

RESEARCH ARTICLE

Factors influencing the transition of pharmacy students from pre-clinical to clinical years at university

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Abstract

Introduction: The transition to clinical studies can be a source of stress, though little is known about how pharmacy students manage this transition. This mixed-methods study investigated factors influencing student transition from pre-clinical to clinical years of an Australian pharmacy degree. **Methods:** Students rated and discussed their confidence in performing pharmacy-related skills, factors influencing their ability to carry out these skills and key enabling factors and barriers that influenced their transition. **Results:** Differences in teaching and assessment style and placement workload affected the transition experience. Self-confidence in the clinical learning environment was enhanced by patient contact, previous pharmacy work experience, case-based learning and supportive placement supervisors. A perceived lack of relevance of pre-clinical learning and heavy workload during placement were major barriers to a smooth transition. **Conclusions:** Support systems are essential to foster transition into the clinical learning environment with confidence and effective application of theoretical knowledge to real-world practice.

Introduction

The university experience is rarely linear, with expectations, learned content and associated assessment changing as undergraduate students progress through their respective degrees. Most students enrolled in undergraduate healthcare degrees usually go through several stressful transitional phases, including not only the transition from high school to university and from university into the workforce, but also a mid-degree transition from pre-clinical to clinical learning environments (Radcliffe & Lester, 2003; Perrone & Vickers, 2003; Noble *et al.*, 2015; Botelho, Gao, & Bhuyan, 2018). This mid-degree transition implies changes in learning and assessment style, the application of knowledge and skills to real patients in placement settings, professional socialisation and other differences compared to the pre-clinical learning environment (Van Hell *et al.*, 2008; Godefrooji, Diemers, & Scherpbier, 2010). These expected changes are a source of

excitement, though also of concern for students and the experience has been described in previous research as 'being thrown in the deep end' or as a 'shock of practice' (Boshuizen, 1996; Dornan & Bundy, 2004). Experiencing a difficult transitional period between pre-clinical and clinical learning environments is theorised to affect students' mental health, retention at university, performance in the workplace and patient outcomes (Van Hell *et al.*, 2008; Godefrooji, Diemers, & Scherpbier, 2010; El-Masry *et al.*, 2013).

Research into the transitional phases for medical and dental students has identified key barriers and enabling factors that influence their transition into clinical training (Godefrooji, Diemers, & Scherpbier, 2010; Orsini *et al.*, 2016; Soo *et al.*, 2016). Barriers include a lack of confidence in clinical knowledge, feelings of inadequacy and increased workload, whereas pre-clinical patient

interactions, clear overviews of expectations and self-determination and motivation facilitate this transition (Godefrooji, Diemers, & Scherpbier, 2010; Orsini *et al.*, 2016; Soo *et al.*, 2016). However, compared to other healthcare professions such as dentistry and medicine, little research indicates what factors affect pharmacy students' transition, particularly from the pre-clinical to clinical years at university. Pharmacists have a distinct field of knowledge and skill set compared to these other healthcare professions and it is reasonable to expect that pharmacy students would experience different challenges throughout their university experience.

Due to the lack of research on pharmacy students' experience of this transitional phase, the aim of this study was to investigate perceived barriers and enabling factors that affected the ease of transition of pharmacy students from pre-clinical to clinical years. It is expected that gaining an understanding of these factors would allow pharmacy schools to provide learning experiences that facilitate smooth transition from the pre-clinical to clinical years of pharmacy training. This study involves pharmacy students enrolled in the James Cook University (JCU) Bachelor of Pharmacy (B.Pharm.) programme, which is a four-year undergraduate degree including optional honours, with a shift from pre-clinical to clinical subjects between Years 2 and 3 of the programme. Pre-clinical subjects relate to chemistry, biochemistry, anatomy and the basics of pharmacy practice, whereas integrated clinical subjects focus on pharmacology, therapeutics and more advanced pharmacy practice. Experiential placement within this programme includes brief tours through community and hospital pharmacy in Year 1, and 15 weeks of placement across multiple settings, spread throughout Years 3 and 4, which align with the clinical learning within the programme.

