Advancing clinical pharmacy practice globally through an innovative internationally-trained Pharm.D. degree programme

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Abstract

Introduction: There are increasing calls worldwide for pharmacy education to prepare graduates to provide patient-centred care.

Description of Programme: In response, University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences (CU SSPPS) developed the innovative Internationally-Trained Pharm.D. (ITPD) degree programme for international pharmacists. Admitted students complete two years of online didactic coursework in their home country, two live sessions in Colorado, one before and one after didactic coursework is completed, and introductory and advanced experiential rotations in the United States.

Evaluation: The ITPD programme addresses the complexity of educating diverse pharmacists to provide and meet the increasing demand of patient-centred care. Since 2014, ongoing evaluation of admission criteria and student performance assesses achievement of programme goals and continuous quality improvements. Results demonstrate student and programme success, and identified need for minor programme improvements.

Future Plans: CU SSPPS hopes to expand the ITPD programme to pharmacists in low- or low-middle income countries seeking to utilise pharmacists in clinical roles.

Keywords: *International, Global, Pharmacy Education*

Introduction

The worldwide pharmacy profession has been progressing from its original product-centred focus to a patient-centred focus with an emphasis on inter-professional practice, improving patient outcomes, and addressing local healthcare needs (Toklu & Hussain, 2013; Anderson *et al.*, 2014). Pharmacists are now providing patient education, promoting wellness, preventing disease, contributing to disease management, and providing direct patient care. As the role of a pharmacist advances, the education and training of pharmacists must also advance to meet those needs by focusing on training pharmacists to think critically and be adaptable to a variety of healthcare needs. (Anderson *et al.*, 2012; International Pharmaceutical Federation [FIP], 2013; Anderson *et al.*, 2014). The Doctor of Pharmacy (Pharm.D.) degree meets this call, either as an entry-level or as a post-graduate degree for practicing pharmacists. Creating quality-assured Pharm.D. programmes may be difficult in many countries due to

limited resources, including faculty members, clinical preceptors, clinical sites, and jobs upon graduation. (Asiri, 2011; Odegard *et al.*, 2011; Al-Qadheeb *et al.*, 2012; Anderson *et al.*, 2012; Deshpande, 2013; Gums, 2013; Anderson *et al.*, 2014).

When considering the great investment and resources necessary to create a pharmacy programme, some have suggested it may be better to outsource the education, sending students to other countries for clinical pharmacy degree programmes (Odegard *et al.*, 2011; Anderson *et al.*, 2012; Gums, 2013; Rennie & Anderson, 2013). In these cases, the pharmacists are able to return home after completing their training to apply their acquired knowledge and skills to contribute to the local educational and clinical needs. The challenge of this educational model is that the students/trainees are required to leave their families and jobs for extended periods. For those interested in obtaining a Pharm.D. degree, this is typically three or four years.

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Understanding the clinical pharmacy education needs and challenges worldwide, the University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences (CU SSPPS) developed the Internationally-Trained Pharm.D. (ITPD) degree programme, an innovative Pharm.D. degree programme. CU SSPPS has the foundation of a well-established on-campus entry-level Pharm.D. (ELPD) degree curriculum, a longstanding distance-based post-baccalaureate North American-Trained Pharm.D. (NTPD) degree programme, and an extensive clinical network for its experiential training programme. These programmes served as the foundation for the distance-based Pharm.D. degree programme for international baccalaureate-trained pharmacists described here.

Description of Programme

The ITPD programme is an accelerated entry-level degree pathway that incorporates distance and campus-based instruction for pharmacists who graduated with a bachelor's degree (or equivalent) in pharmacy from a pharmacy programme outside the United States (US). The goal of the ITPD programme is to educate pharmacists worldwide who will expand the practice of pharmacist-provided, patient-centred care and better meet the healthcare needs of their home countries.

