

Characterizing the Perceived Need for Advanced Clinical Pharmacy Training in British Columbia

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ABSTRACT

Background: Currently in Canada there are limited opportunities for advanced clinical pharmacy training after a year 1 residency. Advanced training programs currently in existence are year 2 residencies, clinical Master's degrees, and Fellowships.

Objectives: To characterize the perceived need for advanced clinical pharmacy training in British Columbia and to determine the desired educational competencies to be gained through advanced training.

Methods: Current pharmacy residents (academic year 2021/22) and residency graduates of the past 5 years (2017–2021), together referred to as early career pharmacists or ECPs, were surveyed. Provincial health authority pharmacy leaders who hire clinical pharmacists were also surveyed and invited to participate in key informant interviews.

Results: Eighty-four ECPs and 22 pharmacy leaders participated in the surveys (estimated response rates 26% and 35%, respectively). Eleven (13%) of the ECPs had already completed advanced clinical training, and an additional 24 (29%) planned to pursue such training within 5 years. Sixteen (73%) of the pharmacy leaders had experienced difficulties in filling advanced practice positions over the previous 3 years due to a lack of qualified applicants, and 21 (95%) believed that more advanced training positions should be offered. The majority of ECPs interested in advanced training (39/60, 65%) chose year 2 residency as their preferred program, and 20 (91%) of the pharmacy leaders agreed that British Columbia should offer year 2 residencies. Both ECPs and leaders rated clinical skills and knowledge as the most important educational competencies.

Conclusions: Pharmacy leaders expressed a need for more pharmacists with advanced clinical pharmacy training, and many ECPs were interested in pursuing such advanced training. Most respondents preferred the year 2 residency, with the most common goal being to improve clinical competencies.

Keywords: advanced pharmacy training, needs assessment, year 2 residency, clinical Master's degree, Fellowship, educational competencies

RÉSUMÉ

Contexte : Actuellement au Canada, les possibilités de formation avancée en pharmacie clinique après une première année de résidence sont limitées. Les programmes de formation avancée qui existent actuellement sont les résidences de deuxième année, les maîtrises cliniques et les programmes de bourses.

Objectifs : Caractériser le besoin perçu de formation avancée en pharmacie clinique en Colombie-Britannique et déterminer les compétences pédagogiques souhaitées qui doivent être acquises grâce à la formation avancée.

Méthodologie : Les résidents actuels en pharmacie (année universitaire 2021-2022) et les diplômés en résidence des 5 dernières années (2017-2021), appelés ensemble « pharmaciens en début de carrière » (« PDC »), ont été interrogés. Les responsables de pharmacie des autorités sanitaires provinciales qui embauchent des pharmaciens cliniciens ont également été interrogés et invités à participer à des entrevues à titre d'informateurs clés.

Résultats : Quatre-vingt-quatre PDC et 22 responsables de pharmacie ont participé aux sondages (taux de réponse estimés à 26 % et 35 %, respectivement). Onze PDC (13 %) avaient déjà suivi une formation clinique avancée et 24 autres (29 %) prévoyaient de le faire dans les cinq ans. Seize responsables de pharmacie (73 %) ont éprouvé des difficultés à pourvoir des postes de pratique avancée au cours des trois années précédentes en raison d'un manque de candidats qualifiés, et 21 (95 %) d'entre eux étaient d'avis que des postes de formation plus avancée devraient être offerts. La majorité des PDC intéressés par une formation avancée (39/60, 65 %) ont choisi la résidence de deuxième année comme programme de premier choix, et 20 responsables de pharmacie (91 %) convenaient que la Colombie-Britannique devrait offrir des résidences de deuxième année. Les PDC et les responsables ont évalué les compétences et les connaissances cliniques comme étant les compétences théoriques les plus importantes.

Conclusions : Les chefs de file des pharmacies ont exprimé le besoin de disposer d'un plus grand nombre de pharmaciens ayant une formation avancée en pharmacie clinique, et de nombreux PDC souhaitaient poursuivre une telle formation. La plupart des répondants préféreraient la résidence de deuxième année, l'objectif le plus couramment cité étant l'amélioration des compétences cliniques.

Mots-clés : formation avancée en pharmacie, évaluation des besoins, résidence de deuxième année, maîtrise clinique, bourse, compétences théoriques

INTRODUCTION

With the introduction of entry-level PharmD programs in Canada over the past decade, traditional postgraduate PharmD programs have been mostly eliminated across the country,¹ leaving a gap in advanced clinical training opportunities after the completion of a year 1 (Y1) residency. Currently, the few advanced clinical pharmacy training programs in Canada consist of a limited number of year 2 (Y2) residencies (13 seats across 9 programs for the 2023/24 academic year),² Fellowship programs, and 2 Ontario-based Master's programs for advanced clinical pharmacy practice. These 2 clinical Master's programs are mostly intended for graduates of a Y1 residency, in contrast to the Master's programs in Quebec, which are considered equivalent to a Y1 residency. The number of seats for Fellowship and advanced clinical Master's programs are not publicly available, as they depend on the availability of supervisors at any particular time.

Pharmacists with advanced training have a unique role to fill in the health care system. Advanced practice has been associated with high-quality patient care (which may include prescribing and physical examination), teaching, research, and leadership.³ Advanced practitioners may also be involved in consulting for health care providers inside and outside their facility, as well as planning and assessing treatment policies.⁴ Given that pharmacists with advanced training are essential in the health care system, it is important to assess pharmacists' training needs in the era of entry-level PharmD programs.

In studies conducted in the United States over the past decade, pharmacy residents have reported various motivators for pursuing postgraduate training, including gaining knowledge, experience, and confidence^{5,6}; gaining research skills⁶; preparing for the evolving role of pharmacists⁵; and meeting job requirements.⁷ Studies of pharmacy students in Canada and the United States over the same period have found similar results. Gaining knowledge and experience^{8,9} and the belief that residency would help the students achieve their career goals¹⁰ were common motivators. Conversely, financial constraints,^{5-9,11} jobs available without further training,⁵⁻⁸ family obligations,¹¹ and concerns about succeeding in a challenging program^{8,11} were commonly cited as barriers or demotivating factors for residents and students. There is a lack of Canadian research related to post-Y1 advanced clinical pharmacy training, particularly since the shift to entry-level PharmD programs. Such information may inform the further development of advanced clinical pharmacy training programs.

