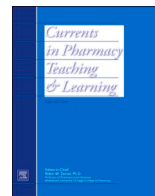


Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Currents in Pharmacy Teaching and Learning

journal homepage: www.sciencedirect.com/journal/currents-in-pharmacy-teaching-and-learning



Empowering early career pharmacists: Unleashing non-clinical competencies through pharmacy residency

Tarik Al-Diery^{a,*}, Stephanie Atweh^b, Mohanad Odeh^a

^a College of Pharmacy, QU Health, Qatar University, Doha, Qatar

^b Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmaceutical Sciences, The Hashemite University, P.O. Box 330127, Zarqa 13133, Jordan

ARTICLE INFO

Keywords:

Pharmacy residency
Competency development
Leadership
Education
Innovation

ABSTRACT

Introduction: Pharmacy residency programs traditionally prioritize clinical skills development. However, non-clinical competencies, such as leadership, conducting education, and innovation, are now emerging as pivotal factors in propelling pharmacists toward excellence in practice. The extent to which these non-clinical skills are effectively fostered by residency programs remains unclear. This study aims to explore how residency programs propel the development of crucial non-clinical competencies such as leadership, conducting education, and innovation.

Methods: Pharmacists who completed a pharmacy residency program and their preceptors from a tertiary teaching hospital took part in semi-structured interviews. Thematic analysis, employing an inductive approach and aided by NVivo software, was used to identify recurrent themes in the interview responses.

Results: Competency development was shaped by four key themes: system-dependent facilitators, system-dependent barriers, individual resident attitudes, and pharmacy department influences. The structure of the residency program was perceived to strongly support competency development in conducting education. The impact on the leadership and innovation competencies development was comparatively lesser.

Conclusion: Pharmacy residency is perceived as effective in supporting non-clinical competency development when there is a clear structured framework with objectives and guidance for pre-defined activities and tasks known to support competency development. Ambiguity and a lack of standardized guidance in developing specific competencies were identified as factors that diminish their relevance for both residents and preceptors. To enhance residency programs, it is essential to establish clear frameworks, with pre-defined objectives and activities known to support competency development and supplement them with the necessary skills-building courses where appropriate.

Introduction

Formalized post-graduate training programs such as pharmacy residency are intended to support the development of competencies that permit an early career pharmacist to transition to more advanced levels of practice.^{1–4} Evidence from residency programs highlight that clear and purposeful education and training programs are effective in serving as markers for advancement and

* Corresponding author at: Clinical Pharmacy and Practice, College of Pharmacy, QU Health, Qatar University, Doha, Qatar.
E-mail addresses: tarik.aldiery@qu.edu.qa (T. Al-Diery), s.atweh@qu.edu.qa (S. Atweh), modeh01@qub.ac.uk (M. Odeh).

<https://doi.org/10.1016/j.cptl.2024.03.015>

Available online 8 April 2024

1877-1297/© 2024 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

specialisation across the workforce.^{5,6} Residency training programs have demonstrated success in developing highly specialized pharmacists and skilled clinicians.^{1,4,7,8} However, less is known about the process in which residency programs advance non-clinical competencies such as leadership, conducting education, and support of innovation.^{9–14}

As the pharmacy profession is in the midst of a rapid expansion to its scope of practice, the need to develop competent and effective leaders, educators, and innovators has become an imperative goal of residency programs.^{1,4,8} Recognized gaps exist in advancing competencies for early career pharmacists, particularly where standardized frameworks and structured programs are unavailable.^{4,8} To support the development of these competencies, residency programs have begun to address these gaps in competency development with the introduction of pre-defined objectives and activities, as well as structured developmental programs for leadership,^{15–18} conducting education,^{19–22} and support of innovation training.^{23,24}

A lack of standardization across how these programs are delivered and disparities in training has led to inconsistent results.^{12,25–28} Although it is acknowledged that leadership, education, and innovation are necessary competencies for advancing practice, growing research suggests that there are ambiguities in their definitions, as well as uncertainty in the conceptualization of how to develop these competencies for early-career pharmacists.^{11,29,30}

Residencies have supported competency development in leadership, education, and innovation through the use of different activities, assessments, and programs, to varying degrees.^{13,21,31–34} Courses and programs such as the health-system pharmacy administration residency and leadership certificate programs in leadership development,^{9,10,16} and the teaching certificate and clinical educators programs in conducting education development have all demonstrated different levels of success in supporting competency development.^{13,35}

Variability in how residency programs support competency development highlights the need for further research to evaluate how residency programs promote competency development and the effectiveness of the different methodologies.^{25–27,30} Therefore, this research aimed to explore how pharmacy residency propels the development of pivotal non-clinical competencies such as leadership, conducting education, and innovation, and the perceived extent to which the structure of the program contributed to the development of these competencies.

Methods

Study design

This was a qualitative process evaluation of the Australian Foundation Residency Program using semi-structured interviews with former pharmacy residents and their preceptors, thematic analysis of the transcribed interviews, and use of verbatim quotes for confirmability of the identified themes.

Residency program design

In Australia, residency programs are overseen by the Society of Hospital Pharmacists of Australia (SHPA).³⁶ Currently in Australia, there are 51 accredited hospital sites that deliver foundation pharmacy residency training, with the SHPA as the only recognized body that oversees residency training.³⁶ Foundation pharmacy residency in Australia is a two-year program that incorporates generalist training, equivalent to the United States (US) postgraduate year 1 program. However, due to its length and extensive training, residents are exposed to other elements of pharmacy practice normally observed in the US postgraduate year 2 (PGY2) program. Although pharmacy residency is not a requirement to practice clinical pharmacy in Australian hospitals, admission into the programs is competitive and limited as it offers a pathway for early-career pharmacists to consolidate key experiences, and then potentially specialize upon completion of the program, similar to what is observed in the US PGY2 program.