Methods

This study employed an explanatory mixed-methods approach, which involved collecting and analysing quantitative (survey) and qualitative (focus group) data.

Participants

All third-year pharmacy students in the JCU B.Pharm. programme were invited to participate, recruited through an announcement during one of their scheduled class times and the provision of an information sheet a week before the scheduled survey date. Students were assured of no adverse repercussions for non-participation, with

staff not associated with the pharmacy programme collecting data in the survey and focus group. As an incentive, participants were entered into a draw to win one of three available AUS\$50 gift cards. Prior to commencement of the study, ethics approval was obtained from the JCU Human Ethics Review Committee (H7853).

Survey tool

Students' perception of their transition experience from pre-clinical to clinical training and its effects on workload, knowledge, skills and learning was assessed using a validated survey tool developed by Prince *et al.* (2005). This 75-item Likert-scale survey tool was administered to students in September 2019 to assess their transition experiences in five major domains: 1) transition and professional socialisation; 2) workload; 3) patient contact; 4) knowledge, knowledge application and skills; and 5) learning and education (Prince *et al.*, 2005). Originally designed for administration to medical students, the survey was adapted slightly in this study for relevance to pharmacy students. The adjustments included changing 'medical' to 'pharmacy' and removing items that did not apply to a pharmacy setting; items regarding physical examinations, bedside teaching and patient handover were removed. Nonetheless, the reliability index (0.80) of the survey tool was not impacted by the slight adjustments made. Three open-ended questions followed the Likert-scale items, to allow students to explain their perceptions on: 1) What helped their adaptation to clinical studies; 2) What aspects of the transition were the most challenging; and 3) What additional supportive measures from the University could be provided to assist with transition. Students also indicated their availability to participate in a follow-up focus group.

Focus group discussion

The focus group was conducted in October 2019, which allowed for student reflection on their first semester experience, increasing their insights into the factors that aided or inhibited their transition. The audio-recorded focus group ran for 60 minutes and took place in an informal classroom setting where honesty and confidentiality was emphasised. The discussion was guided by the survey findings and existing literature.

Data analysis

Descriptive statistical analysis was conducted in SPSS v.25 (IBM Corp, Armonk, NY, USA) to calculate means and frequency of ratings. The focus group discussion (FGD)

was audio taped, transcribed and coded by the researchers in NVivo v11 (QSR International Pty Ltd, Melbourne, Australia). Collated data were coded using a line-by-line open coding process with emerging themes identified using a constant comparison process, as advocated by Corbin & Strauss (2015). To enhance the credibility of the findings, raw data transcripts, coded data and themes were independently reviewed by two authors, and discrepancies resolved through consensus. Illustrative quotes are reported verbatim to support the discussion. Data between the quantitative and qualitative phases were triangulated to increase the rigour and validity of this research, by mapping key themes from the focus group to the survey responses.

Results

All students in the class (n=30) completed the survey and their demographic characteristics are reported in Table I. The sample population was female-dominant (73%), with a mean age of 22.0±4.0 years, were mostly from either a major city or regional centre within Australia, and 53% having a family member practicing as a health professional. Eight students with ages ranging from 20 to 33 years, participated in the focus group. This group was a representative sample of the cohort, comprising of six females and two males, four school-leavers and four mature-aged students, five domestic and three international students.

Table I: Characteristics of participants for the survey (n=30)

| Characteristics | Number | Frequency (%) |
|--------------------------------------|--------|---------------|
| Gender | | |
| Male | 8 | 27 |
| Female | 22 | 73 |
| Origin | | |
| Domestic | 25 | 83 |
| International | 5 | 17 |
| Hometown Rurality (MMM) | | |
| Major city | 6 | 20 |
| Regional centre | 16 | 53 |
| Large rural town | 0 | 0 |
| Medium rural town | 2 | 7 |
| Small rural town | 5 | 17 |
| Remote community | 0 | 0 |
| Very remote | 1 | 3 |
| First in Family | | |
| Yes (immediate) | 16 | 53 |
| Yes (extended) | 2 | 7 |
| No | 11 | 37 |
| Not answered | 1 | 3 |
| Health Professional in Family | | |
| Yes | 16 | 53 |
| No | 14 | 47 |
| Prior Education | | |
| Yes | 8 | 27 |
| No | 22 | 73 |
| Prior Health Experience | | |
| Yes | 7 | 23 |
| No | 23 | 77 |