The primary objective of this study was to characterize the perceived need for advanced pharmacy training in British Columbia, including the demand for such training and the desired types of training, among recent graduates of Y1 pharmacy residency programs and pharmacy leaders. The

secondary objective was to determine the desired educational competencies arising from advanced pharmacy training and perceived barriers to pursuing advanced training.

METHODS

Study Design and Participants

This mixed-methods study, using surveys and semistructured key informant interviews, involved 2 groups of participants. The first group consisted of early career pharmacists (ECPs), who were defined as current pharmacy residents (i.e., in the 2021/22 academic year) or pharmacists who had graduated from a hospital residency or similar Quebec Master's program within the previous 5 years (2017 to 2021 inclusive) and were working within one of British Columbia's health authorities. The cut-off of 5 years was selected as it was felt that this group was most likely to be interested in pursuing additional clinical pharmacy training. The second study group consisted of pharmacy leaders working within British Columbia health authorities, whose responsibilities included the hiring of clinical pharmacists. Pharmacy leaders were included in the study to offer the perspective of stakeholders who would be evaluating the qualifications of pharmacist applicants when hiring for advanced positions in their workplace.

ECPs and pharmacy leaders who declined to provide informed consent or were unable to do so, for whatever reason, were excluded from participation.

Development of Surveys for ECPs and Pharmacy Leaders

A literature search was conducted, and the research objectives and results of the studies found were used to inform the development of the survey questions.⁵⁻¹¹ Members of the study team created an initial draft of 2 surveys, 1 for ECPs and 1 for pharmacy leaders. Pilot testing of the surveys was conducted by 4 ECPs and 2 pharmacy leaders, respectively, to assess the face validity and clarity of the survey questions, and the surveys were revised according to their feedback. The survey for ECPs (Appendix 1) included questions about their awareness of and level of interest in advanced pharmacy training programs, the program types desired, the educational competencies desired, and the motivators and barriers for pursuing advanced training. The survey for pharmacy leaders (Appendix 2) asked for their perspectives on the demand for pharmacists with advanced training, appropriate educational competencies and program goals, and types of training programs that should exist in British Columbia. Both surveys included descriptions of the various types of training programs, as well as questions about participants' work settings and prior training. Most questions were multiple choice, with some opportunities for free-text responses. Both surveys were hosted on the online platform Qualtrics (version February 2022).

Development of Interview Questions for Pharmacy Leaders

Before the surveys were launched, the study team used the topics from the pharmacy leader questionnaire to create questions for the 30-minute semistructured interviews involving pharmacy leaders. These interviews were intended to allow for more detailed exploration of perspectives about the current job market for pharmacists with advanced training. The interviews were conducted by one of the investigators (L.C.) via Zoom video conferencing software (version 5.10.0).

Participant Recruitment

An invitation to participate in the study was sent by email to residency coordinators and health authority pharmacy directors in British Columbia, who were asked to forward the invitation to their residents, staff pharmacists, and leadership teams. The contact information for residency coordinators and health authority directors is readily available, and we received permission from the research ethics board to contact them with this request. Because the surveys were anonymous, multiple leaders from a single site were allowed to participate. Pharmacy leaders were asked at the end of the survey to indicate their interest in participating in an interview.

The surveys were deployed in February 2022, and participants were given 1 month to complete the surveys, with a reminder email sent 1 week before the deadline. Signed informed consent was obtained for participation in the interviews but was waived for the surveys, as consent was implied by survey completion. The study was approved by the University of British Columbia Behavioural Research Ethics Board.

Data Analysis

Descriptive statistics were calculated using Microsoft Excel spreadsheet software (version 16.59). Audio recordings of the interviews were transcribed verbatim for qualitative thematic analysis by a study team member. The transcriptions were verified by a second study team member (L.C.), then coded independently by these 2 team members using the software program NVivo (version 12.7.0; QSR International [now Lumivero]). Field notes were also reviewed. Coding differences were discussed until a consensus was reached, and a third study team member (K.D. or M.L.) was to be consulted if the 2 original members could not reach an agreement. Codes were then grouped to create themes, which were discussed among the entire study team.

RESULTS

Participant Characteristics

Twenty-two pharmacy leaders and 84 early career pharmacists participated in the surveys (Table 1). The estimated

response rates were 26% and 35%, respectively. We could not determine the number of people who received the study invitation, so the estimated response rates are based on estimates of the numbers of pharmacy leaders and ECPs in British Columbia. Most participants worked in the Lower Mainland region (which includes the Greater Vancouver area), but there was also representation from other parts of the province.

Among the ECPs, 75% (63/84) had completed a Y1 residency, and 13% (11/84) had completed some form of advanced clinical pharmacy training, specifically a post-professional PharmD for 9 individuals and a Y2 residency for 2 individuals.

Among the pharmacy leaders, most (86%) were from the Lower Mainland. In terms of practice setting, 59% were responsible for community hospitals and 50% for tertiary/academic hospitals, with 32% overseeing ambulatory care settings. A total of 6 leaders participated in 5 interviews; one of the interviews involved 2 participants from the same site, who chose to be interviewed together. Four of these participants worked in the Lower Mainland, and 2 participants worked in other regions of the province.

Demand for Advanced Clinical Pharmacy Training

In early 2022, when this study was conducted, there were 4 Y2 residency positions available each year across 3 different programs in British Columbia.¹² Of the ECPs who participated in our study, 13% (11/84) had already completed an advanced training program, 29% (24/84) had plans to pursue advanced training within the next 5 years, 43% (36/84) were undecided, and 15% (13/84) had no plans. Interest was similar between current Y1 residents and recent residency graduates, with 38% of residents (8/21) and 25% of recent graduates (16/63) planning for advanced training within 5 years.