Australian Foundation Residency Programs are mapped to the National Competency Framework for Pharmacist in Australia 2016, which describes the performance levels expected at the transition, consolidation, and advanced level for the different competency standards.³⁷ These uniform competency standards define the key clinical and non-clinical competencies expected of all practicing pharmacists in Australia, with performance level in the competencies subject to each pharmacist's experience level. The different performance levels indicate the depth of expertise of a pharmacist based on their training and experience, with the transition pharmacist being an early-career pharmacist who contributes to the progression of the profession, gradually maturing to an advanced level pharmacist who leads, shapes, and influences the profession.

It is expected that pharmacists who complete the foundation pharmacy residency program will be able to perform at transition level (advancing – stage 1) across all of the relevant clinical and non-clinical competency standards, including but not limited to the competencies of leadership, education, and innovation.^{37,38} Evaluation of pharmacy residents is completed by pharmacy preceptors with pharmacy residents maintaining portfolios that demonstrates bodies of evidence for the respective competencies.

Participants and setting

This research was carried out at a major tertiary teaching hospital in Australia. Approximately ten residents are accepted into the hospital's two-year foundation residency program each year. These residents complete four, six-month long rotations across generalist and specialist areas as well as a year-long research project under the supervision of their preceptor or a mentor. Residents are also expected to partake in a variety of activities as part of the residency program such as participating in a hospital committee, serving as mentors and preceptors to pharmacy interns and students, and teaching and lecturing both internally and externally, where required.

Eligibility criteria for this study included any resident who was accepted into the hospital residency program between 2017 and 2021, and any pharmacist who served as a preceptor as part of the residency program during the same time. Any residents who did not complete the residency (i.e., withdrew) were also eligible to participate. All eligible participants were contacted via email, from a distribution list obtained from the hospital residency coordinator. Those consenting to participate were scheduled to complete a one-on-one semi-structured interview with the primary investigator (TA).

Between 2017 and 2021, 42 pharmacists were accepted in the hospital pharmacy residency program under the supervision of 34 preceptor pharmacists. Former pharmacy residents and preceptors were convenience sampled, based on availability of contact details. Contact details were available for 34 residents and 31 preceptors, thus a total of 65 pharmacists were invited to participate.

Data collection

Residency program stakeholders (former pharmacy residents and pharmacy residency preceptors) who consented to participate were invited to take part in a one-on-one semi-structured interview, lasting between 30 and 60 min, either in person or via video-conferencing using the Zoom platform. Participants were required to sign a written consent form and return it to the lead investigator. With the written consent of the interviewees, all interviews were audio-recorded. Two interview templates were developed: one for former pharmacy residents (Table 1) and the other for pharmacy preceptors (Table 2). Interview questions for former residents and preceptors were similar, with each tailored to the specific group. Interview questions were structured to identify how pharmacy residency supported competency development, and the perceived extent that the structure of pharmacy residency advanced competency development. The semi-structured approach of the interview allowed the interviewer to ask follow-up and clarification questions as required, as well as explore emerging ideas, concepts, and themes during each interview.

Data analysis

Following the completion of interviews, the primary investigator (TA) assigned participants a randomly generated unique study code. Interview audio recordings were manually transcribed verbatim and subsequently destroyed. Two investigators then independently inductively coded the transcripts by assigning a descriptive word or words to each segment (word, sentence, or phrase) of the transcript that represented a thought or idea related to the research questions. Investigators met to discuss coding after three transcripts were coded to assess coding agreeance and resolve discrepancies. The primary investigator (TA) then coded the remaining transcripts and coding was reviewed by the second investigator for accuracy. NVivo14 was used to further reaffirm the investigators' coding and to develop a coding mind map.

Once all coding was complete, results were discussed with a third investigator for feedback and for generation of preliminary themes by identifying patterns amongst the codes for combination into categories and then themes. Consensus was obtained from all investigators for the themes included in the results. Finally, representative quotes from the raw data were extracted to support the themes.

Ethics

Ethical approval for this study was obtained from the Alfred Low Risk Ethics Committee, project number 250/21.

Table 1
Former resident interview questions.

Topic/concept	Questions
Introduction/Ice Breaker	<ol style="list-style-type: none"> 1. Can you tell me why you believe residents chose to do the residency program? 2. What was involved in doing the residency program for you? 3. What do you believe you got out of the residency program?
Leadership	<ol style="list-style-type: none"> 1. Can you describe for me how did the program help you learn how to motivate yourself to achieve your own goals? 2. How did residency improve your abilities to understand what it takes to be a good role model? 3. To what extent did the program pave the way for you to understand how to be a better leader and role model? 4. Tell me about the aspects of the program that meant you did or did not achieve the leadership competencies to the level of advancing-stage 1?
Conducting education	<ol style="list-style-type: none"> 1. Can you describe how did residency improve your ability to deliver education? 2. To what extent did the residency support you to improve in your ability to educate and teach others? 3. Tell me about the aspects of the residency that meant you did or did not achieve the education competencies to the level of advancing-stage 1?
Support of Innovation	<ol style="list-style-type: none"> 1. How does your experience support your understanding of the importance of innovation and quality services improvement on the department and organizational level? 2. Have you had any interest or experience in providing feedback and input into the way services are delivered? 3. Tell me about the aspects of residency that meant you did or did not achieve the support of innovation competencies to the level of advancing-stage 1?
Final question	Knowing what you know, would you do pharmacy residency again? Would you recommend it to a colleague? What are the reasons you would or wouldn't recommend the program?

Table 2
Preceptor interview questions.

