

Pharmacy Students' Views on the Inclusion of Immunisation Training in the Pharmacy Curriculum: Focus Group Discussions

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Abstract

Introduction: Immunisation services are usually provided by healthcare workers who receive training in the field of immunisation. In Malaysia, limited exposure of pharmacy students in receiving immunisation training is partly due to lack involvement of pharmacists in immunisation programme. This study aimed to explore the insights of pharmacy students who received introductory training on the role of pharmacist in immunisation and the feasibility of introducing immunisation modules in the pharmacy curriculum. **Methods:** Five focus group discussions (FGDs) were conducted with undergraduate final year pharmacy students who participated in an immunisation workshop. A guide was used to explore students' experiences, challenges faced, learning perceived, perception, and suggestions for improvement from participants. Data were extracted from interview transcripts, sorted, and coded using Atlas.ti® version 9 and subjected to thematic analysis. **Results:** There were four themes emerged from the FGDs: 1) Acquisition of new learning and skills, 2) Challenges in competency development, 3) Applicability of knowledge in practice, and 4) University initiatives on immunisation training. Students appreciated the exposure to the immunisation workshop with practical skills training on injection techniques. There were challenges as an individual and as a team in building the competencies, but knowledge and skills acquired from the training were important to improve students' confidence and learning. **Conclusion:** Pharmacy students who received introductory training on the role of pharmacist in immunisation perceived its importance and suggested introducing immunisation modules into the undergraduate pharmacy curriculum.

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Introduction

Immunisation is a process to protect people from diseases through vaccination. Vaccines help in building protection to reduce the risk of getting a disease by working with the human body's natural defence. The first vaccine presented in history was in the late 18th century, which proved to eradicate smallpox disease that was responsible for 300 million deaths (Plotkin, 2014). Following this, many vaccines were developed to prevent more than 20 life-threatening diseases, including tetanus, diphtheria, influenza, pertussis, and measles (Safadi, 2023). There are also several research lines on therapeutic vaccines for chronic noncommunicable diseases such as hypertension, diabetes mellitus type 1, amyotrophic lateral sclerosis, Alzheimer's disease, cancer, and dyslipidemia (Tian et al., 2022). The advancements in vaccine technology for wider coverage of diseases require the enhanced role of health care professionals to ensure their effectiveness and utilisation.

Suboptimal immunisation rates worldwide and in Malaysia are attributed to multiple factors. These include vaccine hesitancy, misinformation, financial barriers, accessibility, the spread of anti-vaccination messages, and vaccine hesitancy (Wong, Wong & Abu Bakar, 2020). Challenges such as vaccine costs, lack of insurance, and limited healthcare access hinder vaccination efforts and have been prevalent in various regions (Kolobova et al., 2020). Additionally, the shortage of skilled healthcare professionals can impact immunisation rates by limiting vaccine availability and outreach (Gibson et al., 2023). The complex interaction of various factors has been well reported and requires a combination of strategies to address the issues effectively.

The World Health Organisation (WHO) has stated that immunisation against a wide variety of diseases prevents millions of deaths every year (Bustreo et al., 2015). Some countries, including Australia, Canada, the United Kingdom and the United States, have increased the number of healthcare professionals, including pharmacists permitted to administer vaccines. However, in some

countries, pharmacists are more involved in other roles in immunisation programmes such as vaccination education, vaccine storage, vaccine advocacy, vaccine administration and vaccine adverse event reporting (Yemeke et al., 2021). Pharmacists can act as immunisers, improve vaccine-related health literacy, increase vaccination coverage rates, and remove barriers to healthcare access. By involving pharmacists in immunisation programmes, the healthcare system can enhance the effectiveness of vaccination campaigns and address vaccine hesitancy (Bragazzi 2019). Pharmacy services serve at the frontline of the health system effectively in combating suboptimal immunisation in the population.

