The implementation of a pharmacy residency program – A qualitative study on the diffusion of an innovation

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ABSTRACT

Background: Structured workplace training supports pharmacists in achieving individual career goals as well as health services to meet workforce development goals. Hospital pharmacy residency programs offer structured training pathways for early career pharmacists. A residency program was introduced in Australia, modelled on formal programs already established in other countries.
Objective: This qualitative study explored key stakeholders' expectations and early experiences with the implementation of a pharmacy residency program using an analytical framework derived from implementation science.
Methods: Three focus groups and seven semi-structured interviews were conducted over a 24-months period with pharmacy managers, senior pharmacists and resident and non-resident pharmacists from different Australian State and hospital settings. They were audio recorded and transcribed verbatim. Transcripts were analysed via thematic analysis using Diffusion of Innovation Theory as a categorising framework.
Results: Thirty stakeholders participated in focus groups and interviews. Three of the five main factors that influenced the adoption of an innovation according to Diffusion of Innovation Theory were identified as prominent, two as weaker themes. The relative or perceived advantage of adopting or participating in a residency program was identified as a major theme. Pharmacy managers and resident pharmacists regarded individual and workforce advancement as creating a potential advantage for them. The complexity of the program's implementation, with concerns about its resourcing requirements and sustainability, influenced uptake. The compatibility of the program with already existing training pathways was explored, with the residency sharing similar objectives with current pharmacy education and workforce development goals. Observability and trialability played lesser roles in facilitating program uptake.
Conclusion: The implementation and diffusion of the pharmacy residency program can be interpreted by referring to key principles of Diffusion of Innovation Theory. Findings from this study and consideration of theory can inform the diffusion and ongoing maintenance of pharmacy workplace training and education programs.

1. Introduction

Formal pharmacy residency programs for newly registered pharmacists finishing their degree, or starting a career in hospital pharmacy, are common practice in a number of countries including The United Kingdom (UK) and The United States of America (USA).[1–3] Residency programs provide structured, standardised training and usually include specified tasks and rotations for resident pharmacists as well regular skill assessments.[4] Residency programs are considered essential for the development of early career or new to hospital pharmacists, especially for pharmacists with responsibilities for direct patient care.[4–8]

In Australia, the first pharmacy residency program was introduced by the Society of Hospital Pharmacists Australia (SHPA) in late 2016. It is more similar to the UK than the USA program in terms of objectives, structure, duration and target demographics of resident pharmacists. Under the UK and Australian pharmacy education models, pharmacy degrees are generally delivered as undergraduate university programs, and graduates must complete a one-year internship or pre-registration training period prior to sitting a pharmacy board registration examination, before they can become fully registered pharmacists.[2,9] Therefore, by the time they enrol into a two-year residency program, pharmacists in the UK and Australia would have at least one year of formal work experience in a pharmacy setting prior to their first year of residency training. This is one major difference to the USA residency model, where the Pharm.D. is designed as a postgraduate program and graduates are eligible for sitting the board registration examination upon graduation without a one-year internship.[1] The Postgraduate Year 1 (PGY1) year of the residency programs is effectively the first year of formal work experience in a pharmacy setting for the

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USA resident pharmacist, and whether to continue the residency and join Postgraduate Year 2 (PGY2) is optional.[1]

These differences between the three countries may potentially result in different training needs and outcomes of their pharmacy residency programs. However, having a formal, structured pharmacy residency program is emerging as a trend in ongoing pharmacy education and pharmacist development around the world as it could support global workforce development goals.[4–8,10–12]

Adapting the structure of the UK hospital pharmacy residency program, the SHPA residency training is practice and competency-focused, with standard observational assessments, which are used as routine clinical skills and performance indicators.[13–15] A major difference to the UK program is that it is only delivered in the workplace, whereas pharmacists enrolled into a residency program in the UK usually study for a formal postgraduate qualification concurrently.[2,16]

Hospital pharmacies in Australia wanting to offer a residency program have to apply to the SHPA to become an approved and accredited site by submitting evidence of departmental education and training capacities and resources.[13–15] Once this is achieved the SHPA provides them with generic training plans and assessment strategies, which stipulate that the two year residency program must include three six month rotations in a surgical specialty, medical specialty and operational support, and a six month elective rotation. The residents also have to complete routine observational clinical skills assessments, participate in case presentation, research projects and perform higher duties such as joining different working groups and committees.[13–15] However, the SHPA does not directly monitor the detailed execution of site-specific training plans until residents submit their portfolio, outlining and evidencing training at the end of the residency program, to SHPA for final completion accreditation. Hence, variations between residency programs offered by various hospital pharmacies are to be expected and are likely to reflect the implementing site's expectations, experience, needs, resources and support structures. How easily the program can be implemented and adapted to meet these organizational needs may affect the rate and speed with which the new pharmacy training pathway is adopted by hospital pharmacies and health services.