Topic/concept	Questions
Introduction/Ice Breaker	1. Can you tell me why you believe residents chose to do the residency program? 2. What was involved in doing the residency program for them? 3. What do you believe residents got out of the residency program?
Leadership	1. Can you describe for me how did the program help residents learn how to motivate themselves to achieve their own goals? 2. How did residency improve their abilities to understand what it takes to be a good role model? 3. To what extent did the program pave the way for residents to understand how to be a better leader and role model? 4. Tell me about the aspects of the program that meant residents did or did not achieve the leadership competencies to the level of advancing-stage 1?
Conducting education	1. Can you describe how did residency improve a resident's ability to deliver education? 2. To what extent did residency support residents to improve in their ability to educate and teach others? 3. Tell me about the aspects of the residency that meant that residents did or did not achieve the education competencies to the level of advancing-stage 1?
Support of Innovation	1. How do you believe residency supported the residents understanding of the importance of innovation and quality services improvement on the department and organizational level? 2. Did you observe your residents having interest or experience in providing feedback and input into the way services are delivered? 3. Tell me about the aspects of residency that did or did not provide residents with the opportunity to develop the innovation competencies to the level of advancing-stage 1?
Final question	Would you recommend the pharmacy residency program to an early-career pharmacist? What are the reasons you would or wouldn't recommend the program?

Results

Twenty-two individuals consented to participate (14 residents, 8 preceptors), giving an overall participation rate of 34%. Demographics of pharmacy residents and preceptors can be found in [Tables 3 and 4](#), respectively. Four key themes were identified from the interviews, which were system-dependent facilitators, system-dependent barriers, individual resident attitudes, and pharmacy preceptor influences. The four key themes and their respective codes were mapped to a mind map to outline how pharmacy residency supported competency development (see [Fig. 1](#)).

System-dependent facilitators

When examining the leadership competencies, residents reported that opportunities to regularly supervise intern pharmacists and students, lead projects, and coordinate committees, all of which are requirements within the residency program, helped improve their confidence in leading others and managing both themselves and others:

“I learned a lot about management of myself, of others, of resources that you know at the time I probably didn't think I needed or cared so much about.” (Resident 12).

The development of the conducting education competency was strongly supported through the residency program. Residents and preceptors both acknowledged that pharmacy residency establishes practitioners to become more competent educators, communicators, and teachers, using an array of different exercises and responsibilities. These exercises included regular mini-clinical evaluation

Table 3
Characteristics of pharmacy residents ($n = 14$).

Resident characteristics	Number (%)
Gender	
Male	3 (21)
Female	11 (79)
Entry-year of residency	
2017	6 (43)
2018	1 (7)
2019	6 (43)
2020	1 (7)
Completed Residency	
Yes	11 (79)
No	3 (21)
Previous registered pharmacy experience before residency	
Yes	7 (50)
No	7 (50)
Senior pharmacist [‡] following residency completion	
Yes	7 (50)
No	7 (50)

[‡] = pharmacist who is formally recognized by his/her department as either an advanced practitioner and/or manager of other staff members.

Table 4
Characteristics of pharmacy residency preceptors (n = 8).

Preceptor characteristics	Number (%)
Gender	
Male	3 (37.5)
Female	5 (62.5)
Years of senior pharmacy [‡] experience	
< 2	1 (12.5)
2–4	2 (25)
5–9	3 (37.5)
≥ 10	2 (25)
Number of years as residency preceptor	
< 1	2 (25)
1–3	3 (37.5)
> 3	3 (37.5)

[‡] = pharmacist who is formally recognized by his/her department as either an advanced practitioner and/or manager of other staff members.

exercises (mini-CEX),³⁹ Clinical Competency Achievement Tool (ClinCAT) assessments,⁴⁰ frequent presentations to fellow pharmacists, nurses, physicians, and other members of allied health. Residents and preceptors also reported that the increased expectations of residents taking on more precepting and teaching roles in residency allowed residents to improve their teaching skills and learn how to tailor their teaching styles to different students:

“If I hadn't had done so many presentations and mini-CEXs, then my clinical understanding and probably my confidence in that clinical understanding wouldn't have been there as much. So, while I would still teach, I wouldn't be able to teach to the quality I can now after residency.” (Resident 5).

Residents and preceptors also recognized that the clear structure and established goals of pharmacy residency, with respect to developing the conducting education competency, allowed residents to have a clear structure on what was required to improve in this area. Residents identified that preparing and delivering presentations, mentoring students, and completing extra-assessments were part of a clear structure with predefined activities utilized for becoming more competent educators. Preceptors also emphasized that education opportunities are more likely to be given to residents than non-residents as they received priority for such activities within the pharmacy department:

“We tend to have an awareness of all the different education opportunities that exist, and we tend to preference giving them to residents because we know they have to.” (Preceptor 1).

Although not a mandated component of the residency program, all residents interviewed reported that undertaking the formalized clinical educator training course “Teaching on The Run”⁴¹ as a requirement of the residency provided them with some necessary skills needed for delivering clinical education. Residents noted that the practical skills they learned from the course allowed them to feel more confident in their delivery of education and teaching of junior and senior staff. Therefore, the implementation of such courses with clear established goals and structures, opportunities to present and mentor, and regular feedback from preceptors helped facilitate the improvement of residents in conducting education to an advanced level:

“Having to do lots of credentialing as well as well as doing Teaching on The Run, as well as the feedback from ClinCATs and case-based discussions and all that, made me kind of re-review how I would normally do things and how I would present information as an educator.” (Resident 6).

Pharmacy residency facilitated a better understanding in residents for the need to support innovation and participate in quality improvement. Residents and preceptors identified that residents were included in diverse opportunities and projects that would normally not be afforded to early-career pharmacists. Under the guidance of senior pharmacists and mentors, residents were involved in quality improvement projects and were tasked with influencing departmental change, be it small or large:

“I think the residency program did give me the opportunity and scope to be able to be innovative and be part of new projects and ideas, especially because it was supported with all the senior pharmacists.” (Resident 14).