Several studies have examined the inclusion of immunisation courses in pharmacy school curricula and its impact on student competence. For example, among the 80 accredited U.S. pharmacy schools, there were 91.3% offered the American Pharmacists Association (APhA) Pharmacy-Based Immunisation Delivery Programme, and 86.3% have integrated immunisation topics into their required core curriculum. This is in alignment with the Accreditation Council for Pharmacy Education (ACPE) standards, as well as recommendations from the American Association of Colleges of Pharmacy (AACP) and the American College of Clinical Pharmacy (ACCP), which suggested a comprehensive approach to immunisation education (Prescott et al., 2019). In Australia, a study reported significant improvements in students' confidence, self-perceived knowledge, and skills related to immunisation post-training following the integration of immunisation training into the final year of Bachelor of Pharmacy (BPharm) and Master of Pharmacy (MPharm) programmes (Mills et al., 2021). Such curricular integration effectively enhances students' competencies and readiness to provide immunisation services.

Currently, pharmacists in Malaysia are not authorised to administer vaccinations. However, pharmacist-administered vaccination programmes in other countries have been shown to increase vaccination rates, and thus it is reasonable to assume that pharmacist-administered vaccination programmes will be introduced in Malaysia (Ang et

al., 2022; Le et al., 2022). Accordingly, it is reasonable for Malaysian pharmacy schools to develop programmes to teach immunisation skills to pharmacy students. Nonetheless, the public expects pharmacists to be knowledgeable about all medications as well as vaccination services (Al-Lela et al., 2012). Therefore, it is important for Malaysian pharmacy schools that have not already done so to introduce immunisation theory into their curricula and, as with planning any new coursework, to take their students' perspectives into account (Constantino et al, 2016). This study sought to explore the thoughts and opinions of pharmacy students in the Kulliyyah of Pharmacy, International Islamic University Malaysia (IIUM), regarding their experiences after receiving training on immunisation.

Materials and methods

Study Design and Setting

A semi-structured focus group discussion (FGD) guide, comprised of open-ended questions aligned with study objectives, was developed by the researchers as summarised in Table 1. The specific study objectives were 1) to explore perceptions of pharmacy students on the feasibility of incorporating an immunisation module into the curriculum, 2) to explore the important components of immunisation training for undergraduate pharmacy students, 3) to investigate the challenges and obstacles associated with undergraduate pharmacy curriculum related to the immunisation programme, 4) to identify the impact of immunisation training provided to undergraduate pharmacy students towards their readiness in immunisation services, 5) to investigate the changes in knowledge and skills among pharmacy students. The primary investigator, who was an undergraduate student, conducted the online focus group discussions and was supervised by two other researchers. The student had been taught and trained before conducting the FGD.

Participant Recruitment

One hundred and thirteen final-year IIUM pharmacy students were invited through an email invitation to participate in the study. These students had previously participated in a one-and-a-half-day immunisation training workshop conducted by the IIUM Kulliyyah/Faculty of Pharmacy, the IIUM Kulliyyah/Faculty of Nursing, and a faculty member from the University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences experienced in certifying pharmacy students in the United States to administer vaccinations. The one-and-a-half-day programme consisted of didactic teaching followed by hands-on training on injecting manikins (Model: Adult Manikin Medical Training, Brayden CPR Manikin, Practi-man Advance Adult Manikin, Company: TheLifeCare & VitalFour Medical Sdn Bhd). The participants were divided into 10 groups and were given one manikin each. They were instructed to practice injecting normal saline solution to the manikin and follow the step-by-step method as demonstrated by the nursing clinical instructors.

All participants who provided written informed consent were assured that their data would be kept anonymous and confidential. They were arranged into small groups and given the link to access the specific date and time of the online FGD. The FGDs were conducted online, and all participants were informed that the sessions would be recorded for research purposes. To ensure that the participants' identities remained anonymous, each participant was given an alphanumeric code.

Data Analysis

The FGDs were recorded and fully transcribed. The duration of each FGD was between half an hour and one hour per session, and the data saturation was obtained and discussed. A computer software programme (Atlas.ti® Version 9.0) was used for data analysis. Thematic analysis was done using an inductive approach. The software facilitated the systematic process of themes to emerge naturally from the data without being influenced by any theoretical frameworks. It facilitated efficient

coding, retrieval, and categorisation of data, as well as the development of patterns within the data to improve the rigor of the analytical process. Two researchers also checked the transcripts for accuracy and independently coded and analysed the data. All themes and sub-themes identified were reviewed, discussed, and agreed on by the researchers until a consensus was reached.