MMM – Modified Monash Model

Table II: Mean scores for the Likert-scale statements by domain, arranged by highest mean score

| Statement | Mean Score | A % | N % | D % |
|--|------------|------|------|------|
| Domain 1: Transition and Professional Socialisation | | | | |
| A good orientation would make the transition easier | 4.24 | 86.2 | 13.8 | 0.0 |
| The clinical staff were easy to work with | 4.20 | 83.4 | 16.7 | 0.0 |
| Collaboration with my fellow pharmacy students on clinical placement was easy | 4.13 | 87.0 | 8.7 | 4.3 |
| My first clinical placement proved to be better than I expected | 4.13 | 73.3 | 23.3 | 3.3 |
| I enjoyed the first few weeks | 4.13 | 93.3 | 3.3 | 3.3 |
| A general introduction should be provided to all new pharmacy students on clinical placement | 4.10 | 76.7 | 20.0 | 3.3 |
| I felt ready to begin the integrated (clinical) subjects | 4.07 | 86.6 | 10.0 | 3.3 |
| The transition from pre-clinical to the integrated (clinical) subjects went smoothly | 3.93 | 76.7 | 20.0 | 3.3 |
| I felt well prepared for the integrated (clinical) subjects | 3.77 | 70.0 | 20.0 | 10.0 |
| My first semester of clinical work reassured me that I had made the right choice of career | 3.77 | 70.0 | 16.7 | 13.3 |
| My uncertainty lasted only a few days | 3.65 | 73.9 | 8.7 | 17.4 |
| The orientation into the clinical placements was satisfactory | 3.40 | 56.7 | 23.3 | 20.0 |
| I needed time to adjust to the new environment | 3.27 | 56.7 | 10.0 | 33.3 |
| My clinical placement was the first time I experienced what it is like to work as a pharmacist | 3.00 | 43.3 | 6.7 | 50.0 |
| The first few weeks as a pharmacy student on clinical placements were difficult for me | 2.37 | 30.0 | 60.0 | 10.0 |
| I have considered quitting my pharmacy degree | 2.69 | 37.9 | 6.9 | 55.2 |
| I experienced an abrupt transition from pre-clinical to the integrated (clinical) subjects) | 2.69 | 17.2 | 37.9 | 44.8 |
| I was very uncertain at the beginning of the clinical placements | 2.70 | 30.0 | 20.0 | 50.0 |
| I experienced a great deal of stress | 3.17 | 43.3 | 23.3 | 33.4 |
| I was nervous at the beginning of the clinical placements | 3.73 | 73.3 | 13.3 | 13.3 |

Table II: Mean scores for the Likert-scale statements by domain, arranged by highest mean score (continued)

