspire students to learn, we still ask ourselves, "Do they learn from our instruction and put into practice lessons learned during their days in the pharmacy program?" We periodically evaluate their understanding of lessons through examinations, but we know (as we were once students) that much of the information that was "crammed" is lost after the examination. My phrase for this process is "bulimic learning." Additionally, we hope that during the introductory pharmacy practice experiences (IPPEs) and the advanced pharmacy practice experiences (APPEs) students will demonstrate that they know and can utilize the lessons learned for the benefit of the patients, consumers, and allied health care professionals they serve. In addition to students assimilating knowledge, we ask ourselves if we have inculcated in them the performance-based skills (eg, communication, problem solving, decision making, and societal responsibility) necessary to navigate the profession effectively and successfully. After all, part of our purpose as educators is to help our students create their professional futures.

Fifteen years ago, I stood before my first class of pharmacy students at Ohio Northern University (ONU). My new teaching assignment was to instruct the students in the pathophysiology and pharmacological management of myocardial infarction (MI). I knew this content with the therapeutics sequence would be difficult and not one which every student would embrace. Indeed, I told myself in all likelihood perhaps only a few students would remember what I taught. To facilitate student learning, I developed a mnemonic device for them.[1] Since then, I have tweaked my MI instructional plan based in part on constructive criticisms from students and incorporated new information, but I have always wondered about its value. What follows is a letter I recently received from an alumnus from that first class:

> Dear Dr. Sprague:
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> I want to take an opportunity to praise ONU College of Pharmacy for the wonderful education I received. It has served me well in my professional career and most recently in my personal life. As I have been telling my story, I find myself referencing my education and specifically your cardiology class and needed to let you know what an impact it has made. As pharmacists, we are trained to serve our patients to extend and save their lives. . .I never dreamed it would be my own.
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> Seven months ago, at the age of 35, I had a heart attack while home with my two small children. It was acute, painful, frightening, and nothing I had ever felt before. I had some classic as well as atypical symptoms and at the time could not process what was happening. My husband arrived and called 911 after explaining how my chest pain and shortness of breath were not subsiding. The medics immediately treated me as a cardiac patient even though I did not "look the part." I followed everything they said, giving [me] baby aspirin and oxygen. Once en route to the hospital, with the pain level still high, the medic gave me a nitroglycerin; almost immediately the pain reduced although it did not completely subside. At that moment, I knew it was my heart. At the local hospital, I was treated again as a cardiac patient and stabilized. I was being observed and waiting on my 2nd lab draw.
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> The ER physician was surprised to see that, though all my other labs were normal, my troponin had elevated. This marker is something I recalled specifically learning from your cardiology class. It was something you stressed we needed to comprehend when we reviewed the MI process. The physician was surprised that I knew what this meant. I explained I was a pharmacist and confident in knowing what this could indicate.
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> At the heart hospital, I was told by several people that I "did not look the part." I was told there could be a lab error, but they would continue to draw labs and follow-up in the morning. Throughout the night, I would ask a nurse about my troponin levels. By morning I had a total of 4 results, all increasing with time. I wrote them down and tracked it. I needed to know, did I have a heart attack? The rounding cardiologist asked me to explain my symptoms; after detailing every sensation. I finally said "I felt like I was having a heart attack." I figured I would make it as clear as possible. He said he doubted it and went on to explain stress and panic attacks. I then inquired about my troponin levels. I explained they had increased. He said "I will be right back. . ." He came back a few minutes later. "You're having a cardiac cath!"
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> I was taken aback by 2 things, the cath and the fact that I may have possibly been discharged if I had not inquired. The cath was scheduled for the next day—again, because I did not "look the part." I spoke with another cardiologist the next day, again same scenario, I had to inquire about my troponin levels. He ruffled through some paperwork and then started to explain. My husband and I stopped him. We will wait for the cath results. The cath results: right coronary artery aneurysm with a 90%-95% stenosis beyond with a possible dissection. Open heart surgery to perform CABG the next day.
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> After open heart surgery, I endured several weeks of home nursing and physical therapy and eventually cardiac rehab. It took me 14 weeks to complete rehab; along the way, people would say "How did you know something was wrong?" "What did it feel like?" "How did you know to ask and inquire about cardiac markers?" "Most people have no idea what troponin

> is." I explained that I had the best cardiology professor in pharmacy school. The ironic part is, I have said that for years when faced with explaining a cardiac issue. Believe it or not, I have even kept my cardio p-col notes all these years because I would refer to them at times. Recently, I have been asked by the American Heart Association to share my story at a GO RED luncheon in Columbus and at their Board Meeting in December. This is truly a positive opportunity to create awareness from my event. I just wanted to let you know how grateful I am for having such a wonderful knowledge and education from ONU....it allowed me to be confident in questioning my results, and my knowledge base truly saved my life!