Preceptors identified the mandatory research projects that residents are expected to complete as a facilitator for the development of the innovation and quality improvement competency. Preceptors noted that most pharmacy research carried out helps inform quality improvement and innovative change.

“I think with any research, it is a form of quality improvement, because from a pharmacy perspective, that's what we're aiming to do is improve outcomes so whether it's drug therapy or if it's an actual health intervention it's going to be trying to improve outcomes.” (Preceptor 2).

System – dependent barriers

Residency is marked with multiple tasks and requirements designed to help residents achieve the necessary clinical and non-clinical competencies required for advancing practice. While residents reported that the extra activities, assessments, and extra-curricular participation were beneficial for their learning, the sheer volume and expectations resulted in many activities becoming overburdening activities rather than meaningful skills building activities:

“I think that sometimes they do task just to tick tasks off rather than actually taking them as a learning experience.” (Preceptor 5).

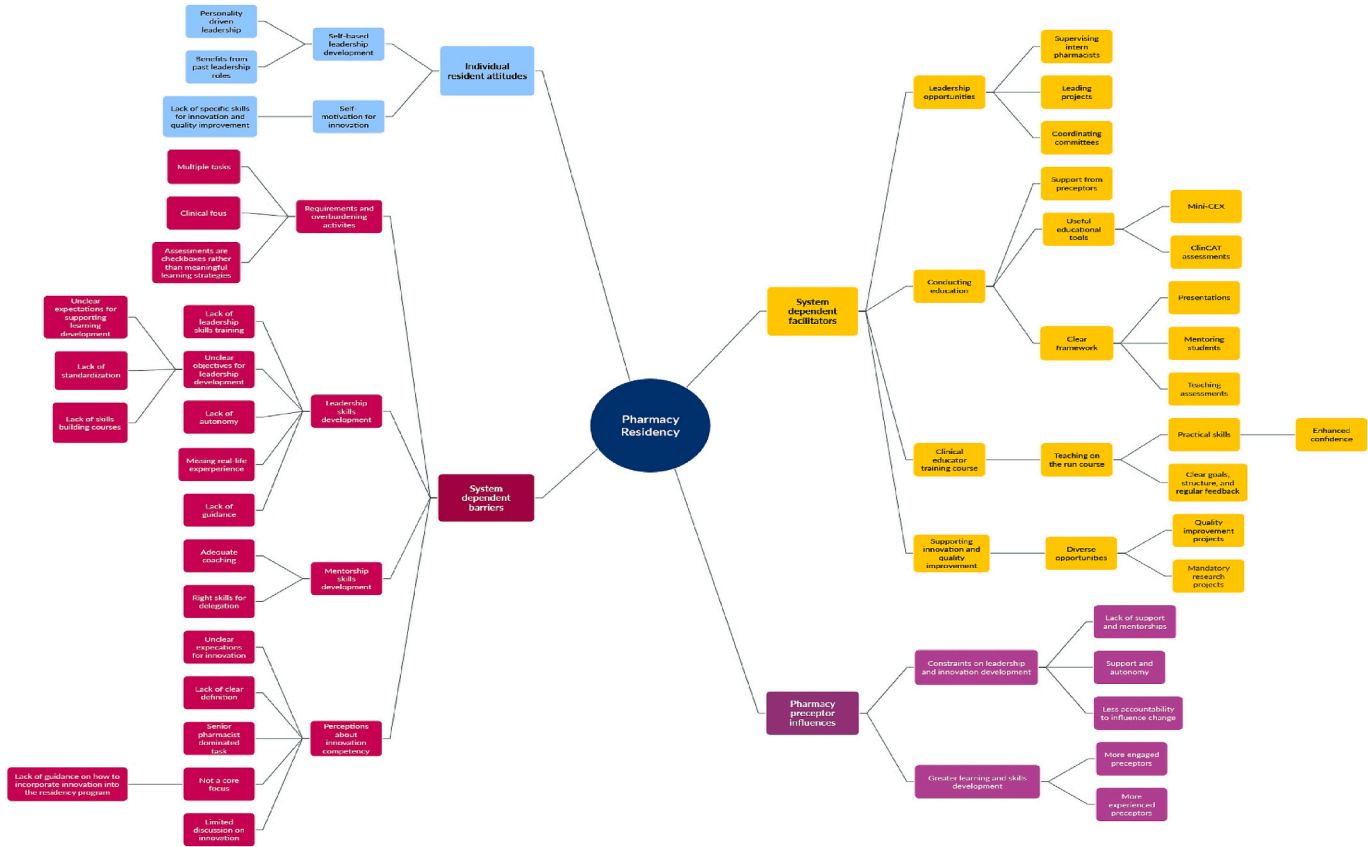


Fig. 1. Mind map for development of non-clinical competencies in pharmacy residency.

Residents noted that there was a lack of emphasis on leadership skills development and training in residency. Residents identified multiple barriers to developing this skill set, such as heavy clinical workloads, unclear expectations/objectives on what leadership development should be by the end of residency, and lack of autonomy to lead on both a small and large scale. In addition, residents identified issues with a lack of real-life experiences and missing mentoring opportunities as barriers in their ability to learn how to manage themselves and others. Residents were expected to participate on committees to understand the importance of advocacy and navigating organizational problems. Whilst committees did help some residents develop confidence in leading and managing different personalities, most residents did not feel that committee involvement supported their leadership development, due to a lack of guidance on what was expected from residents in the committees and how leadership development in them can be achieved:

“I think that there wasn't really a criteria in terms of your involvement in committees.” (Resident 9).

Preceptors agreed that there were unclear expectations and guidance on how to support leadership development skills. Preceptors reported difficulty in the lack of standardization of how this competency can be achieved, and felt further resources or structure from program developers were required:

“Leadership competencies weren't really formalized and there wasn't a whole lot of support in order to build that in, and it wasn't coming from an organizational (SHPA) level either so that did make it quite challenging.” (Preceptor 3).