Results and discussion

This study adhered to the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist (Tong et al., 2007) in reporting a qualitative study. Seventeen pharmacy students consented to the study and were divided into five groups (three to five students per FGD). Demographic characteristics of participants are presented in Table 2. Data saturation, where no new themes were identified during data analysis, was reached by the fourth FGD. The focus group discussions were completed for all five groups, and the findings were analysed. Four themes were identified: 1) Acquisition of new learning and skills, 2) Challenges in competency development, 3) Applicability of knowledge in practice, and 4) University initiatives on immunisation training.

1. Acquisition of new learning and skills

During the workshop, students learned the correct techniques for administering intramuscular and subcutaneous injections. Practical application of the skills was facilitated using manikins, allowing participants to practice injection techniques. Students also attended a one-and-a-half-day programme to revisit and reinforce immunology topics learned in previous years. They were also taught about the direct involvement of pharmacists in immunisation practices in other countries, which inspired them to consider immunisation as part of their future roles as pharmacists. The new learning and skills obtained from the training were described as both from the technical aspects of preparing and handling the injection technique, as well as the insights into the role and practice of pharmacists in immunisation.

"We learnt two ways which are intramuscular and subcutaneous. Intramuscular injections must be administered at 90 degrees (to the skin surface)" (Participant 6, Male 4)

This quote reflects the acquisition of technical knowledge and procedural skills by identifying two distinct injection techniques and the correct angle for intramuscular injection, indicating new clinical competence relevant to immunisation practices.

"We also learnt how to avoid finger-stick injuries opening, to always wear gloves, and the correct techniques to administer injections" (Participant 4, Female 2)

This quote highlights the injection technique, proper protective practices, and infection control as new hands-on skill development.

"This is a new exposure for me as a pharmacy student. Because as we already know, pharmacists in other countries are directly involved with immunisation and vaccination. So, this opens our eyes to focus more on immunisation to become a pharmacist since in the future this will be one of our jobs" (Participant 3, Female 1)

It demonstrates that the students have been exposed to the new scope of practice, recognition of professional roles, and professional development.

These findings are consistent with the previously published literature. For example, immunisation workshops in Quebec, Canada, provided pharmacists with the necessary knowledge, skills, and attitudes to seamlessly incorporate vaccination services into their daily routines (Srirangan & Lavenue, 2021). Nevertheless, our study did not investigate the differences in confidence and skill levels pre- and post-intervention that could be determined using a quantitative study. In Australia, pharmacists who completed a vaccination training course reported a notable enhancement in confidence, skills, and understanding of influenza vaccination (Carroll, et al, 2020).

Other studies have reported similar results (Lau et al., 2017, Lin et al., 2018, Poudel et al., 2019). In Australia, pharmacy students' vaccination knowledge increased significantly post-vaccination training ($p < 0.001$), with competency in the skill of

injection that also increased their confidence to practice (Bushell et al., 2020). Different forms of injection simulation could also improve confidence and reduce anxiety after a vaccination skills training. (Skoy et al., 2013). These components are useful to improve competencies in new learning.

2. Challenges in competency development

The participants faced multiple barriers in the practical aspect of the workshop, particularly with the new experience of administering injections, which was not covered in their syllabus. Nervousness was evident as it was their first time practicing injection, although using manikins. The limited time allocated for the practical session (afternoon session) was thought to be insufficient. This short timeframe and the pressure of being observed by the trainer contributed to mistakes. The participants expressed dissatisfaction with the brief practical session, highlighting the need for more time and opportunities to improve their skills. Pharmacy students, in general, lack hands-on practice in injections, and the workshop provided a valuable opportunity to address this deficiency.