The introduction of the pharmacy residency program into hospital workplaces can be regarded as the implementation of a complex intervention into existing systems and structures.[17] The design and roll out of the residency program by the SHPA was not explicitly based on any theory explaining or guiding the implementation or evaluation of healthcare or workplace training programs.[18]

A preliminary, informal survey by the SHPA found the residency program to be beneficial to the workforce, however, no information is currently available on how and how well this particular or other pharmacy residency programs in general were implemented.[19] This qualitative study aimed to fill knowledge gaps in regard to the uptake, implementation and participation of the program by exploring key stakeholders' expectations and experiences. An investigation of early experiences with the SHPA pharmacy residency program and its implementation in Australian hospital pharmacies in combination with implementation science and theories will inform future implementations. Theories commonly applied in implementation science were consulted to guide data collection and analysis.[20] Deliberating on the detail of the SHPA residency program and related documents, three implementation science theories were identified as potentially applicable to the roll out and site-specific implementation of the program. These were:

1) The organizational theory of innovation implementation effectiveness, which was designed for complex innovations and programs, which often require coordinated involvement and use by multiple individuals to be effective.[21–23]
2) Diffusion of Innovation Theory, which describes aspects of innovations that favour their uptake and maintained implementation.[24]
3) Normalisation Process Model, which explains the processes by which complex interventions become routinely embedded practice.[25]

All theories seemed equally suitable to interpret the uptake and maintenance of a new workplace training program, but the final decision on the theoretical framework to be applied in the analysis of stakeholder experiences and expectations was made during the data analysis.

2. Methods

2.1. Design and setting

This study used a qualitative research approach suitable to exploring the views of program stakeholders, utilising data from focus groups and semi-structured interviews.[26] It was approved by the relevant ethics committees (Approvals: HREC44774 and 2,017,000,827).

2.2. Participants and recruitment

Purposive recruitment of participants targeted those who were regarded either as a driving force behind, or major decision makers supporting or actioning, the implementation of the residency program and its recipients/participants. Managers or directors of Australian hospital pharmacy departments, SHPA residency program staff and resident and non-resident early career pharmacists were invited to participate in this study. Participants were identified and invited either through the professional and personal networks of the investigators or opportunistically at professional meetings.

2.3. Data collection

Face to face focus groups were offered to participants, who were able to attend in person. Participants who were unable to attend due to scheduling conflict or their geographical location, were offered the option of semi-structured interviews via phone or video conferencing software (Zoom Video Communications Inc.). The main investigator (CW) conducted all focus group discussion with one other co-investigator with extensive focus-group and small group facilitation skills. Focus groups were conducted at the University of Queensland, or at professional events. Managers and resident pharmacists were separated into different focus groups to ensure residents felt comfortable and secure to express their opinions without current or potentially future employers present, avoiding any hierarchy gradients within groups.

Focus groups were audio recorded and transcribed in real time by a professional transcriptionist. The main investigator (CW) checked the accuracy of transcripts against audio recordings. Field notes were taken to enhance accuracy and aid the analysis of transcripts. During the focus group discussions, investigators introduced the purpose of the study, format of the focus group, and then started the discussion by following the interview guide (Appendix 1). Discussions were monitored and facilitated to ensure that every participant had the opportunity to express their viewpoint.

The interview guide was not piloted as questions for the initial focus group were generic and asked why participants chose to join the program and about their experience with its adoption. Similar questions with more targeted prompts were used consequently to explore emerging issues more deeply, especially around early expectations of the program, perceived advantages, and experiences with the process of its implementation.

Semi-structured interviews were conducted via phone or video conferencing software (Zoom) by the main investigator (CW), audio recorded and transcribed verbatim. The same question guide was used for focus groups and interviews.