One preceptor strongly felt that residency may not address key skills required for developing effective leadership capabilities. Delegating residents a student or intern to mentor can be a positive for the residents professional and personal development, but without the necessary coaching and guidance, some may not develop the “right skills” and as this preceptor noted, may develop poor leadership styles:

“We sort of give them that opportunity but don't tell them how to do that properly. I think that's the gap that we miss currently in our program is that we certainly give them the chance and some people thrive with that chance but probably what we can do is give them the skills before they get to that.” (Preceptor 4).

Resident and preceptor perceptions regarding the support of innovation competency were similar to the responses received from the leadership competency. They acknowledged that the structure of the residency program did not focus upon the development of resident skills in support of innovation and contributing to quality improvement. Unclear expectations from the residency organization and a lack of emphasis from workplace mentors, led residents to have the perception that the innovation competency was an unaddressed component of the competency framework:

“Service optimization never really came up in residency at all!” (Resident 13).

When analysing the support of innovation competency from an overall perspective, residents and preceptors identified that there is no clear definition and understanding of what innovation and quality improvement mean. Without clear structure and expectations of what must be achieved, residents and preceptors acknowledged that this competency became more of an afterthought in the residency program rather than a core competency that can be developed. Residents and preceptors recognized that while the program supports innovation in principle, it is not a program focus and thus little discussion is provided on what this means and how it can be done:

“While as a general rule SHPA is very pro innovation, there's not really a lot of discussion about what that innovation is, and it's not really discussed.” (Preceptor 5).

Individual resident attitudes

Residents and preceptors interviewed noted that leadership development in residency was mostly personality-driven and not always an influence of the program itself. The residency program afforded residents new opportunities in areas they previously would not have been exposed to, yet all but one of the residents interviewed felt that any development of their own leadership skills was mostly due to their personalities as natural leaders and past experiences in leadership roles. Most residents interviewed were already self-driven and motivated to become stronger leaders, and thus felt the residency program itself did not have a significant role in developing their leadership skills:

“I've been quite involved with like student organization stuff and leadership roles even before I became a pharmacist, so inherently I take on this personality of wanting to be more of a leader, so I wouldn't say that residency necessarily gave me more ability to be leader.” (Resident 1).

Residents interviewed identified their own self-motivation as being a key factor in them contributing to supporting innovation and quality improvement during residency. Residents reported that many of their previous experiences in life, such as youth groups, university societies, sports teams and so on had prepared them to undertake quality improvement initiatives:

“I think it was very self-motivated that if you identified something that could be improved, it was an internal motivation to do something about it. I don't think the program provided any skills or structure in terms of quality improvement.” (Resident 5).

Pharmacy preceptor influences

Residents and preceptors acknowledged that residency experiences were often preceptor dependent, with preceptors who were more experienced or more engaged in mentoring and teaching facilitating greater learning and skill development, compared to preceptors who were assigned into the program due to hospital departmental expectations. Residents reported that their experiences varied depending on their rotation and who their preceptor was:

“It could vary what level of support you get depending on who you got as your mentor...seniors putting their hand up to be part of the residency program are usually more willing to participate in those sort of assessments.” (Resident 10).

Preceptors interviewed noted that those without training in managerial and supervision experience were unlikely to provide the same level of support and training compared to a more experienced senior preceptors with prior management and supervision

responsibilities. This had repercussions on one pharmacist who exited the residency program due to the lack of support and mentorship received from the preceptor:

“I would say I got a lot more structured senior supervision and support in two of my earlier rotations before residency. In both of those areas I felt supported and that I gained knowledge and experience. In my residency, I felt like I was chasing my tail doing extra paperwork.” (Resident 3).

Residents noted that a few of their preceptors were less supportive in facilitating autonomy in decision making or accountability to influence change, and hence felt they had lesser opportunities for leadership and innovation. Some residents interviewed reported that they were motivated to take on extra responsibilities in leadership and innovation but were constrained by the preceptors' offerings:

“I tried to get more leadership experience, but you can only do as much as your senior will allow you to do. I only got an appreciation for it because I wasn't given the opportunity to do more.” (Resident 8).

Discussion

This aim of this study was to explore how pharmacy residency at a large tertiary metropolitan hospital supported competency development in leadership, conducting education, and support of innovation in early-career pharmacists, and the extent that the structure of the program contributed to the development of these competencies. We found that the perceived competency development was influenced by factors which fit within four key themes: system-dependent facilitators, system dependent barriers, individual resident attitudes, and pharmacy preceptor influences. Of the three competencies explored in this research from one training site, the process of pharmacy residency and its structure appear to most strongly support development of the ‘conducting education’ competency. Competencies relating to leadership and support of innovation were less well developed and received less emphasis in residency training.

Residency had a significant perceived impact on how residents developed their competency in conducting education, with residents and preceptors in our study overwhelmingly supporting this view. Our study identified that the clear structure of residency with regards to developing this competency, the tangible objectives, and pre-defined activities and tasks helped facilitate residents in becoming better educators. The use of regular assessments, presentations, and mentoring of pharmacy students and interns all helped resident improve in their ability to develop the education competency. Residents in our study also highlighted that completion of a formalized clinical-educator course “Teaching on The Run”⁴¹ was beneficial at the start of their residency in helping them consolidate the necessary skills to deliver education. While the clinical-educator course was not specific to residency, it was a very important component in helping residents become more advanced and confident educators. Our findings are similar to work conducted in similar settings, where residents who completed a teaching certificate program as part of their residencies reported increased comfort and confidence in precepting students and managing classrooms, delivering didactic lectures, and assessing classroom learning.^{12,14,21,22,34}