| Statement | Mean Score | A % | N % | D % |
|--|-------------|------|------|------|
| Domain 2: Workload | 3.05 | | | |
| There is a huge difference between my workload before and after the transition to the integrated (clinical) subjects | 3.83 | 66.7 | 23.3 | 10.0 |
| As a pharmacy student on clinical placement I have enough time to study | 2.27 | 20.0 | 13.3 | 66.7 |
| I had difficulty getting used to the work routine | 2.50 | 16.7 | 30.0 | 53.3 |
| As a pharmacy student on clinical placement I have to work very long hours | 3.23 | 46.7 | 23.3 | 30.0 |
| So far clinical placements have been tiring | 3.37 | 50.0 | 30.0 | 20.0 |
| The workload of pharmacy students on clinical placement is heavy | 3.67 | 63.3 | 10.0 | 26.7 |
| Domain 3: Patient Contact | 3.72 | | | |
| The knowledge that I acquire from contact with real patients is easier to retain | 4.20 | 83.3 | 13.3 | 3.3 |
| Contact with real patients is easy for me | 4.17 | 90.0 | 6.7 | 3.3 |
| Contact with real patients stimulates me to study | 3.93 | 76.6 | 16.7 | 6.7 |
| I would have liked real patient contact earlier in the curriculum | 3.70 | 53.4 | 36.7 | 10.0 |
| My first contact with real patients was during the clinical placements | 2.62 | 37.9 | 3.4 | 58.6 |
| I am afraid to start a conversation with a patient | 1.83 | 13.3 | 6.7 | 80.0 |
| I feel uncomfortable when I examine a patient | 2.12 | 11.5 | 19.2 | 69.2 |
| I think patients feel uncomfortable when they are examined by a student | 3.07 | 35.7 | 32.1 | 32.1 |
| Domain 4: Knowledge, knowledge application, and skills | 3.85 | | | |
| I felt well prepared with respect to communication skills | 4.30 | 93.3 | 3.3 | 3.3 |
| When I do a history, the findings are checked by clinical staff | 4.15 | 88.4 | 7.7 | 3.8 |
| I am able to take a history | 4.14 | 82.8 | 13.8 | 3.4 |
| I am able to apply my knowledge in practice | 4.07 | 86.7 | 3.3 | 10.0 |
| I have sufficient basic science knowledge | 4.07 | 83.3 | 16.7 | 0.0 |
| In clinical practice other aspects of knowledge are important than during pre-clinical training | 3.97 | 79.3 | 20.7 | 0.0 |
| I feel confident about the findings from history | 3.89 | 75.0 | 21.4 | 3.6 |
| I feel confident to diagnose minor ailments | 3.83 | 80.0 | 13.3 | 6.7 |
| I have sufficient clinical science knowledge | 3.83 | 70.0 | 30.0 | 0.0 |
| I have the appropriate knowledge readily available | 3.83 | 76.7 | 20.0 | 3.3 |
| I felt well prepared to dispense prescriptions | 3.80 | 66.7 | 13.3 | 20.0 |
| I felt well prepared for clinical skill performance | 3.77 | 76.7 | 16.7 | 6.7 |
| The knowledge I acquired during the pre-clinical phase is relevant for the clinical phase | 3.77 | 76.6 | 13.3 | 10.0 |
| I have sufficient behavioural science knowledge | 3.62 | 62.1 | 31.0 | 6.9 |
| I was sufficiently prepared for the clinical placements as regards theoretical knowledge | 3.57 | 66.6 | 16.7 | 16.7 |
| The level of my knowledge is sufficient | 3.57 | 63.3 | 23.3 | 13.3 |
| The knowledge required in clinical practice is different from my theoretical knowledge | 3.24 | 37.9 | 37.9 | 24.1 |
| There are gaps in my knowledge | 3.70 | 70.0 | 20.0 | 10.0 |
| Domain 5: Learning and Education | 3.91 | | | |
| I am able to study independently | 4.50 | 93.4 | 3.3 | 3.3 |
| I study in a different way than during my first years in the pharmacy program | 4.43 | 83.3 | 6.7 | 10.0 |
| Case-based learning provided good preparation for clinical practice | 4.40 | 86.7 | 10.0 | 3.3 |
| What I study is influenced by the assessment programme | 4.31 | 89.6 | 6.9 | 3.4 |
| It is easy for me to obtain experiences from which I can learn | 4.23 | 83.3 | 16.7 | 0.0 |
| Senior pharmacists are good teachers | 4.20 | 86.6 | 10.0 | 3.3 |
| Junior pharmacists are good teachers | 4.20 | 90.0 | 10.0 | 0.0 |
| Real patient tutorials were good preparation for the clinical placements | 4.20 | 93.3 | 3.3 | 3.3 |
| The knowledge I acquire in clinical practice is easier to remember | 4.17 | 76.7 | 23.3 | 0.0 |
| My learning is driven by questions from clinical staff | 4.07 | 82.7 | 17.2 | 0.0 |
| I learned a lot from real patient tutorials | 4.07 | 83.3 | 13.3 | 3.3 |
| I am able to judge my own progress | 4.03 | 83.4 | 10.0 | 6.7 |
| I study to learn the things that I want to know | 4.00 | 76.7 | 16.7 | 6.7 |
| I learned a lot from simulated patient contacts | 3.90 | 73.3 | 13.3 | 13.3 |
| I learned a lot from the tutorial meetings in which the simulated patient contacts were discussed | 3.90 | 65.5 | 31.0 | 3.4 |
| Simulated patient contacts were good preparation for contact with real patients | 3.83 | 70.0 | 16.7 | 13.3 |
| In clinical practice I study in a different way | 3.79 | 65.5 | 24.1 | 10.3 |
| I need to study because I have forgotten a good deal of my theoretical knowledge | 3.77 | 63.3 | 20.0 | 16.7 |
| I study primarily to pass tests and examinations | 3.50 | 60.0 | 13.3 | 26.6 |
| I study more intensively than before the clinical placements | 3.43 | 43.3 | 33.3 | 23.3 |
| I enjoy studying in a group setting | 3.23 | 46.6 | 20.0 | 33.3 |
| What I study depends on the problems I have encountered that day | 3.17 | 30.0 | 50.0 | 20.0 |
| The first years in pharmacy school were relevant for clinical practice | 2.69 | 17.2 | 41.4 | 41.4 |