The residency program aligns with pharmacists' professional registration at the end of their intern year, with intakes (implementation and participation) at the beginning of a calendar year. To capture two cohorts of residents and newly added residency sites, data collection started in early 2018 and was completed in 2020. No incentives to participation in focus groups or interviews were offered.

2.4. Data analysis

As the same questions were used to prompt participant responses during focus groups and interviews, their transcripts were combined for the data analysis, but separated into pharmacy managers and resident pharmacist groups. Microsoft Excel was used to categorise all data. Thematic analysis of the transcripts was conducted inductively as well as deductively. This hybrid approach has the benefit of integrating a data-driven, inductive development of themes with the use of a theory-driven approach in subsequent deductive analysis.[27]

As a first step, an inductive, data-driven approach to thematic analysis was employed to gain an understanding of participants' experiences.[26] This guided the initial phases in which codes were generated independently by two of the investigators (CW, KL) to make sense of these experiences, e.g. with the site specific implementation of the residency program, the motivation for participation (residents) or uptake (managers). This developed an in depth understanding of how participants perceived the residency program in its overall and local development, its advantages, disadvantages and challenges. The initially categorised data were then considered using the initially postulated theories as a lens for their interpretation. At this stage Diffusion of Innovation Theory was identified from the candidate theories as the most suitable theoretical framework for categorisation of data and development of further and final themes.[24] Diffusion of Innovation Theory explains and illustrates how a new idea or innovation is disseminated and accepted by a wider target audience or market, where potential adopters' different backgrounds and needs may affect their willingness to adopt a new idea.[24] The residency program is an innovative education and training initiative designed for a range of diverse users and Diffusion of Innovation Theory also explained the diverse expectations and perceptions of what could be regarded early adopters of the program.

Transcripts were then analysed again taking a deductive approach, which serves the purpose of applying the lens of an existing theory to the data. Using Diffusion of Innovation Theory as a basis, all investigators, by then fully immersed in the transcripts, reviewed the preliminary coding (managers and residents separately) and refined it deductively into the five categories based on the five main factors Rogers described as influencing the adoption of an innovation.[24] Regular team discussions during all stages of analysis supported the decision-making process, resolved any inter-coder differences and established the final categorisation of the data.

The five main factors in the Diffusion of Innovation Theory were:

a) Relative advantage: the degree to which an innovation is regarded as more advantageous compared to existing programs.
b) Compatibility: how the innovation is aligning with the values, experiences, and needs of potential adopters.
c) Complexity: relates to how easily the innovation can be understood or implemented.
d) Trialability: the extent to which an innovation can be tested before a commitment to its adoption and implementation is made.
e) Observability: the extent to which the innovation creates observable and tangible outcomes.

To ensure validity of categorisation, transcripts were analysed for discrepant or disproving data after deductive coding within the framework was completed, which showed a high degree of consilience between Diffusion of Innovation Theory and the data as well as initially generated codes around implementation.[28]

3. Findings

Three focus groups and seven semi-structured interviews were conducted over a 24 months' period. Thirty stakeholders from 17 different hospital sites and four different Australian states (Queensland, New South Wales, Victoria and South Australia) and different hospital settings participated in this study. Focus groups were 60–75 min in duration, with interviews taking an average of 30 min. Participants discussed their experiences and opinions freely, providing a wide range of responses. The

Table 1
Participant demographic data (pharmacy managers, senior pharmacists and SHPA residency program staff).

Participant	Category	Gender	Age group	Current site of employment	Current site offers residency program
M1	PM	M	51–60	TH	No
M2	PM	F	41–50	TH	No
M3	PM	F	31–40	TH	No
M4	PM	M	51–60	TH	Yes
M5	PM	F	41–50	TH	Yes
M6	SP	F	31–40	TH	No
M7	SP	F	31–40	TH	No
M8	PM	M	51–60	TH	No
M9	SP	F	41–50	SH	No
M10	PM	F	31–40	TH	Yes
M11	PM	F	>61	TH	Yes
M12	PM	M	51–60	SH	Yes
M13	PM	M	31–40	SH	Yes
M14	PM	M	41–50	TH	Yes
M15	PM	M	51–60	TH	Yes
M16	SHPA staff	F	21–30	TH	Yes
M17	PM	F	40–51	SH	No

Pharmacy Manager = PM, Senior Pharmacist = SP, Tertiary Hospital = TH, Secondary Hospital = SH.

majority of pharmacy managers (*n* = 13) and senior pharmacists who had direct involvement in implementation of residency program (*n* = 3) and SHPA residency program staff (n = 1) worked in tertiary hospitals (see Table 1). There were no significant differences in participants' demographic data between either focus groups or interview groups.