In *Family Man*, Robert Fulghum wrote, "learn from them (one's children); they have much to teach you."[2] When substituting "students" for children, the sentence would read "learn from students, they have much to teach you." Certainly, through this letter, a former student has taught me why I am an educator. An educator's objective is to enhance their abilities as health care professionals and encourage caring for others. Caring is central to everything because it demonstrates how much we value our students, and our students can feel it emanating from us. Legendary basketball coach John Wooden often talks about the importance of caring in helping players, colleagues, students, and others. Further, he emphasizes actions, rather than words, demonstrate caring. The fact this former student cared enough to write this letter caused me to pause and reflect on why I became an educator. I thank her for caring and in turn teaching me.

As a dean of a college of pharmacy, my administrative duties do not allow me to teach as often as I would like. However, I sincerely cherish those times when I am able to do so. An occasional "escape" to the classroom can be extremely rewarding. My hope is all of us experience the joy of teaching and caring for our students and one day receiving a "15-year thank you."

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The Need for Mentorship as Residents Move Into the Academy

To the Editor. A significant demand for pharmacy faculty members currently exists in the United States, with 53% of vacancies being practice faculty positions. This demand is expected to continue to increase over the next 10 years.[1] The Academy has recognized the need for recruiting more faculty members, and new initiatives have been developed through the American Association of Colleges of Pharmacy (AACP) to expose potential faculty candidates to academic careers. The most effective venues for recruitment, however, remain one-on-one relationships between pharmacy students or residents and current faculty members who express enthusiasm for their careers, and learners with a budding interest in making their professional mark through the role and responsibilities of the academy.

As a resident, the opportunity to connect with my faculty mentor and discuss academia was an important experience that reinforced my decision to apply to the Wal-Mart Scholars program and attend the 2009 AACP annual meeting. While the timing of the meeting may be logistically simpler for students in their final year of the PharmD program, residents and students attend for different reasons and with different outcomes. Fourth-year students may be intrigued by a career in academia, and this exposure may influence their residency choice; whereas, for residents, attending the annual meeting solidifies their interest in the career path, and starts giving them valuable skills to begin looking at faculty positions at various schools.

The timing of the annual meeting may impede many residents from attending, as most are still within their first month of a residency program and may not have thought to orchestrate planning in advance with their residency director. With the variety of events taking place when transitioning from student to resident (eg, graduation, licensing examinations, possibly moving to a new part of the country for residency), it is unlikely that a new graduate would consider attending this meeting without suggestion and encouragement.

The reasons I felt it was a successful meeting to attend as a resident are threefold. Residents are in a unique position, being both learners and teachers, and can draw from recent experiences as students. Being in this pivotal position allowed me to see purpose behind the curriculum, but also challenge the status quo, asking, "how could this be done better so students can experience appreciation for what they are learning?"

As residents are in the early phase of their programs when decisions about residency projects are made, the posters and learning sessions can be beneficial in sparking interests that may have been undiscovered previously. I was excited by the programming that was of relevance to the evolving world of pharmacy academia, and my own residency project, which focused on the evaluation of students' performance on objective structure clinical

examinations (OSCEs), one that I hoped to present as a result of my meeting experience.

Finally, I gained a great deal from the networking experiences that I had. As I am in my second year of residency and planning to pursue a career in academia and practice, the timing could not have been better to begin making contacts that might lead to long-term professional relationships. The timing made more sense for the conversations regarding future opportunities to take place with me as a resident, than as a student because of the nature of my advanced training.