Previous pharmacy residency research has highlighted the gaps in residency leadership training and attempted to address it through different means.^{9,15–17,42} Our research identified that while residency supported residents to develop leadership skills to a degree through exposure to areas they normally would not be involved in such as participation in committees, the structure of residency was not viewed as a primary driver for residents developing the leadership competency. Research in pharmacy residency has uncovered the importance of a culture-change in pharmacy in order to facilitate the importance of leadership development in early-career pharmacists.^{7,16,42} This can only be achieved through clear structure and accountability.³⁰ As residency programs in both the US and Australia are primarily focused on the development of skills for clinical practice and clinical education, it is unsurprising that participants in our study found the residency program provided only general defined leadership expectations by the end of residency and did not provide set examples of the types of activities or tasks that could be utilized to help residents in their leadership development. Such examples could be incorporated into future iterations of the residency program to promote greater development of this competency. Furthermore, residents and preceptors felt a “skills-building” component would be beneficial in developing the leadership competency. A leadership certificate program has been utilized in other programs to address this, with residents expected to complete a series of interactive tutorials and other “elective” activities that foster leadership skills.¹⁶ A supplementary course could be integrated into residency to complement active-learning and real-life leadership experiences during the residency period.

Similar to the findings in leadership development, our participants reported that the development of innovation and quality improvement competencies occurred outside of the residency program. This may stem from non-specific guidance and expectations of what constitutes innovation in residency, and a workplace view that development of competency related to innovation a lower priority. There appeared to be two factors that contributed to this perception. The first involves a workplace cultural perception that innovation and quality improvement are the responsibility of more senior pharmacists and departmental managers and thus are less relevant to residents. This was evident as many residents reported feeling excluded by their preceptors from participating in quality improvement projects. Previous research has demonstrated that residents have been a key driving force in promoting change when under the right guidance.^{23,24,45} Clear structure to provide guidance on how innovation skills can be fostered, with pre-defined activities and objectives could support competency development in this area.^{24,43,44} The second factor is a lack of understanding of what innovation and quality improvement mean at a resident level, which resulted in some preceptors not fully understanding how to support their residents to develop this competency, and thus not offer them a bigger opportunity to get involved with quality improvement projects. Medication safety pharmacists who are experts in quality improvement and innovation could be the most suited individuals to guide early-career pharmacists in the innovation development competency through incorporation of medication safety projects and activities. Future research would be required to evaluate the feasibility of such an approach and the overall outcomes it has on resident competency development.

The residency programs could consider introducing further skills-building courses in leadership and innovation, as the use of

teaching certificates proved to help consolidate some of the necessary teaching skills required during residency practice. The leadership certificate program was an effective way for residents to develop necessary leadership skills and could be a potential model to address the gaps in leadership development.¹⁶ The use of these complementary courses could be introduced half-way through the first year or at the beginning of the second year of residency to not overload residents with courses all at once, and to give residents time to adapt to residency training. Future research should explore the feasibility of introducing further skills-building courses for the leadership and support of innovation competencies and evaluate the outcomes that these have in advancing competency development.

The limitations of our research should be noted. Our sample of residents and preceptors interviewed were all from the same hospital and all had trained/precepted in the same program. Findings from our research may not be transferable to the wider Australian Foundation Residency Program or residency programs in other jurisdictions. Future research on both a local and international level is required to evaluate the transferability of our findings. A second limitation of our research is participant bias. The interviewing investigator at the time of the study was a colleague of the residents and preceptors interviewed, which may have resulted in certain responses being tailored or modified, in both a positive and/or negative way.⁴⁵ Lastly, residents and preceptors who consented to participate in the interview phase were more likely to be individuals with stronger opinions who are naturally more vocal about their views. These findings may not be as generalizable to other residents and preceptors who may have more neutral perspectives.

Conclusion

This study demonstrated that competency development in pharmacy residency is perceived to be most effective when there is a clear program structure with guidance for pre-defined activities, tasks, and outcomes, complemented by skills-building courses or modules to help consolidate the necessary knowledge and skills to achieve that competency. Of the competencies evaluated, pharmacy residency had its biggest impact on the “conducting education” competency because it had clear pre-defined objectives and activities that were known to be effective for competency development such as precepting, teaching, and presenting to different staff, and was further strengthened with a clinical education course which helped give residents a baseline understanding of how to teach and conduct education prior to gaining experience on the job. Residency was not perceived to support development of leadership and innovation competencies in the same manner. In conclusion, future research is needed to evaluate the feasibility and impact of introducing leadership skills-building courses and the potential embedment of pharmacy residents with quality improvement experts to help support competency development during pharmacy residency.

Financial disclosure

None. This project was unfunded.

Ethics approval

That the work was carried out in accordance with the Declaration of Helsinki, including, but not limited to the anonymity of participants being guaranteed and the informed consent of participants being obtained. Ethics approval for this study was obtained from the Alfred Low Risk Ethics Committee, project number 250/21.

Contribution to literature

Previous research in pharmacy residency has evaluated how pharmacy residencies have supported competency development in leadership, education, and innovation using different activities, assessments, and programs, to varying degrees. Our research specifically explored how the process of pharmacy residency specifically supports competency development in leadership development, conducting education, and innovation/quality improvement. Our study demonstrated that pharmacy residency is perceived as effective in supporting competency development when there is a clear structured framework with objectives and guidance for pre-defined activities and tasks known to support competency development in non-clinical tasks.

Author contributions

Tarik Al-Diery: Conceptualization (lead); Methodology (lead); writing – original draft (lead); formal analysis (lead); writing – review and editing (equal). **Stephanie Atweh:** formal analysis (equal); writing – review and editing (equal). **Mohanad Odeh:** formal analysis (equal); writing – review and editing (equal).

Declaration of competing interest

All authors declare no conflicts of interest.