The application process of the ITPD programme is the first step in recognising the prior pharmacy education and professional practice of its applicants. Applicants are required to demonstrate they have the foundational knowledge in the areas of basic and pharmaceutical science. To ensure this, applicants must successfully pass two foundational pharmacy sciences exams, based on the Accreditation Council for Pharmacy Education's (ACPE) 2016 Accreditation Standards and Key Elements for the Professional Programme in Pharmacy Leading to the Pharm.D. degree or successfully pass the US National Association of Boards of Pharmacy Foreign Pharmacy Graduate Equivalency Exam (ACPE, 2015). These exams also serve as assurance of similar baseline competency of the programme's globally-diverse student population. Because students learn US-based coursework and practice in experiential settings, they must also demonstrate English language proficiency through the TOEFL (Test of English as a Foreign Language) internet-based test and the ACTFL (American Council on the Teaching of Foreign Languages) Oral Proficiency Interview. Applicants also must provide a CV/resume and transcripts from previous degree programmes.

Meeting local healthcare needs is core to the ITPD programme's mission. This mission is introduced in the application process by requiring applicants to share local plans for advancing pharmacist-delivered patient-centred care. This requirement is demonstrated through a personal statement and a live video-conferenced interview discussing that statement with a panel of four interviewers consisting of faculty members, current

students and alumni. Applicants must also submit a professional sponsor letter, such as from an employer, upholding their local practice plans. This sharing of local patient-centred care plans is designed to assure a locally-supported need and opportunity to provide the planned patient-centred care to be offered by a Pharm.D. education. While not a requirement for admission to the programme, applicants who are board certified, employed at a Joint Commission accredited institution, or teach at a school of pharmacy receive additional points on their admissions score.

Once admitted, the didactic and experiential curriculum is designed to meet the school's 14 abilities-based outcomes (ABOs) (Appendix A), as well as cover the remainder of the ACPE content (ACPE, 2015). The ABOs assure competency in areas of foundational sciences, patient care, evidence-based medicine, public health, systems management, professionalism and communication, and lifelong learning.

Admitted students complete two live classroom sessions (at the start and end of the didactic course work), distance-based didactic course work, and introductory and advanced pharmacy practice experiences (IPPEs and APPEs, respectively). The first live, one-month session of the ITPD programme requires students to come to the campus in Colorado for orientation, introductory didactic coursework (Patient-Centred Communications, US Pharmacy Practice Fundamentals, and Medical Terminology), and 100 hours of IPPEs. This first month of live coursework was designed specifically for the ITPD students to introduce students to US-healthcare practice norms and laws, and allow for initial relationship building of students and faculty. Together, the initial coursework, IPPE experiences and sound relationships set expectations for the remainder of the US-based pharmacy curriculum, allowing for successful integration in the upcoming didactic and experiential courses.

