

Advanced Strategies in Pharmacy Experiential Education

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INTRODUCTION

Pharmacy practice and pharmacy education in Canada continue to evolve.¹ In 2010, the Association of Faculties of Pharmacy of Canada and the Association of Deans of Pharmacy of Canada issued a position statement and joint resolution that, by 2020, the Doctor of Pharmacy degree would become the first professional pharmacy degree at all Canadian universities.² A major implication of this change is that, in contrast to Bachelor of Pharmacy degree programs, which include a minimum of 16 weeks of experiential education, entry-to-practice PharmD (EPPD) programs must include 40 weeks or more of experiential education.³ At the same time, a traditional pathway for Canadian pharmacists to develop advanced practice expertise, the post-baccalaureate Doctor of Pharmacy degree, has been eliminated. Alternative pathways, such as advanced (year 2) pharmacy residencies, fellowship programs, and advanced practice or professional master's degrees, are in various stages of development and implementation.

Experiential education is the central component of all these programs. The increased emphasis on experiential education relative to the bachelor degree programs is a positive development that has the potential to strengthen the practice skills of future pharmacists. Indeed, a major rationale for the adoption of EPPD programs is to ensure that graduates are capable of fulfilling increasingly advanced pharmacy practice roles.² However, it is critical that the traditional approach to experiential education also evolve, to ensure that learners derive maximum benefit. In addition, solutions are needed to address the capacity challenges created by the rapid expansion in the number and duration of experiential rotations.

This article highlights innovative models and novel approaches to pharmacy experiential education that can help in addressing these challenges and better prepare pharmacy learners to be the advanced practitioners of the future.

BACKGROUND

Experiential education has been a part of pharmacy training since the early days of the profession, when the 1:1 apprentice–master model was the norm. As the profession advanced, formal experiential education was incorporated into university-level pharmacy curricula. In these programs, learners received relatively limited exposure to practice, and it was expected that they would further refine their learning on the job after graduation. This expectation was one of the major reasons that residency programs began to flourish in the 1980s. These residency programs provided the extra training needed to practise in the hospital setting and remained the dominant approach until the 1990s in the United States and until the late 2000s in Canada. Throughout this time, the 1:1 learner–preceptor model remained the primary configuration for pharmacy experiential education.

In 2012, Hall and colleagues⁴ highlighted the need for pharmacy programs to produce “confident graduates who are able and willing to assume responsibility and accountability for drug therapy management.” They identified a number of key barriers to achieving this goal, including rotations of limited duration; rotations at multiple sites, necessitating repeated orientation; and limited opportunities for independent practice. The result, according to these authors, was pharmacy rotations that amounted to “observerships” rather than patient care experiences.⁴ They proposed a variety of potential solutions, including initiating experiential education early in the pharmacy program, instituting extended rotations at a limited number of sites, providing opportunities for students to assume increasing responsibility for patient care, incorporating peer or near-peer learning methods, expanding interprofessional learning opportunities, and establishing a set of patient care activities that students could assume at different levels of training.⁴

The implementation of EPPD programs has addressed some of these concerns. In the EPPD programs, students are required

to complete experiential rotations (including hospital rotations) at an early stage. Advanced Pharmacy Practice Experience (APPE) rotations are typically longer in duration (5–8 weeks) than those in bachelor degree programs (4 weeks), and interprofessional education is embedded in the curriculum. Finally, it is expected that the substantial increase in the total amount of experiential education in EPPD programs will increase PharmD graduates' level of competence, relative to that of bachelor degree graduates.

Despite these positive developments, challenges remain. Pharmacy preceptors, leaders, and educators have been slow to change their approach to experiential education. The most common learner–preceptor model remains the 1:1 model.⁵ Rotation capacity continues to be a concern for many practice sites, a challenge that has intensified as more EPPD programs have been implemented. Finally, it is not certain that the switch to EPPD programs alone will result in graduates who are confident and ready for future practice. The US experience supports these concerns. Despite the implementation of EPPD programs in the United States in the late 1990s, it has been suggested that pharmacy students remain inadequately engaged in impactful direct patient care.^{6,7} Rotation capacity in the United States is also major issue.^{8,9} Thus, in both Canada and the United States, there is a need to consider new approaches to pharmacy experiential education.