All resident and non-resident pharmacists (n = 13) were from tertiary hospitals, with the majority in the process of completing the program (see Table 2).

3.1. Findings

Three of the five main factors proven to influence adoption of an innovation were clearly identified and prominent as themes in the transcripts of both groups, residents and managers. These were the relative or perceived advantage of adopting or participating in a residency program, the complexity of its implementation, and its compatibility with already existing pharmacy training pathways. The other two of the five themes from the Diffusion of Innovation Theory (observability and trialability) were only identified as irregular comments in the data analysis and are, therefore, listed as secondary themes.

Themes are illustrated in Fig. 1, and described with quotes as follows.

3.1.1. Perceived advantage of adopting a residency program

Pharmacy managers perceived a relative competitive advantage of adopting the residency program, in that it would benefit their pharmacy and health service by attracting highly motivated pharmacists. Resident

Table 2
Participant demographics (resident and non-resident pharmacists).

Participant	Category	Gender	Age	Residency status
R1	RP	F	21–30	Current
R2	RP	M	21–30	Current
R3	RP	M	21–30	Current
R4	RP	F	21–30	Current
R5	RP	F	21–30	Current
R6	RP	F	21–30	Current
R7	RP	F	31–40	Completed
R8	RP	F	21–30	Current
R9	CP	F	21–30	Not a resident
R10	RP	F	21–30	Completed
R11	CP	F	21–30	Not a resident
R12	RP	F	21–30	Current
R13	RP	F	21–30	Current

Resident Pharmacist = RP, Clinical Pharmacist = CP.

•Perceived Advantage
•- Workforce and pharmacy service development
•- Career progression
•- Structured training with rapid upskilling

•Compatibility
•- Natural progression in career development
•- Augments & formalises existing training
•- Generalised versus specialized training

Diffusion of Pharmacy Residency Program

Complexity
- Understanding of program & purpose
- Limited resources and abilities to meet program requirements
- Concerns with unfairness in resources allocations
- Need further guidance

Observability
- *observation by proxy*

Trialability
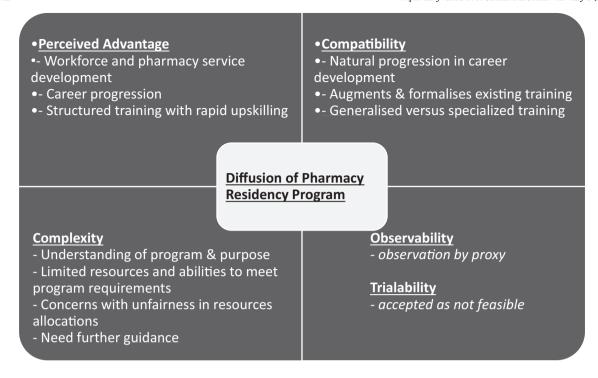- *accepted as not feasible*

Fig. 1. Diffusion of Innovation domains as themes in focus groups and interviews.

pharmacists regarded hospitals offering the program as more desirable workplaces.

> I think it makes us more attractive as an employer to say that we have got a program in place, a career path that you can follow.
>
> [M3]

> Residency I think it is a must have … I just wanted it. We had to have it for survival I guess so that we could attract staff.
>
> [M12]

> From a hospital perspective, they don't want to be left behind. I know a lot of people who are working in smaller sites that aren't doing it. Still can't believe they are not doing it. So behind. So backwards. If they are not offering that for me, I need to be different, I need to excel so I'm going to move to a bigger site.
>
> [R4]

As already alluded to in the quote above, resident early career pharmacists believed that undertaking and completing the residency program would make them more competitive when applying for permanent positions or higher duty roles.

> People get into the residency program because they think it is going to put you ahead of everyone else.
>
> [R3]

> Other than being behind all the other countries in the world, considering we're the last in the program, I also think there are so many pharmacists now so how do you differentiate from everyone when you have got so many universities doing it, the OP *(Overall Position)* has dropped or whatever it is now, and there are thousands and thousands and not

enough jobs. Now everyone has to do more to make themselves stand out; it is going to be a norm, I reckon.