Pharmacy leaders expressed demand for pharmacists with advanced clinical training to fill Clinical Pharmacy Specialist (CPS) positions. Most leaders (77%, 17/22) indicated that over the previous 3 years, they had found it difficult to fill vacant CPS positions, for which pharmacists with advanced clinical training are required.¹³ A similar proportion (73%, 16/22) reported having vacant CPS positions at some time in the past 3 years and needing to withdraw the position, downgrade the position, or leave it vacant for 3 months or longer, due to a lack of qualified applicants. More than half of the pharmacy leaders (64%, 14/22) were very or extremely concerned about the supply of pharmacists with advanced training in British Columbia, and 95% (21/22) believed that British Columbia needed more pharmacists with advanced training than were being trained each year. Just over half of the leaders (55%, 12/22) believed that British Columbia should produce 6 to 10 pharmacists with advanced training per year, and 32% (7/22) wanted 11 to 15 such graduates per year.

TABLE 1. Participant Characteristics

Characteristic	Study Group; No. (%) of Respondents ^a	
	Pharmacy Leaders (<i>n</i> = 22)	ECPs (<i>n</i> = 84)
Estimated response rate	22/86 (26)	84/240 (35)
Location and health authority		
Lower Mainland: Fraser Health and Vancouver Coastal Health	19 (86)	64 (76)
Vancouver Island: Island Health	0	5 (6)
Interior BC: Interior Health	1 (5)	11 (13)
Northern BC: Northern Health	2 (9)	4 (5)
Current work setting ^b		
In year 1 residency	Not applicable	21 (25)
Tertiary care or academic hospital	11 (50)	46 (55)
Community hospital	13 (59)	8 (10)
Ambulatory care	7 (32)	7 (8)
Current/previous Clinical Pharmacy Specialist	Not asked	11 (13)
Pharmacy education or training completed ^c		
Bachelor of Pharmacy	21 (95)	44 (52)
Entry-to-Practice PharmD	0	39 (46)
Post-professional PharmD	14 (64)	9 (11)
Year 1 residency	19 (86)	63 (75)
Year 2 residency	0	2 (2)
Clinical Master of Pharmacy	0	0
Fellowship	1 (5)	0
Board certification	4 (18)	0
Age (years)	Not asked	
≤ 25		11 (13)
26–30		52 (62)
≥ 31		17 (20)
Declined to answer		4 (5)

ECP = early career pharmacists.

^aExcept where indicated otherwise.

^bSum of percentages is more than 100 because some respondents had multiple work settings.

^cSum of percentages is more than 100 because respondents were asked to list all types of training completed.

Desired Types of Training Programs

All of the ECPs who responded to our survey were aware of Y2 residencies, and 96% (81/84) were aware of post-professional PharmD programs, whereas 45% (38/84) and 49% (41/84) were aware of clinical Master's and Fellowship programs, respectively.

When ranking different advanced pharmacy training programs by interest and desired educational outcomes, ECPs who were interested in or undecided about pursuing their first advanced training program (*n* = 60) were most interested in Y2 residencies, with 65% (39/60) selecting it as their first choice. The next most desired programs were specific clinical certifications (e.g., Board of Pharmacy Specialties [BPS] certification), clinical Master of Pharmacy programs, pharmacy Fellowships, post-professional PharmD programs, and others (e.g., specific continuing education opportunities, Master of Health Administration, Master of Business Administration). Eighty-two percent

(27/33) of entry-to-practice PharmD graduates and 46% (12/26) of Bachelor of Pharmacy graduates selected the Y2 residency as their first choice. Many Bachelor of Pharmacy graduates selected the post-professional PharmD (19%, 5/26) or BPS certification (31%, 8/26) as their first choice.

Among pharmacy leaders, 68% (15/22) strongly agreed that the Y2 residency should be offered in British Columbia, whereas 23% (5/22) agreed with this statement, and only 9% (2/22) disagreed. The pharmacy leaders were also interested in clinical Master's programs and Fellowships, with 73% (16/22) and 77% (17/22), respectively, agreeing that these programs should be offered in British Columbia. Almost half of the leaders (41%, 9/22) agreed that advanced practice pharmacists should pursue BPS certification, and 36% (8/22) agreed that there should be a Canadian equivalent to BPS certification. Three respondents commented that BPS certification does not include the practical experience or mentorship offered by other training programs.

Specialized vs General Training

Of ECPs who were interested in or undecided about pursuing their first or second advanced training program, 62% (40/65) were most interested in specialized training in a specific clinical area or setting; an additional 26% (17/65) were most interested in general training, and 12% (8/65) had no preference. Among pharmacy leaders, 73% (16/22) supported the expansion of both specialized and general training programs in British Columbia, 18% (4/22) supported only the expansion of general programs, 1 person supported only the expansion of specialized programs, and 1 person believed that neither type of program needed further expansion in British Columbia. Three leaders commented that general training would confer generalizable skills and allow graduates to work in various practice settings, which would increase flexibility for hiring.

Desired Specialty Areas for Advanced Training

ECPs who were interested in or undecided about pursuing advanced training were asked to select up to 5 specialty areas in which they would be interested in training, and pharmacy leaders were asked to choose specialty areas according to the

current and future needs of their departments and patients. Internal medicine and critical care were highly desired among both groups (Figure 1), and ECPs also favoured infectious diseases/antimicrobial stewardship and cardiology.

Desired Educational Competencies and Motivators

Pharmacy leaders and ECPs somewhat agreed or strongly agreed that various clinical skills and knowledge were desired educational competencies and motivators for pursuing advanced training. Specifically, these skills included increasing or improving pharmacotherapeutic knowledge, skills in patient assessment, critical appraisal and evidence-based decision-making, and management of complex patients (Figure 2). Acquiring specific job qualifications was also a major motivator for ECPs. Leaders also valued research skills, teaching skills, navigating team dynamics within the health care team, and developing as a leader in pharmacy practice.