INNOVATIVE APPROACHES TO EXPERIENTIAL EDUCATION

Nontraditional Learner–Preceptor Models

It has been suggested that pharmacy adopt nontraditional learner–preceptor models, such as the “medical model”, as a strategy to address rotation capacity issues and to enhance the learning experience.^{8–10} Although the traditional (1:1) learner–preceptor model affords ample interactions between preceptors and learners and support of learners, it does have drawbacks. From a capacity perspective, it is inefficient and inflexible, because it permits only as many learners on site as there are preceptors. It also requires significant preceptor time, may inhibit independent practice, and does not allow peer-assisted learning.¹¹

Nontraditional learner–preceptor models may offer advantages. Assigning multiple learners to a single preceptor allows sites to host greater numbers of learners, alleviating capacity issues. Also, these models leverage the concept of peer-assisted learning,¹¹ a system that involves “people from similar social groupings who are not professional teachers helping each other to learn and learning themselves by teaching”.¹² Peers or near-peers have cognitive congruence with each other, meaning that they share a similar knowledge base and can more easily teach each other new concepts in ways that will be readily understood.¹³ The influence of peers or near-peers seems to have an important and positive effect on how these models are perceived by learners.

Several accounts of peer-assisted learning and near-peer models in pharmacy experiential education have been

published.^{14–17} Lindblad and others¹⁴ implemented peer-assisted learning in the form of a pilot clinical teaching unit for student pharmacists on a 36-bed stroke and medicine unit in Red Deer, Alberta. Five fourth-year pharmacy students participated in 9-week rotations, which had staggered starts. At any give time, between 2 and 5 students were working on the unit, with a single attending pharmacist. The students took patient histories, developed care plans, and made recommendations in collaboration with the preceptor and the multidisciplinary team. At the end of the rotation, the students reported being satisfied with the experience and felt that it contributed to their learning. Preceptors also reported being satisfied or very satisfied with the experience. The presence of students on the unit resulted in a 5-fold increase in pharmacy interventions relative to baseline.¹⁴

Kan and others¹⁵ described another variant on the peer-assisted learning model, which was implemented on a general medicine unit at Toronto Western Hospital in Toronto, Ontario. Over a 2-year period, 10 fourth-year EPPD students were scheduled into 2 sequential 5-week blocks each, with 2 students overlapping each month in a staggered fashion. Each pair of students was supervised by a single preceptor, who assigned patients from his or her medical team to the students. Patient case discussions and therapeutic topic discussions were conducted jointly. After each rotation, the preceptors and the learners provided feedback via electronic survey. Overall, the students reported a positive experience, focusing especially on the value of interacting and learning from peers. They also appreciated being exposed to a greater variety of cases during shared patient case discussions. Although a few students felt that the preceptor's time and attention were split between learners, 83% agreed that they would participate in the model again, given the opportunity.¹⁵

Leong and others¹⁶ employed a near-peer “hierarchical model” that involved learners at different levels of training working with an attending pharmacist on a hemodialysis unit. The main objective was to document and qualitatively evaluate the interactions between participants over the month-long rotation. The learners included a postbaccalaureate PharmD student and a pharmacy resident, who acted as senior learners, as well as 2 pharmacy students, the junior learners. All of the students participated in patient care activities, rounds, and didactic discussions. Two major themes that emerged from observation and analyses were the concepts of cognitive congruence and legitimate peripheral participation.¹⁶ The junior learners appreciated having frequent opportunities to seek advice from the senior learners and ask them questions. The junior learners were initially noted to participate less but became more engaged as they gained comfort in their surroundings. The authors concluded that a hierarchical model was viable even in a specialty area such as hemodialysis.¹⁶

Another near-peer model, described by Tsang and others,¹⁷ explored the perceptions of 15 second-year pharmacy students completing brief early hospital experiences at Sunnybrook Health Sciences Centre in Toronto (12 h total, split over 2 or more

visits).¹⁷ Four students had a staff pharmacist alone as their preceptor, 9 students were directly mentored by fourth-year pharmacy students currently on rotation at the site, with a pharmacist as backup, and 2 students had a pharmacy resident as their preceptor. After the experience, the participants provided feedback via an electronic survey. The model was well received by all participants, who also felt that all of the learning objectives of the rotation had been met. The second-year students preferred having fourth-year pharmacy students or the pharmacy resident as mentors. These senior learners were felt to be more accessible to the learners and more familiar with the curriculum and career options than pharmacist preceptors.¹⁷