A = Agree; N = Neutral; D = Disagree

Survey and FGD findings

The mean scores for all Likert-scale statements are summarised in Table II and range from 1.83 to 4.50 out of 5. The mean scores for the five assessed domains were 3.84 for transition and professional socialisation, 3.05 for workload, 3.72 for patient contact, 3.85 for knowledge, knowledge application and skills and 3.92 for learning and education.

Transition and professional socialisation

While 87% of the participants felt they were mentally ready for the clinical placement, approximately 73% of the participants felt nervous at the start of the clinical placement. Almost all participants (93%) indicated that they enjoyed the first few weeks of the placement and more than three-quarters (76.7%) of the participants agreed that the transition was smooth, with only a small proportion stating that the transition from pre-clinical to clinical learning was abrupt (17.2%). However, more than 40% of the participants thought the transition process was stressful and more than half (56.7%) stated that they needed time to adjust to the new environment. Nonetheless, they indicated that the clinical staff were easy to work with (83%) and collaboration with their fellow students on placement was easy (87%).

The students in the FGD expressed satisfaction with the transition process and felt that the higher perceived relevance and applicability of clinical activities made the transition easier.

'I found that going into the clinical level, like pharmacy specific stuff, that's made it a lot easier because you're not juggling the chemistry lectures, the five different biochem lectures' [Student 1, FGD]

'Yeah. I think that's also because it's really hard to put biochemistry into applications' [Student 2, FGD]

By contrast, some students, particularly the mature aged students, stated that the overall transition process was stressful for them.

'...the start of Year three nearly broke me. It was really hard. It's really lonely going through this degree' [Student 6, FGD]

'I'm already struggling a bit with everything. I failed one of my classes last semester because of everything that's going on' [Student 8, FGD]

Workload

Approximately two-thirds (63.3%) of students considered the overall workload on placement as heavy, with almost half (46.7%) indicating that they had to work very long hours during placement. In addition, 66.7% of the students stated that there was a huge difference between their workload before and after transition to the clinical learning environment. Few students (16.7%) had difficulty getting used to the work routine.

The findings from the FGD suggests that the timing of the placements contributed to students' perceived heavy workload. They stated that the end of semester assessment requirements were heavy, meaning that they had to spend a lot of time studying while on placement and there were requests for a greater emphasis towards on-course assessment and less on end-of-semester exams.

'The pressure of exams that are worth 60 per cent [of the total subject] is just full on. I think we should have more assessment throughout the semester so we can keep up with our studies' [Student 7, FGD]

Patient contact

For the majority of the students, contact with real patients was easy (90%) and a large proportion of the students indicated that they were not afraid to start a conversation with a patient (80%). More than half of the students (53.4%) also stated that they would have preferred to have real patient contact earlier in the curriculum.

While the focus group students echoed that real patient contact should come earlier in the curriculum, it was identified that students need to be equipped with the relevant skills before commencing clinical placement.