Barriers

“Financial considerations” was the most agreed-upon barrier to pursuing advanced clinical pharmacy training

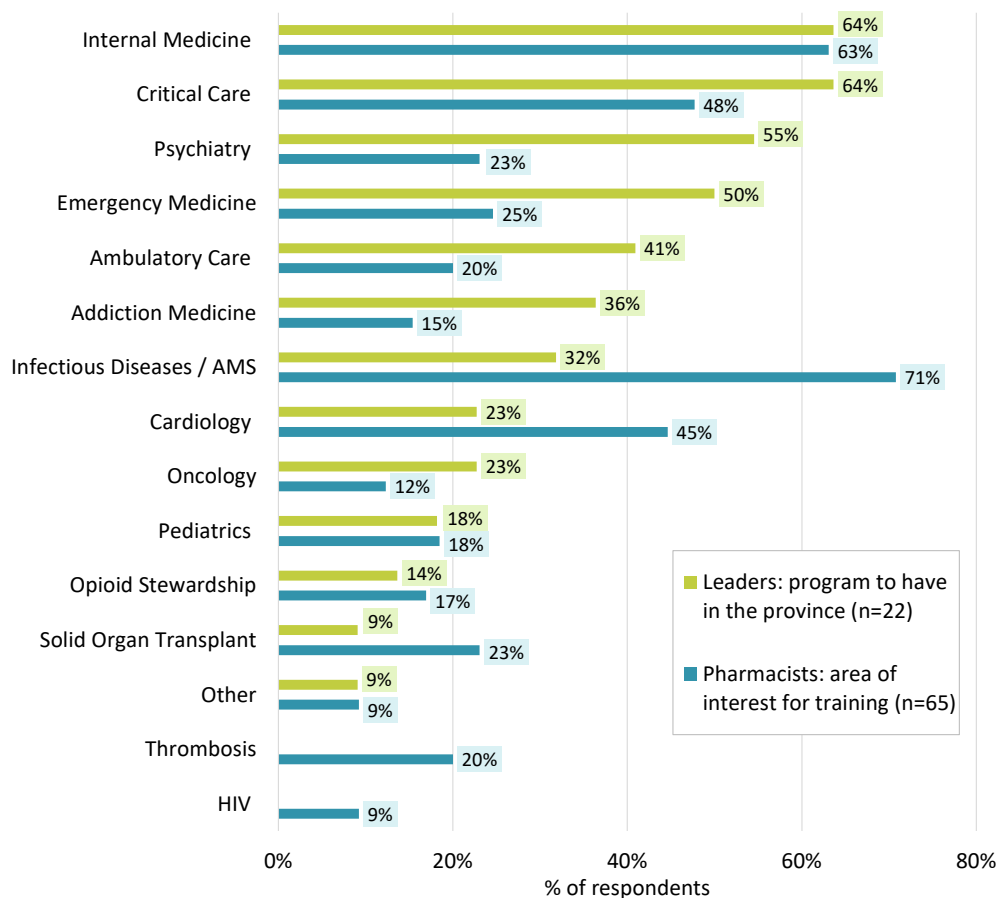


FIGURE 1. Specialty areas desired for advanced training, based on top 5 specialties selected by each participant. AMS = antimicrobial stewardship, HIV = human immunodeficiency virus. “Other” choices by early career pharmacists were nephrology, palliative care, informatics, and surgery. “Other” choices by leaders were neonatal intensive care/perinatal care, combination of mental health/addictions/opioid stewardship.

among ECPs (81%, 68/84). In addition, 74% of ECPs (62/84) agreed that the time taken from other life priorities was a barrier. Seventy-six percent (16/21) of the ECPs who lived outside of the Lower Mainland agreed that a specific program of interest not being offered locally was a barrier, compared with 43% (27/63) of pharmacists living within the Lower Mainland. Of note, all currently available advanced training programs in British Columbia operate only within the Lower Mainland.

Key Informant Interviews

Through thematic analysis, 68 codes were created, and 8 themes were derived. These themes and representative quotes are presented in Table 2. The third reviewer did not need to be consulted in the development of codes and themes, as there was full agreement in the initial coding.

All 6 interview participants expressed that pharmacists with advanced training have qualities and responsibilities that make them valuable members of the health care team. Although 1 participant had not experienced any difficulty in hiring advanced practice pharmacists in recent years, all participants recognized that there is now an increased demand for and a lack of supply of pharmacists with advanced training in British Columbia. Three leaders expressed confusion about the various training programs currently available in Canada, and all 6 cited the variable quality and outcomes produced by these programs as a consideration when hiring for advanced practice positions. Four participants expressed an interest in exploring different training models, and 5 preferred general training programs over specialized programs because they provide transferable skills and flexibility for hiring purposes. Two leaders suggested that specialized programs could be