A recent systematic review of different learner–preceptor models employed in nursing, medicine, and allied health (including pharmacy) corroborated many of findings described above.¹⁸ Models that employed various forms of peer-assisted learning (e.g., 2:1 or 3:1 models, with 2 or 3 learners, respectively, at the same level of training being assigned to a single preceptor) yielded a number of perceived benefits. Learners reported a sense of increased social support and decreased anxiety, shared knowledge and teamwork, and greater independence. Preceptors reported opportunities for richer discussion and greater efficiency relative to the 1:1 model.¹⁸

Near-peer models are sometimes referred to as tiered learning, hierarchical models, or the medical model. In these models, a preceptor supervises 2 or more learners who are at different levels of learning, with the senior learner providing learning support to the junior learner.¹⁸ A variation of this model, referred to as the layered learning model,⁹ is discussed in detail later in this paper. The benefits of these models are that the junior learner receives mentorship and support from the senior learner, and the senior learner gains experience as a preceptor. In addition, learners may be more independent than is the case with the 1:1 model, and the teaching and patient care workload can be split among the team members. As with peer-assisted learning, near-peer models provide increased capacity for learners at the practice site.¹⁸

The disadvantages of peer-assisted learning and near-peer models include limited physical space for learners to work, multiple assessments for the preceptor to complete, difficulty in supporting struggling learners, and, for the near-peer model, role confusion among other disciplines, as well as mismatched expectations around supervision and reporting.¹⁸

In summary, there appear to be a number of benefits associated with nontraditional learner–preceptor models, and these models are viewed favourably by the participants. Nonetheless, there has been limited uptake outside of a few centres and pilot studies, and broader adoption of these models is necessary if their benefits are to be fully realized.

Engagement of Students in High-Value, Mutually Beneficial Patient Care Activities

As stated above, student involvement in impactful patient care activities is an important part of the learning process. In

addition, the satisfaction of both individual preceptors and facility administrators is enhanced when learners are integrated into the work of the department.¹⁹ Several investigators have explored the potential of pharmacy students to contribute to patient care in a general way or through targeted student-delivered services.

Mersfelder and Bothillier²⁰ conducted a comprehensive literature review in an attempt to quantify the impact of pharmacy students on patient care. The authors identified 29 studies conducted in the United States and published between 1990 and 2011 that involved pharmacy students on rotations in community, ambulatory, and acute care settings. Overall, during rotations that ranged from 4 to 6 weeks, students made an average of 6 interventions per week, with the number of interventions increasing over the course of the rotation. Students' activities ranged from general patient care activities to targeted services such as IV-to-oral stepdown, deprescribing of acid-suppressive therapy, warfarin dose adjustment, and medication reconciliation. In the studies that included economic analyses, pharmacy students' involvement in care was associated with cost savings or cost avoidance. The authors concluded that students improved the clinical productivity of pharmacy departments and that schools of pharmacy and practice sites should work together to optimize the scheduling of learners so that they can participate in these activities.²⁰

More recently, Champion and others²¹ conducted a systematic review of medication reconciliation facilitated by technicians or pharmacy students. The authors identified a total of 32 studies, 10 of which involved pharmacy students. Eight of the student-focused studies took place in inpatient settings, whereas 2 occurred in community settings. In these studies, the students obtained medication histories and were involved in medication reconciliation; in some they also provided patient counselling. Overall, students' medication histories were more accurate than those of physicians or nurses, and the rate of medication reconciliation increased when students were involved.²¹ Another recent medication reconciliation study demonstrated that patients whose cases were reviewed by a combined team consisting of 2 APPE pharmacy students and 2 pharmacy technicians had a lower rate of readmission than those not seen by the team.²² In this study, students identified more medication discrepancies than pharmacy technicians.²²

Another innovative student service was described by Wentzell and others,²³ who piloted a student-facilitated program for reporting adverse drug reactions (ADEs) at a tertiary care hospital in Ottawa, Ontario. The baseline rate of pharmacy reporting of ADEs to Health Canada in the 6 months before implementation was low (only 2 reports submitted). After implementation of the student-facilitated service, 27 ADEs were reported in the 6-month study period. A follow-up survey involving students and pharmacists indicated strong support for the program to continue.²³

Student services have also been implemented in the outpatient setting. Kim and others²⁴ described a student-run program

for monitoring direct-acting oral anticoagulants (DOACs) for patients attending an internal medicine outpatient clinic. Students reviewed the health care records and refill histories of patients for whom DOACs had been prescribed in the previous 6 months, and made recommendations and performed interventions when necessary. A total of 136 interventions were performed for 90 patients, including assisting with medication access and coverage, providing adherence counselling, and recommending additional laboratory monitoring. The authors concluded that pharmacy students are valuable team members who can help to ensure the safe use of DOACs.²⁴