> [R8]

The managers believed the new training pathway not only supports individual career advancement for new-to-hospital pharmacists but also overall workforce development in their hospital and the profession in general.

> So, it is really a key part of formalised workplace learning for a rapid upscaling of your workforce to be able to have capable body of people to deliver service. Because that is what I have to do, that is what I am responsible for, is to convert a multi-million dollars' worth of FTE *(Full-Time Equivalent)* into people who the hospital needs against best practice evidence etc.
>
> [M15]

The residents believed that this new training pathway provides structured training opportunities and rapid upskilling for early career pharmacists.

> Because I came as a community pharmacist into hospital I just relearnt a whole lot of things in a short period of time. Residency would have been ideal at that time of transition for me. I jump on board a couple of years later, and it was still good. But if I could have jumped onto the program straight out of community that would have been such a beneficial learning curve, I think. I guess that is where it is targeted, our newly qualified pharmacists, new to hospital.
>
> [R8]

Pharmacy managers observed that a more structured workplace training program provides an advantage over existing workforce and career development pathways.

> A hospital pharmacy service, there are many different parts to it. There is operational, there is manufacture, there is the business side. You have to give them exposure to that in a structured way. Otherwise you might

put someone down the clinical path without giving them the exposure to the rest, so it's a more structured way to expose them to the whole of pharmacy.

[M10]

3.1.2. Complexity of implementing the residency program

The complexity of program requirements stipulated by the SHPA to workplaces, the number and nature of assessments and a lack of understanding of the program requirements and purpose were identified as barriers to a smooth uptake of the new training pathway by residents. They highlighted a need for more clarity of program plans and the purpose of assessment tasks they are asked to complete.

… because I was the first intake, so they hadn't really decided on how to structure it, how to support it, and they also went pretty gung-ho with the amount of people that they allowed to be on the program and there was no extra support or resourcing for the senior staff for the mentorship supervision and feedback. So, for me it was a whole lot of data collection and evidence collection for nobody to actually respond to it.

[R7]

It totally felt like ticking off (assessments); well, we just wasted three hours of our own time.

[R4]

Pharmacy managers agreed that limited resources available to meet the complex program requirements represented a barrier to the uptake of the program or its implementation.

We took on so many; we had 14 in the original cohort. We now have 10 in one year and four in the next year. The work that it causes every other member in our staff to do to accommodate it because as you said, we don't have, we weren't given a whole lot of extra resources to make this work and a lot of some of the areas that the work was done was being done as we progressed because we didn't really have the outlines, et cetera ready to go when we started. We grew as we did it, and the work that has happened in my department has been exemplary, but my pharmacists cannot keep this up.

[M4]

This becomes a particular issue when workplaces were not quite ready to meet the requirements for supervision and mentorship of residents and regular assessments of their progress.

… But trying to run some sort of mentorship at the same time as running a residency program, at the same time as having interns that have to go through their program, at the same time as having pharmacists trying to get their advanced practice accreditation, it's all too much in one hit. We have tried to do too many things too fast, without some change management process.

[M14]

Pharmacy managers were concerned about potential unfairness in resource allocation between residents and non-residents, with the workplace having to prioritise the training opportunities for resident pharmacists to ensure that they meet the program requirements.

But I think there is going to be some limitations to how far we can go or how quickly we can go there. Perhaps the way we have implemented it is very rapid, and I must say personally to get a structure in place that we could accommodate these people within a structure and effectively

rotate them through all the areas that we would like them, that has been a difficult thing to address. Yeah, it's a great concept no doubt but operationalising it is very difficult.

[M3]

They also experienced or anticipated difficulties in accommodating the needs for timing and the minimum of clinical rotations to be offered to residents.

… people who are not on the residency sometimes feel left out because you may have to give them a different rotation because you have to put a resident in that rotation to kind of meet those standards. I think it also causes a divide because of the structure around it and having to accommodate the rigid nature of it. If it was flexible, then you could allow many more people to be on the residency program because you would be able to fit more people in because it didn't matter the exact rotation that they have to go in.

[M11]

Generally, managers and residents found that, in the initial implementation phase, more guidance and support from the sponsoring organisation would have reduced the complexity they experienced, which was often related to having to find their way without clear direction. They also expressed concerns that the lack of guidance contributed to complexity in implementation and would result in inconsistencies and variable outcomes.