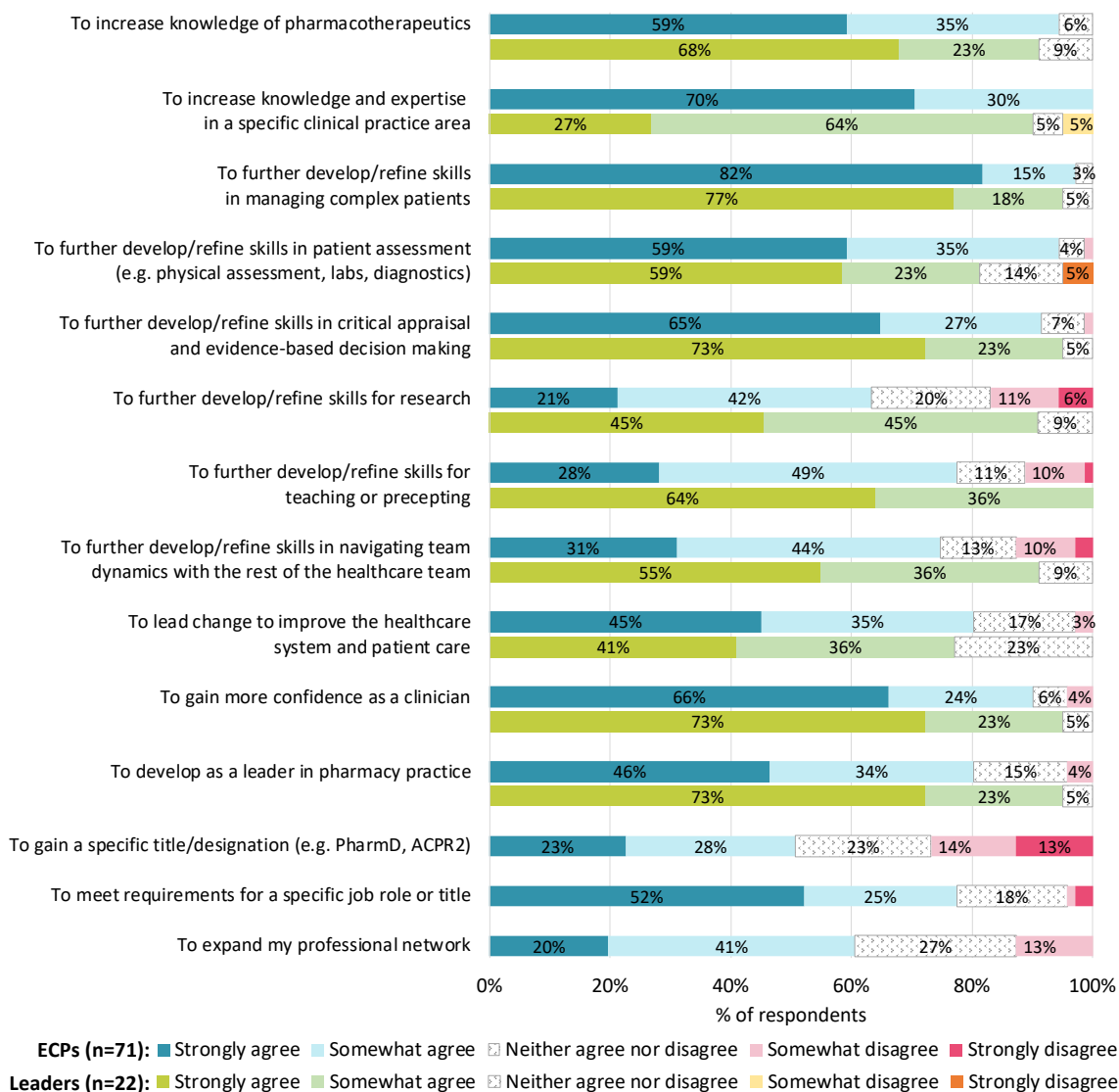


FIGURE 2. Desired educational competencies and motivators for pursuing advanced pharmacy training. ACPR2 = Accredited Canadian Pharmacy Resident year 2, ECPs = early career pharmacists who had completed any advanced clinical pharmacy training or were interested in or undecided about pursuing advanced training within the next 5 years.

TABLE 2. Thematic Analysis of Key Informant Interviews

Theme	Representative Quotations
Advanced practice pharmacists have various qualities and roles that make them highly valuable	"... our CPS's tend to be really great ambassadors for the profession in a variety of ways, not just clinically but also in a leadership manner, research, and teaching." (Participant 6)
Lack of supply and increased demand are major reasons for difficulty hiring qualified individuals for advanced practice positions	"I think with the sunseting of the post-grad UBC PharmD from a few years ago, it's been a challenge to hire CPS's into these [advanced practice] positions, just because there is a lack of supply." (Participant 3)
Many different training programs exist, with variable quality and outcomes	"... what we've also noticed is the quality of the graduates [from the remaining bridging PharmD programs] have varied quite a bit compared to the post-grad PharmD program." (Participant 3)
There is interest in exploring different types of training programs	"... there's an opportunity to support a lot of research in the Lower Mainland if we had more of those [clinician scientist] positions, so I think one of the first steps would be having a research fellowship program." (Participant 6)
The role and value of board certification is unclear	"... there's really no benefit for me doing [board certification] because it's really the same thing, you're just reviewing things ... I don't think it adds anything at all." (Participant 1)
General programs tend to be preferred, but specialized programs have a role as well	"I would like to see a general year 2 residency, and then fellowships in BC. Then you could do your fellowship in nephrology, you can do your fellowship in critical care, but you have that general advanced base under your belt." (Participant 5)
There are many important educational competencies that advanced training programs should include	"I think the three domains of clinical practice, precepting, and research [are] probably what we should be [homing] in on when we are developing the training programs." (Participant 3)
Pharmacy leaders are interested in having advanced training programs at their sites	"... I want our health authority to formally partner with the Lower Mainland [Pharmacy Services] and springboard off their existing programs to develop— you know, there's no reason why [year 2 residency] can't be provincial." (Participant 4)

CPS = Clinical Pharmacy Specialist, UBC = University of British Columbia.

pursued after completion of a general program. All participants agreed that advanced patient care skills and research were key educational competencies for advanced training programs, whereas they did not consistently agree upon the value of teaching and leadership skills in such programs. Two leaders commented that although it is important to develop leadership skills, they should be secondary to clinical competencies. One mentioned that pharmacists who wish to work as administrators or managers could also consider specific leadership training programs.

DISCUSSION

The results of this study demonstrate that pharmacy leaders in British Columbia were concerned about a lack of pharmacists with advanced training. Many ECPs were interested in pursuing advanced training, which suggests that the lack of supply is not due to a lack of interest among pharmacists. Year 2 residency programs were viewed favourably by leaders and pharmacists alike, but there were differences in the preference for general versus specialized training, and the specialty areas that were prioritized. Skills and knowledge in research, teaching, leadership, and, in particular, clinical practice, were seen as important educational competencies and motivators for pursuing advanced clinical training.

As described in the interviews with pharmacy leaders and reflected in the desired educational competencies,

graduates of advanced clinical pharmacy training can make significant contributions to patient care, as well as to pharmacy departments and health care systems. Pharmacy leaders most often suggested increasing the number of advanced training graduates in British Columbia to 6–10 per year, but as the demands on health care systems continue to increase, the need for pharmacists with advanced clinical pharmacy training will likely increase further. Canada will need to develop strategies to accommodate the enrolment of more learners in advanced clinical training.

Compared with pharmacy leaders, ECPs were most interested in Y2 residencies and had a lower interest in clinical Master's and Fellowship programs. Clinical Master's and Fellowship programs do not currently exist in British Columbia, and although the various program models were explained in the survey itself, the lack of awareness of these programs among ECPs may have affected these results. It is also possible that Fellowships would be more relevant for pharmacists who have already done some advanced training, or that Y2 residencies were more favoured because of their shorter duration (1 year vs 2 years) and lesser financial impact (receiving a stipend vs paying tuition), given that pharmacists considered both time and money to be important barriers to pursuing advanced training.

The barriers and motivators for pursuing advanced training were similar to those reported in studies of pharmacy residents in the United States⁵⁻⁷ and pharmacy

students in Quebec⁸ and the United States.⁹⁻¹¹ However, ECPs placed a slightly lower value on competencies relating to research, teaching, and leadership than did pharmacy leaders. It may be that ECPs are more focused on achieving the advanced clinical practice outcomes and may not be familiar with the full extent of an advanced practitioner's nonclinical duties. It would be interesting to further explore the reasons for this difference, as it may relate to the professional identities of ECPs and their understanding of the expectations of advanced practitioners.