'...Second year... we had no placements. So at least one of the three [placements] that we have this year can be pushed to the second year' [Student 5, FGD]

'I feel like if they could space placement out, but before that's done, there needs to be some preparation... you could teach us how to dispense and stuff' [Student 1, FGD]

Knowledge, knowledge application and skills

Most students felt well prepared with respect to communication skills (93.3%) and were able to apply their knowledge in practice (86.7%). However, only two-thirds (67%) felt they were sufficiently prepared for clinical

placement concerning theoretical knowledge whilst a large proportion (70%) indicated that there were gaps in their knowledge. Only 63% felt their level of knowledge was sufficient.

Several students in the survey and FGD also voiced their lack of confidence in applying the theoretical knowledge gained within the classroom to real-world situations and patients.

'I've never been in a pharmacy, working or anything. I'm not exactly the most confident in my knowledge or anything, and they've just put me in a pharmacy [for placement]' [Student 1, FGD]

[Significant challenges included] *'Relating theoretical knowledge to real life situations'* [21, F, Survey]

Learning and education

Nearly all students indicated that they now had to study using different learning methods compared to during their pre-clinical years in the programme (93.4%), though more than 40% believed that the pre-clinical years in pharmacy school were irrelevant for clinical practice. In relation to clinical learning, most students stated both in the survey and FGD that real patient tutorials were good preparation for clinical placements (93.3%), particularly case-based learning (86.7%).

'Experiencing simulated clinical cases and being able to discuss it with other students and lecturers' [21, F, Survey]

'Interactions with real people and professionals as well as doing case studies and workshops in class' [20, F, Survey]

The students also regarded senior (86.6%) and junior pharmacists (90.0%) as good teachers for clinical practice. However, what they studied specifically was largely influenced by their assessment programme (89.6%).

Beneficial aspects of clinical subjects were the clinical tutorials and workshops especially those that replicated real-world situations or used patient volunteers. They also found the move away from laboratory reports to clinical-based quizzes useful in motivating them to study key learning materials and preparing them for clinical exams.

'I wouldn't be studying already if it wasn't for these quizzes [agreement by others]. I am literally up to date with my course content only because of these quizzes' [Student 1, FGD]

Triangulation of quantitative and qualitative findings

There were several points of data convergence between the survey and focus group datasets, with the most prominent themes relating to the change in learning content and study style utilised between the pre-clinical and clinical years, the benefits and struggles of placement and existing support systems and requests for improved support capacity.

Changes in content, assessment and study style

Students were supportive of the increase in content they perceived as relevant, namely the move away from pre-clinical chemistry and biochemistry in first and second year to the clinical subjects. The lack of pharmacy-oriented material in the early years was believed to cause attrition issues between the first and second year of study.

'A lot of people left because it was not very pharmacy oriented, the programme. So I was a first year and I'm like "what am I even learning here?"' [Student 7, FGD]

'They just quit within the first year without even knowing what pharmacy is' [Student 5, FGD]

Although there was a steep learning curve from the pre-clinical and clinical years, this was partly remedied by the increased focus on pharmacy-specific material.

'The first semester of third year, it was a very steep learning curve... but it was also really good, in that it was more specifically focused on pharmacy as well' [Student 8, FGD]

Students requested a greater emphasis on pharmacy-specific subjects including basic over-the-counter medication knowledge and patient counselling skills earlier in the course. This was expected to have improved the placement experience and made students feel more valued and useful. Furthermore, there were requests for a greater emphasis towards on-course assessment and less on end-of-semester exams.

'We should have learned to counsel earlier in the course, because when I was working as a second year, I found myself useless...couldn't help at all in the pharmacy' [Student 4, FGD]

'I think we should have more assessment throughout the semester so we can keep up with our studies' [Student 7, FGD]

In addition to content and assessment changes was the change in teaching staff. Having consistent and fewer teaching staff per subject in the second half of their

degree allowed students to become more familiar with specific teaching styles and grasp key concepts. In comparison, a higher number of teaching staff in pre-clinical subjects made it more difficult to follow so many teaching styles.