I don't think it is the actual physical resources; it's the 33 registered sites or more now and there's 33 sites that are doing 33 different things. … While residency is great to have a consistent approach, the current residency is not consistent at all.

[M11]

As an employer, I would like to see consistency. It is very difficult for someone to say 'I have got the "it (residency)" '. You have to dial it back and say 'Where did you get the it from?' It is very difficult to find to out: 'So what did that look like? Did it mean that you were just left alone and that there was one assessment and there was no feedback, and you didn't implement any changes?' The profession is not that big, and it can be very judgemental. An "it" from somewhere is very different from an "it" from somewhere else. There are calibres of it, irrespective of calibres of people.

[M17]

3.1.3. Compatibility of the residency with existing pharmacy workplace training structures and pathways

Residents agreed that the residency program is a natural progression in their career development.

I have also just finished my internship so progressing to residency felt like a great opportunity to reinforce the skills I had learned as an intern pharmacist and kind of provided, I guess, a track to launch my career on and see new aspects of pharmacy and have a structure to guide me about what skills I need to develop as a competent early career pharmacist and where it can take me in the context of like a pharmacy team and like in a hospital, as a hospital pharmacist.

[R2]

They believed that ongoing professional development would become a norm and would be expected by other health professionals.

I was talking to a doctor today about that, (residency) because she asked 'What is residency?', and I said 'It's kind of like what you do, I guess. It's like more years of foundation training'. She said, 'Oh, wait, you didn't do that already?'.

[R4]

There really has never been any structured learning in a hospital environment following internship so probably a huge gap, I think. Other clinicians, doctors, they have years and years of training and experience. We don't have that, and we have a big impact in a hospital.

[R6]

Managers who had already adopted the residency program as well as the residents agreed that the residency program has the potential to provide a normalised continuum in pharmacy training, which enhances and builds on the existing pharmacy training pathway.

It also helps with our career trajectory as well, not that we have a huge problem in recruiting because of the surplus of pharmacy students and graduates these days. I think it helps keep people in hospital pharmacy as well, to know there is a structure and path that they can follow: internship, residency and structured specialty residency after that.

[M4]

We put in state-wide workforce development years ago when the Health Minister agreed having a minimum standard for pharmacy was a core benefit for patient care. We know how to do it, spend money in the state level. We have a lot of these building blocks, but the key point is actually for the directors to put them into practice, and have the senior pharmacist to drive it.

[M15]

The pharmacy managers also agreed that the residency program augmented or formalised already existing structured training programs with rapid upskilling and secured training opportunities for new to hospital pharmacists.

… an early career hospital pharmacist education strategy, but also to upskill people quickly and give them a formal way of seeing a wide range of specialties. Quite often in a busy environment you may not always be able to make those rotations happen.

[M8]

Managers who had not adopted the residency program so far, did not necessarily perceive the residency program as compatible with their resources or advantageous over existing early career training pathways, and wondered how generalised training would be feasible in specialised hospitals, e.g. paediatric or oncology hospitals.

It's about structure and direction and gold stars and all of this. The whole idea is for the masses…. The program is not left field; it's not radical. It's truly not any of those things. But it is the operationalising of it and then, as you say, maintaining it. … I don't have a residency program, for a lot of the reasons they have talked about over here, in that the demands and the requirements and the seniority just isn't available.

[M17]

3.1.4. Trialability and observability

Trialability and observability were observed more irregularly than the main themes, with a few comments made around observability, which demonstrated that being able to watch others' success may support the acceptance and uptake of the innovation.

I was working at a hospital where I got to see the development of the two residents from the start of the program, and I couldn't believe how far they came in the two years, so I was very keen to get involved in the program.

[R1]

Managers seemed to accept that they had to commit to the residency program once they decided to implement it, and that its complexity precluded any trialability. This was reflected in comments about committing resources without being able to gauge the impact on their department and future benefits for their workforce.