Upon successful completion of this first live session, students return to their local areas, where they complete the online portion of the programme in courses alongside students in the school's NTPD programme. Coursework includes pharmacotherapy courses, drug information and evidence-based medicine courses, public health, clinical reasoning and decision-making, and a clinical capstone course. Online coursework specifically created for the ITPD students included education on US healthcare practice norms, inter-professional education, ethics, and US and state law. CU SSPPS's 20-year history of offering the NTPD programme courses has helped to identify the best methods for online learning and utilise both asynchronous and synchronous skills-application exercises, completed both independently and in teams to assess student's performance of the outcomes. Professional skills development is reinforced throughout the curriculum and documented in the ITPD longitudinal professional skills development portfolio. Skills development is designed to address students' individual and home country educational and practice needs and evaluate student performance and achievement of the
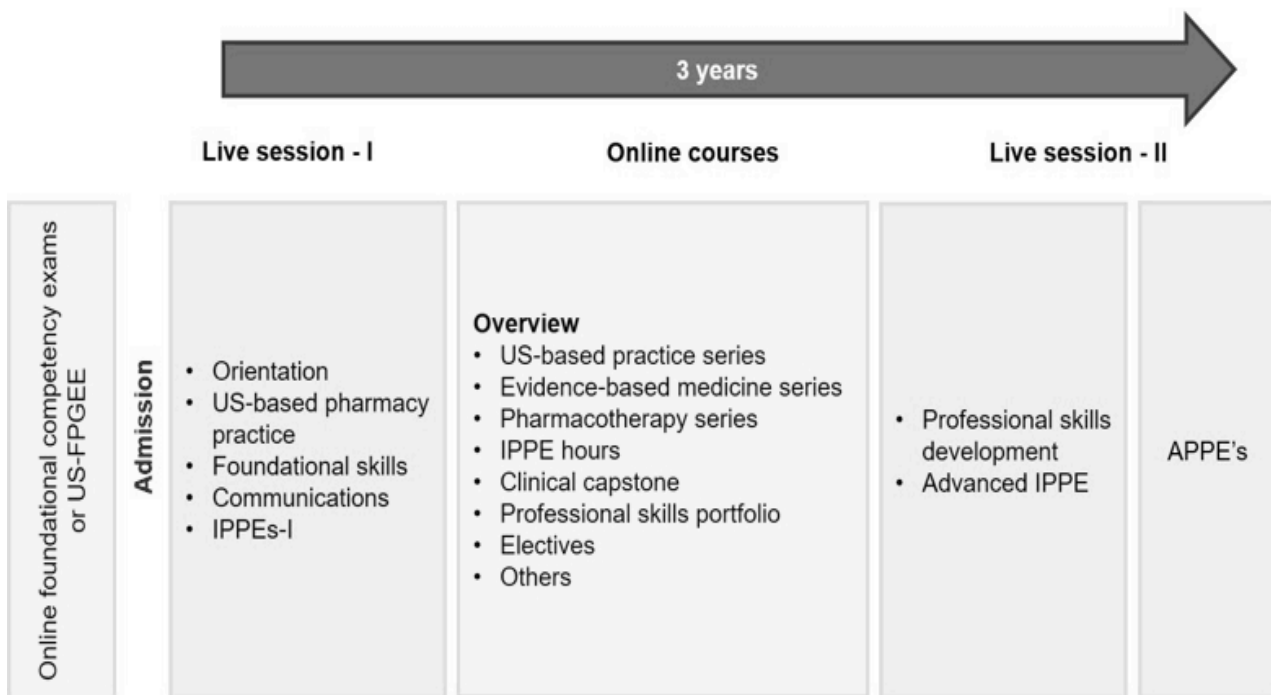
school's educational ABOs and ACPE-required IPPE skills. To assess and assure the ITPD programme's mission of meeting local healthcare needs, students provide written reflections documenting how they are applying or plan to apply their Pharm.D. education to impact healthcare in their home country. They also document achievement of student-identified competencies of the FIP Global Competency Framework, further assuring local practice needs are met. The experiential section of the portfolio includes specific activities aligned with online didactic courses, allowing these adult learners to immediately apply their new knowledge and skills in their local settings and to reflect on them and any practice differences between the US and their local sites. Students' longitudinal portfolio content is assessed through rubric-guided review of submitted activities and reflections and documents additional IPPE hours.

Upon completion of the distance-based coursework, students return to the US for the second live session. During this session, students continue their preparation to provide US-based pharmacist-delivered patient-

centred care *via* a live Professional Skills Development didactic course and experiential training. The Professional Skills Development course is designed to reinforce knowledge gained in the online didactic curriculum and assess IPPE skill abilities from the portfolio course. The experiential component of the second live session includes completion of the final 120 hours of IPPEs, as part of the Advanced IPPE course. Upon successful completion of the second live session, students are deemed to be APPE-ready and progress to 36 weeks (1440 hours) of APPEs, where they practice and are assessed on providing pharmacist-delivered patient-centred care. These APPEs are identical to those of, and alongside the school's entry-level Pharm.D. students. Please refer to Figure 1 for details of the ITPD curriculum.

The innovative and comprehensive education of the CU SSPPS ITPD programme leads to the awarding of the same Pharm.D. degree as students in the school's two other Pharm.D. pathways. It meets the calls of FIP by providing education that is based on local needs and is quality-assured through its accreditation by ACPE.