References

1. Fuller PD, Smith KM, Hinman RK, et al. Value of pharmacy residency training: a survey of the academic medical center perspective. *Am J Health-Syst Pharm.* 2012; 69(2):158–165. <https://doi.org/10.2146/ajhp110199>.

2. Johnson TJ, Teeters JL. Pharmacy residency and the medical training model: is pharmacy at a tipping point? *Am J Health-Syst Pharm.* 2011;68(16):1542–1549. <https://doi.org/10.2146/ajhp100483>.
3. Smith KM, Hecht KA, Armitstead JA, Davis GA. Evolution and operation of a pharmacy residency on-call program. *Am J Health-Syst Pharm.* 2003;60(21):2236–2241. <https://doi.org/10.1093/ajhp/60.21.2236>.
4. Swan JT, Giouroukakis M, Shank BR, Crona DJ, Berger K, Wombwell E. The value of pharmacy residency training for health systems: an annotated bibliography. *J Pharm Pract.* 2014;27(4):399–411. <https://doi.org/10.1177/089719001351517>.
5. Bright DR, Adams AJ, Black CD, Powers MF. The mandatory residency dilemma: parallels to historical transitions in pharmacy education. *Ann Pharmacother.* 2010;44(11):1793–1799. <https://doi.org/10.1345/aph.1P39>.
6. Johnson TJ. Pharmacist work force in 2020: implications of requiring residency training for practice. *Am J Health-Syst Pharm.* 2008;65(2):166–170. <https://doi.org/10.2146/ajhp100483>.
7. Ivey MF, Farber MS. Pharmacy residency training and pharmacy leadership: an important relationship. *Am J Health-Syst Pharm.* 2011;68(1):73–76. <https://doi.org/10.2146/ajhp100051>.
8. Smith KM, Sorensen T, Connor KA, et al. Value of conducting pharmacy residency training—the organizational perspective. *Pharmacotherapy.* 2010;30(12):1313. <https://core.ac.uk/download/pdf/48844850.pdf>.
9. Isaacs D, Bishop MA, Burke ES, et al. Career advancement in health-system pharmacy: clinical pharmacists as future leaders. *Am J Health-Syst Pharm.* 2021;78(12):1134–1136. <https://doi.org/10.1093/ajhp/zxab131>.
10. Santalo O, Farano J, Igwe J, Deyhim N. Survey of health-system pharmacy administration and leadership residencies. *Am J Health-Syst Pharm.* 2020;77(6):449–456. <https://doi.org/10.1093/ajhp/zxz327>.
11. Darko W, Fancher JL, Feldman EA, Krasniak AE, Miller CD, Probst LA. Evaluating the design and conduct of teaching, education, and dissemination of knowledge learning experiences: a survey of American Society of Health System Pharmacists (ASHP)-accredited postgraduate year 1 pharmacy residency programs (TEDKLE—PGY1 survey). *J Am Coll Clin Pharm.* 2019;2(5):544–553. <https://doi.org/10.1002/jac5.1117>.
12. Peters L, Long B, Eddy E, Kuhn K, Huppert C. Participants' perceptions of a residency teaching certificate program: the quality, impact and benefits. *Pharm Pract.* 2021;19(3). <https://doi.org/10.18549/pharmpract.2021.3.2423>.
13. Pogge EK, Raney E, Jackowski RM, Larson S, Storzjohann T, Davis LE. Evaluation of a teaching and learning curriculum for preceptors and residents. *J Am Coll Clin Pharm.* 2020;3(1):87–94. <https://doi.org/10.1002/jac5.1170>.
14. Smith L, Hansen BK, Heubel E. Common teaching activities and self-perceived teaching proficiency in PGY2 residencies. *Curr Pharm Teach Learn.* 2017;9(2):217–223. <https://doi.org/10.1016/j.cptl.2016.11.006>.
15. Gazda NP, Griffin E, Hamrick K, et al. Development and implementation of a combined master of science and PGY1/PGY2 health-system pharmacy administration residency program at a large community teaching hospital. *Hosp Pharm.* 2018;53(2):96–100. <https://doi.org/10.1177/001857871875665>.
16. Lyons K, Griggs D, Lebovic R, Roth ME, South DA, Hatfield C. The University of North Carolina Medical Center pharmacy resident leadership certificate program. *Am J Health-Syst Pharm.* 2017;74(6):430–436. <https://doi.org/10.2146/ajhp160107>.
17. Saito EM, Patel RJ, Herrera EM, Kroner BA. Incorporation of formal leadership activities into pharmacy residencies. *Am J Health-Syst Pharm.* 2017;74(4):196–199. <https://doi.org/10.2146/ajhp160098>.
18. Fruhling L, Lafever M, Erstad B. Enhancing educational and leadership opportunities for second-year pharmacy residents. *Am J Pharm Educ.* 2019;83(10):2037–2040. <https://doi.org/10.5688/ajpe7099>.
19. Gettig JP, Sheehan AH. Perceived value of a pharmacy resident teaching certificate program. *Am J Pharm Educ.* 2008;72(5). <https://doi.org/10.5688/aj7205104>.
20. Gonzalvo JD, Ramsey DC, Sheehan AH, Sprunger TL. Redesign of a statewide teaching certificate program for pharmacy residents. *Am J Pharm Educ.* 2013;77(4). <https://doi.org/10.5688/ajpe77479>.
21. Sales I, Meyer S, Kane-Gill SL, Schiff D. The influence of teaching programs on residents' perceptions of comfort and confidence in teaching. *Curr Pharm Teach Learn.* 2014;6(3):455–459. <https://doi.org/10.1016/j.cptl.2014.02.014>.
22. Wahl KR, Margolis A, Lintner K, Hartkopf K, Martin B. Impact and application of material learned in a pharmacy residency teaching certificate program. *Am J Pharm Educ.* 2014;78(6). <https://doi.org/10.5688/ajpe786123>.