Although most of the emphasis here has been on pharmacy students, it should be noted that pharmacy residents can also make significant contributions to patient care. Pharmacy residents provide service to health care organizations through direct patient care activities, research projects, and targeted services.²⁵ Examples of innovative pharmacy resident services include providing weekend antimicrobial stewardship services, assisting patients with medication access or coverage, providing after-hours on-call services, and participating on the cardiopulmonary resuscitation team.²⁵⁻²⁷ Increasingly, residents are also fulfilling the role of senior learners in near-peer or layered learning models.

In summary, there are numerous ways in which pharmacy learners can provide care that is mutually beneficial to patients, the practice site, and their own learning. Although much of the literature reviewed here is from the United States, there is no reason to believe that these approaches would not work in Canada.²³ The most extensively studied student activities are medication history taking, medication reconciliation, and patient counselling. Even students who are relatively early in their training can contribute to these activities. Advanced learners can enhance or extend the quality or scope of pharmaceutical care provided to patients, or they can serve as copreceptors for junior learners. Learner involvement in these activities has the potential to increase facilities' willingness to host learners and to allow the learners to develop independence and a sense of responsibility for patient care.

A Combined Approach: The Layered Learning Practice Model

The layered learning practice model (LLPM) arose out of a need to increase clinical pharmacy services and address rotation capacity challenges without additional resources.²⁸⁻³⁰ This model is a variant on the near-peer model and has the built-in expectation that the learners provide tangible service to the organization. The LLPM was pioneered at the University of North Carolina (UNC) Medical Center, in collaboration with the UNC Eshelman School of Pharmacy, and is now gaining widespread interest and acceptance at other sites across the United States.^{29,30}

Implementation and evaluation of the LLPM at the UNC Medical Center was described in a series of publications.^{28,31,32} The model was deployed in multiple acute care areas, including critical

care, medicine, cardiology, pediatrics, and oncology, as well as in ambulatory care. The model involves teams of participants, specifically a clinical pharmacy specialist (the attending pharmacist), a postgraduate year 1 or year 2 resident, a fourth-year APPE pharmacy student, and, in some cases, a clinical generalist pharmacist. Members of the layered learning pharmacy team work together to provide pharmacy care for all of the assigned patients. Key responsibilities of learners include obtaining medication histories, reconciling medications during care transitions, providing patient medication education, and facilitating patients' access to medications on discharge.²⁸ Factors thought to be important for successful implementation of the LLPM include a systematic approach, good communication, flexibility for the attending pharmacist to adapt the model to the practice area, adequate resources, the commitment of all participants to ensuring the model's success, and evaluation after implementation.³¹

Bates and others^{31,32} published 2 studies that evaluated the impact of the LLPM on the oncology units at UNC Medical Center. In the first study, they found that after implementation of the LLPM, 51% of patients received personalized medication education at discharge,³¹ whereas before implementation, no patients in the clinical area had received such education. The authors also noted that most of the discharge counselling was conducted by either the pharmacy resident or the pharmacy student.³¹ The second study, which attempted to evaluate the educational impact of the LLPM, indicated that learners had a positive experience.³² Residents reported that they learned to be more independent and organized, and students reported feeling less intimidated when working with the resident. Students also felt that the experience helped them to prepare for a residency.³²

Soric and others²⁹ described an LLPM on an intensive care and internal medicine service in a 126-bed community hospital. The participants were an attending pharmacist, 2 postgraduate year 1 residents, and 2 pharmacy students. The model was designed to run continuously with each successive rotation block (11 months per year). The learners performed patient workup and made recommendations, provided medication education, and participated in multidisciplinary rounds. Units where the LLPM was implemented experienced a 22% reduction in medication expenditures. In addition, the frequency of medication education at discharge increased by nearly 20%, and patient satisfaction scores in all categories relating to medication education increased.²⁹

Delgado and others³⁰ described a model that incorporated a single layer of learners (specifically, fourth-year APPE students), who worked with an attending pharmacist in a learning and service delivery model at Cleveland Clinic Florida hospitals. The stated goal of the model was to obtain "pharmacy-generated medication histories and discharge counselling for all patients in a cost-neutral manner." Before implementation of the model, preceptors hosted 1 or 2 pharmacy students per rotation. After implementation, each preceptor was assigned 5 or 6 students per block. The model resulted in improvements in patient satisfaction

scores, an increase in pharmacy interventions, and an increase in patients receiving bedside delivery of discharge medications.³⁰