Figure 1: Details of the ITPD Curriculum

Definitions:
US-FPGEE: United States National Association of Boards of Pharmacy Foreign Pharmacy Graduate Equivalency Exam
IPPE: Introductory Pharmacy Practice Experience
APPE: :Advanced Pharmacy Practice Experience

Evaluation

Methods

Initial evaluation of the programme meeting local healthcare needs occurs subjectively through assessment of applicants' personal statements and interview responses. Admission criteria are tracked for all applicants and accepted/enrolled students. Student performance is assessed by evaluating the average cumulative Grade Point Average (cGPA) for all active and graduated students. These results are compared between the three Pharm.D. pathways.

Ongoing evaluation of the programme is done through assessment of admission criteria for predictability of student performance in didactic and experiential course work throughout the ITPD curriculum, which includes evaluation of the average cumulative GPA, directly and in comparison to students in our school's other Pharm.D. pathways. Evaluation and quality assurance of the ITPD program occurs through its review and approval by ACPE.

Results

In 2014, CU SSPPS enrolled its inaugural class of ITPD students into the programme. Applicants state they need a Pharm.D. to:
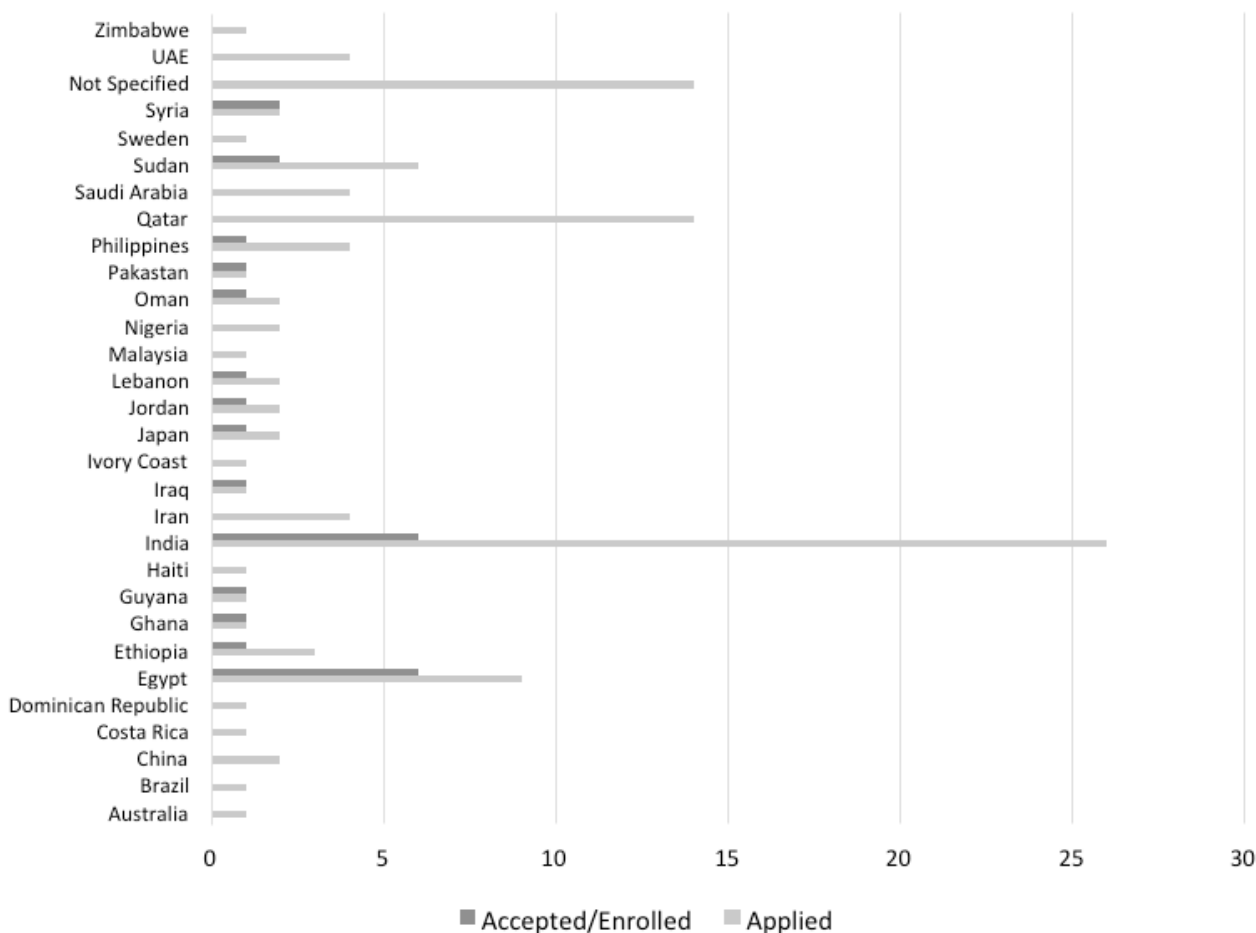
"*…develop my clinical and professional skills..*"