4. Discussion

In this qualitative study of stakeholders' expectations and early experiences with the implementation of a pharmacy residency program, focus groups and interviews clearly pointed to aspects of the program which will potentially influence how it will be adopted more widely. Taking these into account may safe-guard further uptake and diffusion. So far, the SHPA pharmacy residency program has been initiated with a positive attitude and strong expectations by different hospital pharmacies. The hospital pharmacists who participated in this study and either implemented or supported the uptake of the program as managers or enrolled as residents at the early implementation stages can be regarded as early adopters. These early adopters expressed positive expectations that the program would enhance the individual development of early career pharmacists, and more globally, the future pharmacy workforce. They mostly experienced the program as compatible with, and as an enhancement to, rather than a replacement of their current workforce training pathways. However, both managers and residents thought some of the program requirements were not easily adaptable to their workplace and expressed the need for clarification and more explicit guidance to reduce complexity in the implementation.

Managers and residents pointed to multiple factors that can affect how well and quickly the new idea of pharmacy residency diffuses into hospital pharmacies. Many of these will become more relevant once the early adoption phase stalls, and they relate to the nature of the innovation, communication channels, time and social systems.[24,29]

Diffusion of Innovation Theory posits that stakeholders need to be able to perceive a relative advantage of adopting an innovation, in this case the pharmacy residency program, and believe that implementing the program provides them with advantages over existing training programs.[24] The findings of this study demonstrate that early adopters of the program welcomed a change to the current pharmacy training pathway, and participants believed that the structured residency training would benefit both workplace and individual pharmacists by ensuring training opportunities. This may reflect the recognition that the pharmacy workforce will need continuous and advanced training opportunities after graduation and registration, to meet the ever-changing complex health system needs and maintain career satisfaction.[8,11,12,30,31] As such, the implementation of and participation in the residency program was conceptualised as an advantage. However, this would be expected of early adopters and perceptions of advantage will vary between individual hospital pharmacies and residents, depending on the success of already functioning training programs, service models, career expectations and opportunities.[24,29,32,33]

The complexity of the pharmacy residency program will also affect the rate of further adoption.[24] In this study, barriers to the implementation and uptake of the program were managers' concerns around program complexity and availability of resources workplaces can provide, including senior staff to supervise residents. This was also reflected in resident pharmacists' concerns about some of the program requirements. Stakeholders' perceptions of how difficult it is to implement, operationalise and understand a program are likely to have a negative effect on future uptake and

sustainability.[24,29,34] Further standardisation and procedural support by professional organisations such as the SHPA may mitigate the unavoidable complexity of a two-year workplace training program. These complexities may be of particular concern in the early stages of program implementation as adopters and users are only developing a clear understanding and more accurate expectations of what the program demands in resources and engagement.

The compatibility of the pharmacy residency program with already existing pharmacy training pathways, departmental structures and available resources plays an important role in easing implementation. The pharmacy residency program needs to share similar objectives with existing aims in pharmacy education and hospital training, which is to support the development of pharmacists to meet current and future individual career and workforce needs. The tasks and activities in the residency program also have to fit with the residents' and supporting hospital pharmacists' usual roles and duties. The more compatible tasks and assessments required by the residency program are with the regular role and duties of hospital pharmacists, the easier its adoption will be. Participants regarded the newly implemented program as compatible with existing pharmacy training and pharmacists' clinical roles, providing additional structure, which at times was perceived as a burden or risk to the long-term maintenance of the program. The similarity, familiarity and compatibility between old and new training pathways will assist in enhancing the uptake and acceptance of the new program by current and potential users as suggested by Diffusion of Innovation Theory.[24,29,35]

Other aspects of Diffusion of Innovation Theory which can play an important role implementing an innovation, like trialability and observability, were only peripherally discussed and mentioned in the focus groups and interviews during this study. Currently, there is no option for a hospital pharmacy or a potential resident pharmacist to trial or have a test run of the program before fully committing to it. There seemed to be an implicit acceptance by managers that they would have to commit resources and effort to the full implementation of the program in order to trial it. This may discourage some pharmacies, especially smaller pharmacy departments, which are often less well-resourced compared to tertiary and quaternary hospital pharmacies, to take up the residency as they cannot test how significant an investment in both time and resources the two-year training program will be, perceiving commitment without trial as too much of a risk. It may be beneficial to allow interested non-residency hospital pharmacies to collaborate with the larger hospital pharmacies and become a rotation site within their program, or to trial a mini six-month residency program by themselves with a single rotation.[24,29,34,36]

Rogers suggests that the observability of successes can positively support a program's uptake.[24] This was reflected in participants observing the accelerated development of residents through the program, which motivated a few of the early career pharmacists to enrol. Non-residency sites can experience the diverse advantages by proxy, e.g. through competitions the SHPA currently holds for the resident of the year, and the publication of the residents' research projects, enhancing the observability of the program, which would support the dissemination of the positive training outcomes from residency program to the non-residency sites.[24,29,34,36] Fostering networks and the sharing of experiences and resources may allow those who are interested but hesitant to make an informed decision on uptake.