The LLPM represents an innovative approach that combines near-peer learning opportunities with an emphasis on learner contributions to patient care and service delivery. LLPMs appear to be associated with increases in interventions and productivity, and the limited published data that exist suggest that they are regarded positively by learners. LLPMs also address rotation capacity issues and may prove attractive for Canadian hospitals. When implementing such models, it will be important to ensure that assigned activities provide clear value to the students' learning, and ongoing assessment of the impact of such models on learning will be essential.

FUTURE DIRECTIONS

In many of the examples described above, the novel models and approaches were implemented on a single ward or at a single practice site or were temporary pilot projects. In the future, it will be necessary to permanently implement a combination of these approaches alongside broader system changes such as redesigned learner schedules and local workflows aimed at better integrating learners. Ideally, these changes will occur across multiple practice sites or across the entire health system.

Cameron and others³³ described a system-wide approach. In 2010, the University Health Network hospitals in Toronto partnered with the local faculty of pharmacy to strategize in advance of upcoming increases in placement demands associated with a new EPPD program.³³ Several goals were established for experiential education rotations, including the need to maximize capacity and the learner experience through novel models of preceptorship. It was also agreed that learners should perform work that is "meaningful to learning and to patient care."³³ To accomplish these goals, a variety of strategies were implemented, including year-round student placements, extended duration of rotations, integrated near-peer and peer-assisted learning models, a streamlined student onboarding process, a validation process to confirm learners' ability to independently conduct medication reconciliation, and preceptor guidelines outlining teaching expectations. Together, these strategies successfully increased the rotation capacity by 3.5-fold over a period of 4 years.

In British Columbia, the AGILE project (Advancing Experiential Learning in Institutional Pharmacy Practice) outlined a series of approaches, such as strengthening the partnership between the university and the health authority, using non-traditional learner–preceptor models, establishing mutually beneficial patient care activities to be performed by students, and implementing site-based faculty support liaisons, referred to as experiential education facilitators.⁵ These experiential education facilitators have now been deployed at multiple sites across the province, helping to build rotation capacity and fuel teaching innovation at a local level.

It is also important to assist preceptors and practice sites as they embark on the changes described above. Reports from the Canadian Experiential Education Project for Pharmacy (also known as CanExEd) provide a series of recommendations related to promoting and supporting the implementation of novel strategies in experiential education.³⁴ The Priority 2 report, which focuses on learner–preceptor models, highlights the need to customize the approach to each practice site, to provide adequate education to preceptors and model-related orientation for learners, and to establish preceptors with expertise in using the models.³⁵

Preceptor education may also be necessary, given that many current preceptors have little or no direct experience in a peer-assisted learning or near-peer model. To promote these models, the University of British Columbia, the University of Alberta, and the Association of Faculties of Pharmacy of Canada jointly developed a series of guidebooks.³⁶⁻³⁸ These guidebooks provide practical advice and guidance for preceptors who are considering rotations involving peer-assisted learning, near-peer models, or co-preceptorship. They highlight best practices from the literature and convey advice from preceptors who have experience with each of these models. As such, they may be useful resources in helping preceptors transition away from the status quo.

There are a number of potential approaches to increasing preceptor comfort with greater student involvement in and responsibility for patient care activities. Specific student training or validation processes similar to those outlined by Cameron and others³³ for medication reconciliation could be developed. In addition, close collaboration between practice sites and the faculty of pharmacy can ensure that on-campus learning activities realistically simulate activities that the learners will be expected to perform at the practice site. Conversely, if preceptors have a good understanding of the curriculum and expected levels of student performance, they can more easily determine which patient care activities may be appropriate to assign.

CONCLUSION

A number of significant changes have occurred recently in the structure and duration of pharmacist training programs in Canada. Overall, these changes are intended to produce pharmacy practitioners who are prepared to advance the profession and take pharmacy practice to the next level. However, to achieve this result the current approach to experiential education must be re-evaluated, and new approaches investigated and applied. This paper has outlined a variety of innovative approaches to experiential education along with considerations for their implementation. If the profession is to continue evolve, it will be essential for the pharmacy practitioners of the future to be fluent in these approaches.

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