"*…meet the new challenges of our practice and taking our role to higher levels that would improve and develop the quality of healthcare delivered to patients and have a great impact on their lives*"

"*…fill in the therapeutic knowledge gap in my country and be able to contribute in advancing patient-centred care*".

The ITPD programme has nineteen students currently enrolled and four alumna. The number of applicants per year ranges from 12-30, demonstrating that there is an ongoing demand for clinical pharmacy education. To date, the ITPD programme has attracted applicants from 30 countries and enrolled students represent 14 different

Figure 2: Applicants/enrolled students by country

*country indicates location of original pharmacy degree

countries. Please refer to Figure 2 for a breakdown of applicants and enrolled students by country.

The majority of individuals who applied but did not enroll either did not complete the admission process or did not meet the required admission criteria.

Mean foundational competency exam scores of admitted students (2014-1018) were 79.4% (range 70-92%, n=18) on the biomedical sciences exam and 77.4% (range 70-87%, n=18) on the pharmaceutical sciences exam, both requiring a minimum score of 70%). Mean scores of English proficiency tests (TOEFL and OPI) of admitted students are summarised in Table I.

The ITPD programme has four graduates (one in 2017 and three in 2018). Mean cGPA for all students (active as of autumn 2018 and graduated 2017-108) are provided in Table II.

No significant correlation between any specific admission criterion and student performance (cGPA) has been identified based on current and graduate ITPD student data. (Table III).

To date, there have been no progression issues with the ITPD students. The ITPD pathway was granted eight-year full ACPE accreditation through the school's ACPE accreditation in 2016.

Discussion

The recent 'Nanjing Statements' of the FIP, highlight calls for the development of a global pharmacy workforce with pharmacists being "patient advocates and care providers who provide/facilitate efficient access to quality medicines with the goal of helping patients make the best use of their medicines" (FIP, 2013:p.2). International expectations of pharmacy education put forth by the Nanjing Statements include providing education that prepares students with professional and patient-centred skills, such as wellness promotion, pharmacotherapy expertise, inter-professional practice, professional communication, ethical competence and preparing students to provide this care with a social,

Table I: English proficiency scores of admitted students

(Admission threshold)	TOEFL Composite	TOEFL Reading (min. = 15)	TOEFL Listening (min. = 15)	TOEFL Speaking (min. = 19)	TOEFL Writing (min. = 20)	OPI (Min.=7 or Advanced Low)
n = 23	97.7	23.6	26.1	24.5	23.7	8.4

Table II: Student performance by Doctor of Pharmacy (Pharm.D.) pathway

	Active Student mean cGPA		2017-2018 Graduates mean cGPA	
ITPD	n = 19	3.64 (2.95-3.99)	n = 4	3.68 (3.43-3.84)
NTPD	n = 80	3.37 (2.23-4.00)	n = 66	3.35 (2.07-3.95)
ELPD	n = 596	3.40 (2.09-4.00)	n = 309	3.53 (2.65-4.00)

Table III: Admission criteria correlation with mean cumulative Grade Point Average (cGPA)