The reasons for ECPs' preference for specialized over general advanced training should also be further explored and considered during the development of advanced training programs. The direction of Y2 residency training in Canada has previously been debated,¹⁴ but the current Y2 residency accreditation standards focus on advanced pharmacy practice in a specific area of practice rather than general practice.¹⁵ Many of the high-priority specialty areas selected by pharmacy leaders in this study, such as psychiatry, addiction medicine, emergency medicine, and ambulatory care, reflect areas of expansion and current mandates set by the government.¹⁶ Advanced pharmacy training programs will need to consider balancing current health care priorities and pharmacists' interests, while offering enough flexibility and transferable skills to allow pharmacists to work in other areas if needed.

This study may have been limited by volunteer bias, in that respondents may have been more interested in advanced training than were nonrespondents. In addition, the response rates were low, and could only be estimated. The majority of pharmacy leaders who participated had some form of advanced training beyond Y1 residency, and therefore may have been more inclined to support advanced pharmacy training. The 2 leaders who were interviewed together could have influenced each other's responses, but we believe that their combined input was still valuable. Pharmacy practice and job requirements vary across Canada, so the results may not be directly applicable to other provinces. Despite these differences, the need for advanced pharmacy practitioners across Canada will continue to grow, so further study about the reasons for ECPs' preference for specialized or general training and their understanding of the nonclinical roles of advanced practitioners is warranted.

CONCLUSION

In this study, pharmacy leaders reported a need for more pharmacists with advanced clinical training after a Y1 residency, and many ECPs described an interest in pursuing such training. Most leaders and ECPs favoured a Y2 residency as the method for advanced training, although there was limited awareness and understanding of the other types of advanced training programs. Study participants

agreed that developing competencies in clinical practice, research, teaching, and leadership were important outcomes of advanced training. These findings may help inform the development of additional advanced clinical training opportunities in British Columbia and in the rest of Canada.

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APPENDIX 1 (part 1 of 3): Survey for early career pharmacists.

Section 1

Q1. Are you currently enrolled in a Year 1 (PGY1) residency program?

- No Yes

Q2. Did you complete a Year 1 (PGY1) residency in the last 5 years (graduated from 2017 to 2021 inclusive)?

- No Yes

Display if Q2 = Yes

Q3. Have you completed, or are you currently enrolled in an advanced clinical pharmacy training or certification program beyond Year 1 (PGY1) residency? For example: Post-Professional Doctor of Pharmacy (not Entry-to-Practice), Year 2 advanced pharmacy residency, fellowship, board certification

- No Yes

Display if Q3 = Yes

Q4. Which program(s) did you complete/are currently enrolled in?

- Year 2 (PGY2) Advanced Pharmacy Residency
- Post-professional PharmD program (eg. UBC Flex PharmD, U of A PharmD for Practicing Pharmacists, U of T PharmD for Pharmacists)
- Master of Pharmacy (with clinical component, eg at UWaterloo or U of T)
- Pharmacy Fellowship program
- Board of Pharmacy Specialties certification
- Other (please specify) _____

Display if Q3 = Yes

Q5. Did the program(s) meet your expectations? Or is the program meeting your expectations so far?

- No Partially Yes

Display if Q5 = No or Partially

Q6. What else did you want/need from the program? _____

Display if Q3 = Yes

Q7. Are you planning to pursue another advanced clinical pharmacy training program or certification in the future?

- No Undecided
 Yes, within the next 2 years
 Yes, within the next 3 to 5 years
 Yes, after 5 years

Display if Q3 = Yes

Q8. Are you planning to pursue a formal non-clinical education program? Eg. programs focused on leadership, administration, research, public health, education, etc

- No Undecided Yes

Display if Q8 = Yes OR Undecided

Q9. What type of non-clinical training are you interested in? Eg. a specific program you're interested in, or a general field of study. _____

Display if Q1 = Yes or Q3 = No

Q10. Are you planning to pursue an advanced clinical pharmacy training program or certification in the future?

- No Undecided
 Yes, within the next 2 years
 Yes, within the next 3 to 5 years
 Yes, after 5 years

Display if Q1 = Yes or Q3 = No

Q11. Are you planning to pursue a formal non-clinical education program? Eg. programs focused on leadership, administration, research, public health, education, etc

- No Undecided Yes

Display if Q11 = Yes or Undecided

Q12. What type of non-clinical training are you interested in? Eg. a specific program you're interested in, or a general field of study. _____

Display section if Q3 = Yes, or Q10 ≠ No

Section 2

Q13. Which of the following would be (or were) reasons &/or motivating factors for you to pursue advanced clinical pharmacy training beyond Year 1 residency?

Select Strongly Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, or Strongly Agree for each of the following statements:

To increase my knowledge of pharmacotherapeutics
To increase my knowledge and expertise in a specific clinical practice area
To further develop or refine my skills in managing complex patients
To further develop or refine my skills in patient assessment (eg. physical assessment, labs, diagnostics)
To further develop or refine my skills in critical appraisal and evidence-based decision making
To further develop or refine my skills as a researcher
To further develop or refine my skills as an educator or preceptor
To further develop or refine my skills in interacting with the rest of the healthcare team
To allow me to lead change to improve the healthcare system/patients care
To gain more confidence as a clinician

APPENDIX 1 (part 2 of 3): Survey for early career pharmacists.

To help me develop into a leader in pharmacy practice
To gain a specific title/designation (eg. PharmD, ACPR, APY2)
To meet requirements for a specific job role (eg. Clinical Pharmacy Specialist, supervisor, coordinator, researcher, faculty positions)
To expand my professional network

Q14. Please list any other reasons &/or motivating factors for you. _____

Section 3

Q15. Which of the following barriers or issues are/were you concerned about when considering whether to apply for advanced clinical training programs beyond Year 1 residency?