There clearly are barriers to residents attending the AACP Annual Meeting, even though both residents and the academy would benefit from increased resident attendance. Therefore, residency program directors and preceptors, new graduates transitioning into residencies, and faculty members from schools and colleges of pharmacy should assume a shared responsibility to ensure these opportunities are fully realized. As students progress through APPEs, preceptors and faculty mentors should be engaged in discussions with them about future plans, identifying students who are interested and well-suited for a career in academia. Because the application process occurs well before residents are able to make a personal connection with residency preceptors, the mentorship provided by pharmacy faculty members should extend beyond the PharmD program; faculty members should consider serving as mentors to PharmD students who are interested in completing residencies. Efforts should be coordinated with residency directors in advance to request time off to attend the Annual Meeting.

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Why Analytical Testing Is Needed in Pharmaceutical Compounding

To the Editor. With the evolution of today's specialized therapy, the role of the compounding pharmacist in the practice of pharmacy is more evident than ever. The art and science of compounding allows the pharmacist to prepare dosage forms that best suit the needs of individual patients. For several years compounding has been on the rebound, influenced by the modernized practice of pharmacy. In the United States, compounded prescriptions occupy a growing portion of the drug market and account for 250 million prescriptions annually.[1] Patients and the Food and Drug Administration have entrusted compounding pharmacists with preparing these compounded preparations. Although the state pharmacy boards regulate and guide compounded preparations, they are seldom analyzed for quality, and it is left to the individual pharmacist to assure the quality.

In 2001, the FDA's Division of Prescription Drug Compliance and Surveillance conducted a limited survey of common drugs and dosage forms compounded by 12 pharmacies located throughout the United States[2]. This survey enabled the FDA to assess quality, purity, and potency of the compounded drug products. Twenty-nine samples were collected and subjected to original and repeated analytical testing during the survey. Ten (34%) of 29 sampled products failed standard quality tests. Nine of the 10 products failed potency testing (less of the active ingredient(s) than declared on the label) with a failure range of 59 to 89%.

In 2006, the FDA conducted a second survey in which it collected both active pharmaceutical ingredients (API) and finished compounded drug products from compounding pharmacies.[3] Of the 36 samples analyzed, 12 (33%) failed analytical testing, with potency ranging from 67.5% to 268.4% of the amount declared on the label.

Both studies by the FDA confirm that the pharmacy profession has the opportunity to make an important contribution to the quality of preparations compounded in laboratories and pharmacies. In order to maintain the highest professional standards and ethics, we have to identify the sources of error that may affect the quality of these preparations so we can reexamine our compounding techniques and modernize them where needed.

There have been few if any academic reports describing the incorporation of analytical testing within the compounding teaching laboratory. We decided to integrate the analytical component into our compounding curricula to evaluate students' skills, performance, and competency. For this purpose, we set up a special session in the advanced compounding laboratory where we analyzed a suppository from each student and reported the result to the student.

We started this exercise in fall 2008. Students prepared progesterone, 25mg, suppositories using PEG bases as directed. Students had no previous knowledge that their preparations would be analyzed. A United States Pharmacopeia (USP) method was adopted for analyzing the suppositories using high performance liquid chromatography (HPLC). The same testing was also repeated with a different class in the fall of 2009. This class was informed

about the suppository analysis before preparation. The results of the potency testing in 2009 were better than 2008; thus, this exercise showed that analytical testing is crucial and needed.

More attention must be focused on the potency and strength of compounded preparations, and students should be aware of the consequences if they do not adhere to the appropriate guidelines. The most likely source of error for this experiment was the improper incorporation and mixing technique for progesterone with the melted PEG base prior to pouring into the molds. However, this stresses the importance of attaining a simple compounding technique and justifies the need to address the preparation of more challenging formulations. The FDA's findings from both surveys did not elaborate on the sources of error in their findings.

Our aim was to help the students gain more knowledge about the steps taken for the development of an analytical method, and to better guide them in the pursuit of reasonable explanations for why their suppositories failed the potency and strength test. When student results fall outside of the acceptable range, they understandably will begin to question the importance of proper mixing and compounding techniques.