	Mean cGPA	
TOEFL Exam Score - Composite (Min = 89)	R = 0.379	$p = 0.133$
TOEFL Exam Score - Reading (Min - 15; Pref - 21)	R = 0.007	$p = 0.979$
TOEFL Exam Score - Listening (Min - 14; Pref - 21)	R = 0.173	$p = 0.507$
TOEFL Exam Score - Speaking (Min - 19; Pref - 25)	R = 0.391	$p = 0.120$
TOEFL Exam Score - Writing (Min - 20; Pref - 23)	R = 0.461	$p = 0.063$
Interview Score	R = 0.351	$p = 0.168$
Duration of past experience	R = -0.188	$p = 0.469$

cultural and ethical perspective. A number of colleagues have met this call through a variety of pharmacy education programmes (Asiri, 2011; Odegard *et al.*, 2011; Manasse, 2013; Katz *et al.*, 2014). Yet, global pharmacy education remains in transition, with the needs of each country and its patients still to be determined. Meeting the needs to provide education toward patient-centred care is complicated, with a multitude of potential barriers, such as limited resources, practice sites and opportunities, making it difficult for many to provide.

Overall, the ITPD students are performing well in the curriculum, indicating general success of CU SSPPS's admission criteria in identifying individuals who will be successful in the programme. Additionally, ITPD student and graduate performance is comparable to that of the other Pharm.D. pathways offered at CU SSPPS. Based on current evaluation of the programme, minor changes have occurred. Longitudinal portfolio-based IPPE requirements have changed, requiring students to complete an additional 40 hours in the US, rather than in their local sites, as not all students had appropriate local practice sites; IPPE reflection activities remained, but now half of them, are modelled as entrustable professional activities (EPAs). Minor changes to the English proficiency criteria (*e.g.*, TOEFL subsection scores and OPI exams) have changed based upon our assessment and results demonstrating a lack of correlation to student performance. The programme now accepts IELT (International English Language Testing System) scores for English proficiency, due to applicant demand. Ongoing evaluations may result in future adjustments.

The authors believe that CU SSPPS has successfully combined its strong pharmacy education curricular foundation with distance-based innovations, and its excellent experiential opportunities with meaningful application to the student's local practice to contribute toward meeting global pharmacy educational needs. Once enough students have completed the programme the authors will also assess the impact the programme has had on their practice.

Future Plans

The ITPD programme has received a great deal of interest from pharmacists around the world however the majority of current students and alumni are practicing in upper-middle and high income countries that recognise the important role pharmacists can play in providing patient-centred care services. The CU SSPPS would like to expand the reach of the ITPD programme to pharmacists in low or low-middle income countries that are not currently utilising pharmacists in clinical roles. In order to help reach this group of pharmacists and offset some of the financial barrier for low and low-middle income countries, CU SSPPS is now offering scholarships to qualified applicants toward the tuition of the ITPD programme. CU SSPPS is hopeful that the scholarships will help to diversify the ITPD student body, providing for a richer learning experience for all students and a greater impact worldwide.

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Appendix A

Ability-Based Outcomes (the Colorado 14) Expected of Doctor of Pharmacy Graduates

1. Collect appropriate patient data to make an assessment
   - Identify and collect information from health records that will influence optimal pharmacotherapy
   - Obtain a history from patient or caretaker (e.g. chief complaint, medical, medication management, financial, social, cultural, review of systems)
   - Conduct appropriate physical assessment relevant to pharmacy practice

2. Conduct a patient-centred assessment
   - Recognise common symptoms/complaints
   - Identify drug-related problems
   - Determine disease severity, chronic disease control and therapeutic goals
   - Prioritise identified problems in collaboration with the patient and other health care providers

3. Design, implement, evaluate and adjust a patient-centred pharmacy care plan
   - Critically evaluate treatment options using sound scientific principles (including basic and clinical sciences) and evidence
   - Consider patient specific characteristics including health literacy, cultural diversity, and behavioural psychosocial issues
   - Select appropriate drug therapy (*e.g.* drug, dose, route, frequency)
   - Select appropriate non-drug therapy
   - Develop a monitoring plan
   - Conduct patient education including verification of patient understanding of treatment plan
   - Implement interventions to improve adherence
   - Refer to other providers as appropriate

4. Process medication related orders
   - Perform calculations required to compound, dispense, and administer medications
   - Dispense medications in a manner that promotes safe, accurate and effective use
   - Prepare and compound extemporaneous preparations
   - Carry out duties in accordance with legal, ethical, social, economic and professional guidelines

5. Participate in population-based care
   - Analyse epidemiologic, pharmacoeconomic, and pharmacogenomic data, medication use review, and risk management strategies
   - Apply, or participate in the development or implementation of population-specific, evidence-based disease management programs and protocols.