If you have already applied for, enrolled in, or completed advanced training, please answer based on how you felt prior to applying for the program. Select Strongly Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, or Strongly Agree for each of the following statements:

The specific training program that I am most interested in is not offered locally
There are too few positions/seats available in my desired program (accessing/getting into the program is a challenge)
I am unsure if existing training programs will improve my job opportunities
Financial considerations (eg. reduced salary or cost of tuition/registration fee)
I would have to quit my current job or turn down a job offer in order to enter the program
I've completed too many years of training already
Further training would take time away from other priorities in my life

Q16. Please list any other barriers or issues for you.

Section 4

Q17. Prior to completing this survey, were you aware of any of the following advanced pharmacy training programs?

Select [No – have not heard about this] or [Yes – have heard about this] for each program.

Year 2 (PGY2) Advanced Pharmacy Residency programs
--

Post-professional Doctor of Pharmacy (not including Entry-to-Practice, but including UBC Flex PharmD, U of A PharmD for Practicing Pharmacists, U of T PharmD for Pharmacists)
Master of Pharmacy (with clinical component, such as programs at UWaterloo, U of T)
Pharmacy fellowship programs
Specific clinical certifications (eg. Board of Pharmacy Specialties certification)

Display section if Q7 ≠ No, or Q10 ≠ No

Section 5

Q18. When you consider pursuing your next training program, which type of training or certification program most fits your interests or desired educational outcomes? Rank the following options from most interested to least interested.

If a program does not apply to you, please rank it last.

- ___ Year 2 (PGY2) Advanced Pharmacy Residency
- ___ Post-professional Doctor of Pharmacy, not including Entry-to-Practice
- ___ Master of Pharmacy (with clinical component)
- ___ Pharmacy Fellowship Programs
- ___ Specific clinical certifications: eg. Board of Pharmacy Specialties certification
- ___ Other (please specify)

Display if Q3 = Yes, or Q10 ≠ No

Descriptions of each program type (not presented in appendix due space limitations)

- Year 2 Advanced Pharmacy Residency
- Post-professional Doctor of Pharmacy
- Master of Pharmacy (with clinical component)
- Pharmacy Fellowship Programs
- Specific clinical certifications: eg. Board of Pharmacy Specialties certification

Q19. Have you ever enrolled in, applied for, or currently intend to apply for any of the following advanced clinical pharmacy training programs? Select [No, never enrolled or applied, and do not intend to apply], [Maybe, unsure if intend to apply], or [Yes, have enrolled in, applied, or intend to apply].

Year 2 (PGY2) Advanced Pharmacy Residency
Post-professional Doctor of Pharmacy (not including Entry-to-Practice)
Master of Pharmacy (with clinical component)
Pharmacy Fellowship Programs

APPENDIX 1 (part 3 of 3): Survey for early career pharmacists.

Specific clinical certifications: eg. Board of Pharmacy Specialties certification

Other: please specify _____

Display section if Q3 = Yes, or Q10 ≠ No

Section 6

Q20. When you consider pursuing further training in the future, are you most interested in a general training program or a specialized training program focused on one specific practice area/setting?

- General training program
- No preference
- One specialized area or setting

Q21. If you had to choose a specialty, which specialty areas are you interested in? Select up to 5.

- Addiction Medicine
- Cardiology
- Emergency medicine
- Infectious diseases / antimicrobial stewardship
- Internal medicine
- Opioid stewardship
- Thromboembolism / anticoagulation
- Psychiatry
- Ambulatory care
- Critical care
- HIV
- Oncology
- Pediatrics
- Solid organ transplant
- Other: _____

Display section if Q3 = Yes, or Q10 ≠ No

Section 7

Q22. If it was up to you, what additional advanced clinical pharmacy training programs would be available in BC? _____

Section 8

Q23. Which geographic region do you currently work or train in?

- Lower Mainland
- Non-Lower Mainland Coastal
- Interior
- Vancouver Island
- Northern BC

Display if Q1 = No

Q24. Do you still work with the organization where you did your Year 1 residency?

- No
- Yes

Display if Q1 = No

Q25. Which of the following best describes where you work the majority of the time? (select one)

- Community hospital
- Tertiary/Academic hospital
- Hospital-associated outpatient clinic
- Other healthcare institution (long-term care, rehab facility etc)
- Primary care

- Community pharmacy
- University/college
- Not related to pharmacy
- Other (please specify) _____

Display if Q1 = No

Q26. Which of the following describe your primary and additional roles? Select 1 [Primary Role] and any [Additional Roles] that apply.

	Primary Role	Additional Roles
Direct patient care	<input type="radio"/>	<input type="checkbox"/>
Drug distribution	<input type="radio"/>	<input type="checkbox"/>
Management	<input type="radio"/>	<input type="checkbox"/>
Research	<input type="radio"/>	<input type="checkbox"/>
Clinical teaching	<input type="radio"/>	<input type="checkbox"/>
Academia	<input type="radio"/>	<input type="checkbox"/>
Other	<input type="radio"/>	<input type="checkbox"/>

Display if Q1 = No

Q27. Have you ever been employed as a clinical pharmacy specialist?

- No
- Yes

Q28. Which of the following degrees or programs have you completed? Select all that apply

- BSc (Pharm)
- Entry to Practice PharmD
- Post-professional PharmD program (eg. UBC Flex PharmD, U of A PharmD for Practicing Pharmacists, U of T PharmD for Pharmacists)
- Year 1 (PGY1) Residency (or a Master in Advanced Pharmacotherapy from Quebec)
- Year 2 (PGY2) Advanced Pharmacy Residency programs
- Master of Pharmacy (with clinical component, eg. programs at UWaterloo or U of T)
- Non-clinical Masters programs in Pharmacy
- Pharmacy Fellowship program
- PhD program in Pharmacy
- Board of Pharmacy Specialties certification
- Others (please specify) _____

Q29. What is your age?

- ≤25
- 26-30
- 31-35
- 36-40
- >40
- Prefer not to answer

APPENDIX 2 (part 1 of 2): Survey for pharmacy leaders.