'Makes it a lot easier because you know their style of teaching and you come to know how to study with them...because you're not juggling the different lecturers...you know we had about at least 10 in one semester' [agreement from others] [Student 1, FGD]

Benefits and struggles of placement

Placement was also a key topic within the focus group as students had commenced short placement blocks in community and hospital pharmacy earlier in the year. Findings from both phases of the study indicated that students found the experiences rewarding though difficult, particularly the volume of knowledge that was applicable to the placement experience and their lack of confidence in their own knowledge and skills, especially for hospital placement.

'We learn a lot relating to practice in community pharmacy but very little in regards to hospital so initially placement was overwhelming' [21, F, Survey]

'For those who don't work in pharmacy, having the first placement, it's a shock, because you've never talked to a customer before...you don't have any knowledge' [Student 5, FGD]

In comparison, those who had previous work experience in a pharmacy setting found the transition into placement easier and less overwhelming. Some students felt the need to seek part-time or casual employment to make the most of their learning experience and feel more comfortable with placement requirements.

'Having a part-time/casual work in a clinical setting helped me during clinical placements' [28, M, Survey]

'I've actually gotten a job in pharmacy, just because placement isn't enough for me to learn anything...I don't feel like I was well prepared for it at all' [Student 6, FGD]

The on-site supervisor (preceptor) also influenced the placement experience, with the quality of induction to the placement site, as well as time available to teach the student varying significantly.

'When I spoke to mine [preceptor] she said "oh, that's our busiest time, I won't be able to teach you anything"...I thought that's specifically why I am coming' [Student 7, FGD]

'The hospital had extra staff that were here with you from 9 to 5 that is there to support you...I think everyone had a good experience at the hospital' [Student 5, FGD]

Support systems and improved support

Support and advice from family, friends and pharmacy staff were considered the greatest sources of support for students, with many indicating they were being provided with enough information and didn't need any additional support systems.

'Studying with friends and learning how they learn and applying that to determine my own learning style' [22, F, Survey]

'Knowing the lecturers more personally definitely helps, they are more open to helping work on any weaknesses and difficulties' [21, F, Survey]

However, some students offered suggestions for additional support or changes that could assist in their transition through university. This included additional clinical tutorials and workshops earlier in the degree to make them more confident and useful on placement.

'Having more tutorials/workshops with real patients before clinical placements' [28, M, Survey]

'It would have been good to have one or two extra ones (pharmacy-specific subjects) earlier on so that if we were looking for employment, it would have been a bit easier for us to be a bit more useful on the outside' [Student 8, FGD]

Discussion

This study utilised a survey and focus group to investigate factors influencing a cohort of pharmacy students' transition from pre-clinical to clinical learning at a regional Australian university. The factors that influenced the transition process were related to transition and professional socialisation, workload, knowledge acquisition and skills and learning and education. Although the students indicated that the transition from preclinical to clinical setting was smooth, some students felt that the process was stressful. While the younger

students expressed satisfaction with the transition process, the mature aged students stated that the process had been challenging and stressful. This may have been related to family-work balance issues, as evidence suggests that mature aged students tend to have difficulties balancing family-life, work and study requirements (Hayden, Jeong, & Norton, 2016). Therefore, it is important for educators to discuss with these group of students about their learning needs and the support they may require.

Furthermore, the perceived stress reported by the students may be in relation to the structure of the curriculum and the perceived higher academic workload when on placement. Students indicated that the academic workload, particularly assessment demands were heavier during placement, as similarly reported by Prince *et al.* among medical students (Prince *et al.*, 2006). In the current study, the perceived increase in workload was related to the pressure of preparing for examinations while on placement, which has been reported in the literature among medical students (Radcliffe & Lester, 2003). Pharmacy educators and preceptors need to consider providing guidance on learning expectations and outcomes during placement, to aid learning and help students cope with the varied workload (Atherley *et al.*, 2016).