6. Manage aspects of pharmacy operations using appropriate data and procedures
   - Comply with laws and regulations
   - Apply ethical and professional principles
   - Assess and improve medication distribution and control systems
   - Employ effective personnel management principles
   - Use sound principles of fiscal resource management

7. Participate in the management of a successful patient-centred practice
   - Describe a plan for the establishment, marketing, and compensation for medication therapy management and patient care services
   - Use sound principles that support efficient and cost-effective utilisation of resources (*e.g.*, human, physical, medical, informational, and technological)

8. Retrieve, evaluate, and utilise basic science, professional, and lay information in a critical and scientific manner that enhances the practice of pharmacy
   - Identify and select appropriate drug information resources
   - Demonstrate expertise in informatics by acquiring, storing, analysing, using, and disseminating medication-related data and knowledge in a manner that optimises patient care and health outcomes
   - Evaluate the safety, efficacy, and pharmacoeconomic implications of medications, medical devices, and patient care services

9. Manage medication use systems to optimise patient and population outcomes
   - Predict, identify, evaluate and report adverse drug reactions and medication errors and recommend actions to minimise drug misadventure
   - Participate in the process of conducting medication use evaluations
   - Describe, evaluate and navigate a health system's formulary process
   - Compile and evaluate literature necessary to review a class of medications and make formulary recommendations that influence pharmacy benefits
   - Participate in the development of policies related to medication use and health systems

10. Develop and participate in health promotion, disease prevention, and public health policy
    - Participate in immunisation provision programs
    - Engage in public education programs (*e.g.* health fairs, screenings, brown bags, disease prevention)
    - Collaborate with other organisations (*e.g.* governmental organisations, health organisations, business groups) to develop and promote public health policy

11. Exhibit the highest standards of professional and ethical behaviour in pharmacy practice (*e.g.* honesty, integrity, tolerance, confidentiality, care and compassion, respect for others, responsibility)

    - Develop and maintain professional relationships with patients

    - Develop and maintain professional relationships with other health care providers

    - Make and defend rational, ethical decisions within the context of professional and personal values

    - Respect and protect patient privacy

12. Maintain professional competency and professional stewardship

    - Identify and analyse emerging issues (including basic and clinical scientific advances), products, and services to improve pharmacy practice and public health

    - Self-assess learning needs and design, implement, and evaluate strategies to promote intellectual growth and continued professional competence

    - Advance oneself and the profession through leadership, service activities, and participation in professional organisations

13. Apply basic and clinical scientific principles and methods to identify and solve problems

    - Formulate a relevant and significant question or hypothesis

    - Develop a strategy or method to answer the question or hypothesis

    - Analyse available information to answer the question or reformulate hypothesis

    - Provide evidence based solutions that most effectively answers the question or hypothesis

14. Communicate effectively using multiple strategies to improve health outcomes

    - Communicate and collaborate with patients, caregivers, and health care professionals to engender an intraprofessional and interprofessional approach to patient-centred and population-centred care

    - Provide accurate and succinct verbal or written information that is appropriate for the target audience (*e.g.* patient, caregiver or other health care professional).

    - Identify factors (*e.g.* low health literacy, cultural) that influence effective communication and modify communication strategies to optimise health care interactions

    - Display verbal and non-verbal mannerisms that promote empathetic, respectful and compassionate communication

    - Appropriately document patient-specific information in health records

    - Explain health-system related issues (*e.g.* pharmacy benefits, formularies) to relevant stake-holders (*e.g.* patients, caregivers and health care providers)