- Q1. Are you a pharmacy supervisor, coordinator, manager, or practice leader who hires clinical pharmacists? No Yes
- Q2. How many Clinical Pharmacy Specialists (CPS's) or pharmacists with **advanced clinical pharmacy training** do you typically need to hire each year for permanent or temporary positions?
 0-1 2-3 4-5
 6-7 8 or more
- Q3. Over the last 3 years, how difficult has it been to fill vacant CPS positions?
 Very difficult Somewhat difficult
 Neither easy nor difficult
 Somewhat easy Very easy
- Q4. In the last 3 years, have you had to withdraw a CPS position, convert it to a lower grade, or leave the position vacant for ≥3 months, due to a lack of qualified applicants?
 No Yes
 No open CPS position in the last 3 years
- Q5. How concerned are you about the supply of pharmacists with advanced clinical pharmacy training (beyond Year 1 residency) in BC?
 Not concerned Slightly concerned
 Moderately concerned Very concerned
 Extremely concerned
- Q6. Additional comments about the supply of and demand for pharmacists with advanced clinical pharmacy training? _____
- Q7. In your opinion, what should be the **educational/program goals** of advanced (post year 1 residency) clinical pharmacy training programs? Select Strongly Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, or Strongly Agree for each of the following statements:

To increase a trainee's knowledge of pharmacotherapeutics
To increase a trainee's knowledge in a specific clinical practice area
To further develop or refine the skills of trainees in managing complex patients
To further develop or refine the skills of trainees in patient assessment (eg. physical assessment, labs, diagnostics)
To further develop or refine the skills of trainees in critical appraisal and evidence-based decision making
To further develop or refine the skills of trainees as researchers
To further develop or refine the skills of trainees as educators or preceptors

To further develop or refine the skills of trainees in navigating team dynamics
To allow trainees to lead change to improve the health care system or the care of specific groups of patients
To help trainees gain more confidence as clinicians
To develop leaders in pharmacy practice

Q8. Please list any other educational/program goals you think are important for advanced clinical pharmacy training programs in BC. _____

Q9. Additional comments about the educational/program goals of advanced (post year 1 residency) clinical pharmacy training programs? _____

Q10. Do you agree or disagree that the following advanced clinical training types are needed in BC? Select Strongly Disagree, Somewhat Disagree, Neither Agree nor Disagree, Somewhat Agree, or Strongly Agree for each of the following:

Year 2 (PGY2) Advanced Pharmacy Residency
Master of Pharmacy (with clinical component)
Pharmacy Fellowship Programs
Other: please specify

Descriptions of each program type (not presented in appendix due space limitations)

- Year 2 Advanced Pharmacy Residency
- Master of Pharmacy (with clinical component)
- Pharmacy Fellowship Programs

Q11. In total, how many graduates from ALL advanced clinical pharmacy training programs do you believe are needed each year in BC?

- 1-5 6-10 11-15
 16-20 >20

Display if Q10 = Year 2 (PGY2) Advanced Pharmacy Residency programs [Neither agree nor disagree], [Somewhat agree], or [Strongly agree]

Q12. How many Year 2 (PGY2) Advanced Pharmacy Residency positions should be offered in BC each year? (currently 4 per year) _____

Display if Q10 = Master of Pharmacy [Neither agree nor disagree], [Somewhat agree], or [Strongly agree]

Q13. How many Master of Pharmacy positions should be offered in BC each year? (not currently available in BC) _____

APPENDIX 2 (part 2 of 2): Survey for pharmacy leaders.

Display if Q10 = Pharmacy Fellowship Programs [Neither agree nor disagree], [Somewhat agree], or [Strongly agree]

Q14. How many Pharmacy Fellowship positions should be offered in BC each year? (not currently available in BC) _____

Q15. Do you agree or disagree that Board of Pharmacy Specialties certification is valuable and something that advanced practice pharmacists should pursue?

- Strongly disagree Somewhat disagree
- Neither agree nor disagree
- Somewhat agree Strongly agree

Q16. Do you agree or disagree that there should be a Canadian equivalent to the Board of Pharmacy Specialties certification?

- Strongly disagree Somewhat disagree
- Neither agree nor disagree
- Somewhat agree Strongly agree

Q17. Additional comments about types of advanced clinical pharmacy training programs? _____

Q18. What is your perspective on the need for general versus specialized advanced clinical pharmacy training programs in BC?

- We only need more specialized advanced clinical training programs
- We only need more general advanced clinical training programs
- We need more of both types of programs
- We don't need either type of program

Q19. Based on your staffing needs and the current/future needs of your patients, which of the following specialties/practice settings would you prioritize to have available as a specialty training program in BC? **Select up to 5.** You may include specialty positions that do not currently exist.

- Addiction Medicine Ambulatory care
- Cardiology Critical care
- Emergency medicine HIV
- Infectious diseases / antimicrobial stewardship
- Internal medicine Oncology
- Opioid stewardship Pediatrics
- Thromboembolism / Solid organ
anticoagulation transplant
- Psychiatry Other: _____

Q20. Additional comments about specialized vs general training? _____

Q21. Which geographic region do you work in?

- Lower Mainland Vancouver Island
- Non-Lower Mainland Coastal
- Interior Northern BC

Q22. What type of facilities you hire clinical pharmacists for? Select all that apply

- Community hospital
- Tertiary/Academic hospital
- Hospital-associated outpatient clinic
- Other healthcare institution (long-term care, rehab facility etc)
- Primary care
- Community pharmacy
- University/college
- Other (please specify) _____

Display if Q22 = Community hospital, Tertiary/Academic hospital, Hospital-associated outpatient clinic, or Other healthcare institution

Q23. What is the capacity of the primary facility that you hire for?

- ≤ 100 beds 100-200 beds
- 201-300 beds 301-400 beds
- > 400 beds

Q24. How long have you worked in your current role? ≤ 5years 6-10 years

- 11-15 years 16-20 years > 20 years

Q25. Which of the following degrees or programs have you completed? Select all that apply

- BSc (Pharm)
- Entry to Practice PharmD
- Post-graduate PharmD program
- Year 1 (PGY1) Residency (or a Master in Advanced Pharmacotherapy from Quebec)
- Year 2 (PGY2) Advanced Pharmacy Residency
- Master of Pharmacy (with clinical component, eg. programs at the UWaterloo or U of T)
- Non-clinical Masters programs in Pharmacy
- Pharmacy Fellowship program
- PhD program in Pharmacy
- Board of Pharmacy Specialties certification
- Others (please specify) _____

Q26. Are you interested in participating in a **30 minute follow up interview** regarding this topic?

The purpose of the interview would be to better understand your perspectives on what types of advanced clinical pharmacy training are needed in BC in the future.

- Not interested in participating
- Interested in participating