23. Bagwell A, McFarland MS, Hulgan T. An innovative approach to addressing the HIV care continuum: implementation of a clinical pharmacy resident in a veterans affairs HIV specialty clinic. *J Pharm Pract.* 2018;31(5):422–428. <https://doi.org/10.5688/ajpe786123>.
24. Messinger NJ, Buring SM. Development of an ambulatory care pharmacy elective by a second-year pharmacy resident. *Curr Pharm Teach Learn.* 2015;7(5):676–683. <https://doi.org/10.1016/j.cptl.2015.06.019>.
25. Aistrophe DS, Attridge RT, Bickley AR, et al. Strategies for developing pharmacy residents as educators. *Pharmacotherapy.* 2011;31(5):65e–70e. <https://doi.org/10.1159/phco.31.5.526>.
26. Havrda DE, Engle JP, Anderson KC, et al. Guidelines for resident teaching experiences. *Pharmacotherapy.* 2013;33(7):e147–e161. <https://doi.org/10.1002/phar.1250>.
27. Bartelme KM, Bzowickyj A, Frueh J, Speedie M, Jacobson G, Sorenson TD. Experience and outcomes of a pharmaceutical care leadership residency program. *INNOV Pharm.* 2014;5(3). <https://doi.org/10.24926/iip.v5i3.350>.
28. Sasser CW, Miller ML, Schellhase E, Dascanio SA, Steeb DR. Creating global health leaders in pharmacy by evolving postgraduate training. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.06.001>.
29. Beckett RD, Isaacs AN, Montaganano KJ, Sheehan AH, Ramsey DC, Sprunger T. Perceived value of teaching and learning curriculum programs among pharmacy practice department chairs. *Am J Pharm Educ.* 2020;84(12):1595–1602. <https://doi.org/10.5688/ajpe7981>.
30. Reed BN, Kluttus AM, Mattingly II TJ. A systematic review of leadership definitions, competencies, and assessment methods in pharmacy education. *Am J Pharm Educ.* 2019;83(9):1873–1885. <https://doi.org/10.5688/ajpe7520>.
31. McNatty D, Cox CD, Seifert CF. Assessment of teaching experiences completed during accredited pharmacy residency programs. *Am J Pharm Educ.* 2007;71(5). <https://doi.org/10.5688/aj710588>.
32. Lis JE, Martin BA, Margolis AR, Barnett SG, Kopacek KJ. Evaluation of a required teaching rotation for pharmacy residents at a school of pharmacy. *Curr Pharm Teach Learn.* 2014;6(1):158–166. <https://doi.org/10.1016/j.cptl.2013.09.011>.
33. DiPaula BA, Mohammad RA, Ayers P, et al. Residents as preceptors and educators: what we can learn from a national survey to improve our residency programs. *Curr Pharm Teach Learn.* 2018;10(1):21–27. <https://doi.org/10.1016/j.cptl.2017.09.006>.
34. Romanelli F, Smith KM, Brandt BF. Teaching residents how to teach: a scholarship of teaching and learning certificate program (STLC) for pharmacy residents. *Am J Pharm Educ.* 2005;69(2):126–132. <https://doi.org/10.5688/aj690220>.
35. Peters L, Long B, Eddy E, Kuhn K, Huppert C. Participants' perceptions of a residency teaching certificate program: the quality, impact and benefits. *Pharmacy Practice (Granada).* 2021;19(3). <https://doi.org/10.18549/pharmpract.2021.3.2423>.
36. Society of Hospital Pharmacists of Australia (SHPA). Training Programs. Available from: <https://www.shpa.org.au/workforce-research/training-programs/resident>; 2024.
37. Society of Hospital Pharmacists of Australia (SHPA). National Competency Framework for Pharmacist in Australia 2016. Available from: https://shpa.org.au/publicassets/02aae786-f577-ec11-80de-005056be03d0/national-competency-standards-framework-for-pharmacists-in-australia-2016-pdf-2mb_1.pdf.
38. Society of Hospital Pharmacists of Australia (SHPA). Resident Training Programs. Available from: <https://shpa.org.au/workforce-research/training-programs/resident>; 2024.
39. Nair BR, Alexander HG, McGrath BP, et al. The mini clinical evaluation exercise (mini-CEX) for assessing clinical performance of international medical graduates. *Med J Aust.* 2008;189(3):159–161. <https://doi.org/10.5694/j.1326-5377.2008.tb01951.x>.
40. Society of Hospital Pharmacists of Australia (SHPA). SHPA ClinCAT. Available from: <https://shpa.org.au/cpd/shpa-clinca>; 2024.
41. Potter M. Teaching on The Run. Available from: <https://www.tellcentre.org/about>.

42. Williams CR, Abbott K, Hughes M, Wilson CG, Scott MA. Development of pharmacy resident leadership skills through creation of a regional ambulatory care forum. *Curr Pharm Teach Learn*. 2018;10(12):1641–1646. <https://doi.org/10.1016/j.cptl.2018.09.006>.
43. Lamb KD, Baker JW, McFarland MS. Implementation of a pharmacotherapy clinic into the patient centered medical home model by a second year pharmacy resident. *Am J Health-Syst Pharm*. 2015;72(17 Supplement 2):S83–S89. <https://doi.org/10.2146/sp150015>.
44. Wilhelm SM, Petrovitch EA. Implementation of an inpatient anticoagulation teaching service: expanding the role of pharmacy students and residents in patient education. *Am J Health-Syst Pharm*. 2011;68(21):2086–2093. <https://doi.org/10.2146/ajhp100658>.
45. Cairns-Lee H, Lawley J, Tosey P. Enhancing researcher reflexivity about the influence of leading questions in interviews. *J Appl Behav Sci*. 2022;58(1):164–188. <https://doi.org/10.1177/002188632110374>.