Aspects of Diffusion of Innovation Theory were already observable in the planning and design of the Australian pharmacy residency program. Firstly, in setting the agenda, hospital pharmacy managers and their professional representatives realised that current training for junior hospital pharmacists did not meet the demands of their services in the current, rapidly changing hospital environment. Individual leaders in hospital pharmacy and the SHPA believed that a formalised training program provided a conceptual solution to the problem.

Findings from the focus groups and semi-structured interviews showed the residency program to be in the redefining and clarifying stages of implementation. Participants' experiences showed the program may need to be adapted to accommodate each hospital pharmacy's needs and capacity. The final stage, the implementation of residency programs into health

services as a new norm had not been achieved at the time point of study, which means that residency as an innovation may still risk discontinuation and abandonment, jeopardising the long-term and wide-spread establishment of the program.[24,29]

The Diffusion of Innovation Theory also highlights the importance of communication channels as elements to consider in the distribution or adoption of new programs. Mass media channels, such as SHPA national conferences, newsletters and websites, can be effective in introducing the concept of residency training to hospital pharmacists. Although not specifically explored as part of this study, in the broader context of residency implementation it was evident that localised and interpersonal channels between different hospital pharmacies, their managers and residents seemed to have positive effect on the acceptance and uptake of the new training program. This aligns with another aspect of Diffusion of Innovation Theory that people in general, in this case hospital pharmacy managers and resident pharmacists, tend to form an opinion about a new initiative through its subjective evaluation by peers who have already implemented the program rather than its scientific review. This effect is potentially amplified when early adopters are also opinion leaders and strong drivers of uptake within their networks.[24,29,33]

Since its first implementation the Australian pharmacy residency program has undergone several key phases of the diffusion of innovation process. While a number of sites have firmly implemented and routinised the program, others seem still in the confirmation and re-invention stage. Although the SHPA has conducted a survey that confirmed stakeholders' perceptions of the residency program as beneficial for the pharmacy workforce,[19] further evaluation and review of the program is needed to guide its future development and refinement. Initially the program was mainly adopted by larger hospital pharmacy departments, who often were managed by key opinion leaders in its design and promotion. This again aligns with Diffusion of Innovation Theory where early adopters of a new program usually have greater ability to deal with abstractions, more favourable attitudes towards change, and greater ability to cope with uncertainty and risk. These early adopters were also found to have more social participation with better connections in interpersonal networks and channels. Therefore, it is not surprising that a significant number of early residency participation sites were from states where due to the state-wide organisation and funding public hospital pharmacies are highly interconnected.[24,29]

4.1. Limitations

This study was a preliminary qualitative study which included a variety of participants with a broad range of experiences (pharmacy managers and resident pharmacists) from different states and practice settings in Australia. Due to the early stages of residency roll out, however, the majority of participants worked in tertiary hospital pharmacy departments, which are usually better resourced compared to smaller or rural hospital pharmacy departments. Findings from this study may not be generalisable to hospital pharmacy departments with less educational infrastructure. Pharmacists in the process of completing the residency program are also likely to have more favourable views due to their investment into the program, compared to pharmacists who chose not to undertake a residency. A national study inviting all residency sites and resident pharmacists in Australia would further explore how issues identified in this study are experienced beyond the early adoption phase and what needs to be in place for the residency program to become a normalised training pathway.

4.2. Conclusion

The implementation of the SHPA pharmacy residency program in Australia can be interpreted by referring to key aspects of Diffusion of Innovation Theory, where the clear advantage of the new program and its compatibility with existing training pathways effectively and successfully attracted its uptake. However, the adopters and users of the program still have questions and concerns, especially around its sustainability. Further

review and research are needed to enhance the implementation and maintenance of the pharmacy residency program. The strategies and the principles derived from Diffusion of Innovation Theory are applicable in this context and are ideally considered when planning new education and training programs in health care education, and similar implementations, such as the Australian advanced residency program.

Funding

Declarations of interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.rcsop.2021.100048.

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