In this regard, we are calling for a widespread effort at the academic level to address this problem. Our task as academicians is to ensure the quality of teaching and learning, and analytical testing is the proper tool to preserve the quality and integrity of compounding. We call upon every college and school of pharmacy to incorporate some type of analytical testing in compounding laboratories, leaving no doubt that our pharmacy students and professional pharmacists are always striving to perform their duties to the highest standards. Compounding requires diligence and careful attention to small details, and we are committed to pursuing more rigorous academic solutions to this problem. In the meantime, we are hopeful that most institutions will begin to incorporate analytical testing to instill in the minds of the students the importance of potency, strength, and quality of preparations, and strengthen their compounding skills and mixing techniques.

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Developing a Practice-based Master in Clinical Pharmacy Program at the Universiti Teknologi MARA, Malaysia

To the Editor. Over the past 2 decades, the paradigm shift in pharmacy services from dispensing to direct patient care has created the need for curricula change and introduction of new, clinical-oriented programs. In Malaysia, a multiethnic developing country in Southeast Asia, the pharmacy profession is still in a transition phase like many other developing countries. Currently, there are 13 pharmacy schools (4 public and 9 private) in Malaysia, producing over 600 pharmacy graduates per year.[1] The basic degree in pharmacy is the bachelor of pharmacy, earned by completing a 4-year full-time program. Typically, undergraduate curriculum covers all the major disciplines in pharmacy, including analytical and medicinal chemistry, physiology, pharmacology, pharmaceutics, and pharmacognosy, with only modest emphasis on clinical pharmacy and pharmacy practice. In 2004, the Ministry of Health imposed a 3-year compulsory service in addition to 1-year preregistration training for new pharmacy graduates in an attempt to increase the number of pharmacists in the government sector primarily in hospitals and health clinics. Currently there are 2 universities in Malaysia offering 1-year, full-time master in clinical pharmacy programs. Keeping the current status and future direction of the pharmacy profession in mind, the Faculty of Pharmacy at the Universiti Teknologi MARA (UiTM) has created a practice-based master in clinical pharmacy (MClinPharm).

UiTM is the biggest public university in Malaysia with 17 campuses.[2] Established in 2001, the Faculty of Pharmacy offers the diploma in pharmacy, bachelor of pharmacy, and research degrees at the master and doctoral level. There are about 537 undergraduate and 105 postgraduate students. Together with lecturers from the discipline of clinical pharmacy, clinical academicians from the Faculty of Medicine, UiTM, and clinical pharmacists from the Ministry of Health, Malaysia, and lecturers from other pharmacy schools will be invited as well to enhance the teaching and learning process. Lecturer to student ratio is 1:2 to ensure optimum supervision.

The curriculum of MClinPharm has been developed keeping in view the growing local needs and changing global trends of pharmacy practice. The program spreads over 3 semesters (1.5 years full-time), with a strong emphasis on both practice and research. The program broadly consists of 3 pharmacotherapeutics modules, a module each on personalized medicines (clinical pharmacokinetics & pharmacogenomics) and research methodologies. Students have to complete 2 core clerkships, each lasting 3 months, and based on the student's desired area of specialization.

To ensure more hands-on training, classroom teaching is limited to 3 weeks per semester. Didactic teaching will be combined with problem-based learning (PBL) and case-based learning (CBL). Following the classroom teaching, for each pharmacotherapeutics module, students have to prepare structured reports on 5 clinical cases to be collected from hospitals. The case with the most significant drug-related problems will be presented during individual case presentations. Both reports and presentations contribute towards continuous assessment.

Clinical clerkships are directly supervised by a senior clinical pharmacist and a clinical pharmacy lecturer. Three hospitals have been identified for this purpose. The assessment will be based on case reports, case presentations (2 per month), portfolios, *viva voce*, and inward activities. The final examination will consist of multiple-choice and long-essay questions. For the pharmacotherapeutics modules, an objective structured clinical examination will also be conducted to assess clinical skills.

Each research project will be supervised by at least 2 lecturers (principal and co-supervisor) and graded by the principal supervisor and an external examiner. Ethics approval and registration with National Medical Research Register (NMRR), Malaysia, is a must for each project. Proposal submission and defense will be at the end of the second semester. Data collection and analysis and thesis submission will be completed in the third semester.

In summary, the MClinPharm is expected to equip graduates with the necessary knowledge and skills required to be a competent clinical pharmacist. Greater emphasis is paid in the curriculum to the acquisition of clinical skills. A variety of teaching and assessment methods are used to ensure better learning outcomes.

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