Evidence suggests that appropriate placement experiences also support students in applying their knowledge to real-world practice, thereby facilitating patient exposure and interactions (Crebert *et al.*, 2004). In this study, the lack of confidence and gaps in knowledge negatively influenced the placement experience. The students suggested integrating clinical study materials early in the curriculum through additional tutorials and workshops and an early introduction to placement to cement their understanding and apply knowledge to practice. Overall, these activities are likely to assist in the transition from pre-clinical to clinical years, aid reduction of student uncertainty on expectations and enhance their confidence in applying theoretical knowledge (Godefrooji, Diemers, & Scherpbier, 2010). The application of knowledge in simulated practice or in a real-world setting assists the students in linking theory to practice by allowing them to understand the relevance of their theoretical knowledge (MacLean *et al.*, 2017). In addition, pharmacy preceptors also require training and support, to ensure that they understand and can fulfil their important roles and responsibilities in guiding students in the development of their knowledge, attitudes and practices (Chaar *et al.*, 2011).

Despite the perceived knowledge gap, the findings of the study indicated a relatively high student comfort level in their communication skills with patients, which in turn fostered self-esteem and self-efficacy (Yorra, 2014). This underscores the importance of aligning university teaching materials and assessment to real-world practice requirements. This can be done through techniques such as problem/case-based learning, which is considered essential for attainment of learning outcomes and effective integration into practice (Godefrooji, Diemers, & Scherpbier, 2010). Accordingly, these teaching strategies are outlined in the Australian accreditation standards from the Australian Pharmacy Council and reflected in the Pharmaceutical Society of Australia's national framework on competency standards (Pharmaceutical Society of Australia, 2016; Australian Pharmacy Council, 2020).

However, despite the content provided in the pre-clinical years aligning with these standards, there was a perceived irrelevance of core chemistry and biochemistry material, and these introductory materials were perceived as not aligned with pharmacy practice (Harvey, Drew, & Smith, 2006). The role of these 'basic' or 'core' sciences has been subject of ongoing debate across multiple health professions, with dental and medical professionals similarly demonstrating an under-appreciation of these fields (Cooke *et al.*, 2006; Scheven, 2012). Integrated clinical tutorials and workshops which draw links between pharmacy-specific and non-pharmacy-specific content are one recommended method in ensuring that students understand the importance of these pre-clinical materials (Prince *et al.*, 2005). As the transition into clinical learning occurs, the ideal learning style is changed, with rote learning of facts becoming less useful, being replaced by integrative learning techniques that connect multiple concepts and experiences (Dolmans *et al.*, 2016).

Support from friends, family and staff are valuable at all stages of the university experience, including key transitional stages, which are known to potentially affect personality and relationships (Wintre & Sugar, 2000; Buhl, Noack, & Kracke, 2018). Additional support from academic staff and supervisors may be required as students approach the clinical phase of their learning and are expected to apply theoretical knowledge to real-world situations. Over one-third of students indicated they had considered quitting their degree, and while this was likely to be during their first year of the degree (Credé & Niehorster, 2012), it may have also stemmed from negative placement experiences. This highlights the need for appropriate academic support systems tailored to each year level.

Strengths and Limitations

The mixed-methods nature of this study increased the rigour of the findings by comparing and contrasting quantitative and qualitative datasets. This study also utilised a validated survey tool (Prince *et al.*, 2005) and gathered a representative voice of the target population, with all students in the cohort completing the survey and one-quarter participating in the focus group. However, the small sample size of the cohort, which was taken from a single university, could potentially limit the generalisability of the findings to the wider pharmacy student population. There was also the potential for students to be less forthcoming in the focus group environment due to the presence of peers and college staff, though this was mitigated through non-teaching staff involved in data collection and the emphasis on confidentiality.

Conclusion

This study found that the transition from pre-clinical to clinical training for pharmacy students can be a source of significant stress and uncertainty, due to high perceived workload, gaps in knowledge and expectations relating to placement. To assist in managing this transition, improved support systems are needed for students to ensure that they are confident and effective in applying their theoretical knowledge to real-world practice. Introducing pharmacy-specific learning content, utilising simulated clinical scenarios and fostering communication skills early in the degree pathway is likely to assist in managing these issues. The findings of this study have implications for pharmacy tertiary education as they emphasise the importance of providing additional support for transitional issues faced by pharmacy students entering the clinical years of their degree and how these issues can be effectively managed.

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