"The practical part of this workshop was very short; we can only try once per person then that makes us unsatisfied with our skill. This is because we are nervous because the trainer or lecturer looks at us when we try to inject a manikin. Due to this nervous feeling, we are shaking and make mistakes with only once try" (Participant 9, Female 3)

"Maybe we also lack a pharmacy lecturer who is an expert in immunisation or vaccination injection, so that we lack a trainer to do the workshop to train students" (Participant 3, Female 1)

"Pharmacy students are not exposed to learning injection techniques. We only learn about injections regarding the insulin pen injection, so when we have this workshop, it is advantageous for us since we lack hands-on practice" (Participant 5, Male 3)

The findings demonstrated that vaccination training programmes must allow students sufficient practice opportunities for them to become comfortable and skilled in administering injections. In addition, training programmes must be flexible to meet the

needs of individual students. The experience of one author (CJT) is that training for students fearful at the thought of administering injections and being embarrassed in front of their classmates is more efficient if undertaken in a quiet area separated from other students. According to Esther et al. (2017), a significant obstacle to pharmacists delivering immunisation services in Australia was the lack of competency, particularly in administering injections. Researchers in Saudi Arabia also noted the lack of relevant training courses as a significant barrier to offering vaccinations in pharmacies. Notably, pharmacists who did not attend the pharmacist's immunisation workshops identified barriers to a much greater extent (Balkhi et al., 2018). Our findings indicate that challenges span across practical exposure, instructional support, and emotional readiness. Appropriate training on competency addressing these components must be emphasised to prepare pharmacists to be well-equipped with the skills.

3. Applicability of knowledge in practice

The workshop served as a valuable platform for students to realise the potential for pharmacists to administer vaccines directly. Their reflections demonstrate a growing awareness of how academic knowledge translates into real-world responsibilities, public health impact, and accessible healthcare delivery. Participants noted that pharmacists are often sought after to clarify vaccine-related myths and provide information, especially given the prevalence of misinformation on social media.

"After COVID spread around the world, Malaysia undertook a large-scale immunisation programme. So, this situation makes it more significant to learn because who knows in the future if something similar will happen again. We as student pharmacists can play a key public health role by participating in immunisation campaigns" (Participant 2, Male 2)

"Actually, because of myths and misinformation that people spread through social media regarding vaccines and immunity, many people ask pharmacists to clarify facts about vaccines and immunity. Also, people with medical backgrounds refer members of the public to pharmacists since pharmacist are expected to have

expertise in medication-related matters” (Participant 10, Female 4)

Students also stated about the broader professional trajectory and national policy direction. For example, the Malaysian Pharmaceutical Society (MPS) has advocated for pharmacists to be included in national immunisation efforts, aligning with global trends where pharmacists play a greater role in public health delivery. They expressed the belief that exposure to such programmes is beneficial for pharmacy students. The sentiment was that pharmacists should play a more active role in immunisation, including administering vaccines, due to their expertise in drug-related matters. In community settings, pharmacists were seen as the initial point of contact for patients, where they could recommend suitable vaccines and provide information. The participants envisioned a future where community pharmacists could expand their services to offer immunisations beyond clinics, allowing patients to conveniently walk in for their shots.

“MPS Malaysia has stepped forward to involve pharmacists in immunisation programmes in Malaysia. If pharmacists are involved in immunisation programmes, then it is beneficial for pharmacy students to be exposed to immunisation programmes” (Participant 1, Male 1)

“Pharmacists must know how to communicate with individual patients as well as communities of patients and other healthcare professionals. For example, pharmacists are aware of myths regarding vaccines and that there are individuals who advocate against the use of vaccines. So, the role of a pharmacist in debunking vaccine-related myths and providing factual information to individuals and communities is important. We must provide information using layman terms instead of using medical terms unfamiliar to the public.” (Participant 10, Female 4).

“For example, people want to get a vaccine to go to Makkah. So, they need to make an appointment or meet the doctor to get a shot. So, we can just make this vaccine available at community pharmacies for people just to walk in anytime they need the shot” (Participant 5, Male 3)

These indicate the role of pharmacists in health

literacy and patient-centered communication for addressing vaccine hesitancy and misinformation. Pharmacists are increasingly recognised as accessible healthcare providers who can influence vaccine acceptance (Isenor & Bowles, 2019), as has been demonstrated elsewhere (Dalgado et al., 2023), that pharmacists have increases vaccination rates. The students recognised that pharmacists must be able to recommend appropriate vaccinations to patients and to address any concerns that patients might have regarding vaccinations. Patients were generally comfortable with pharmacists administering vaccinations, but their concerns include doubts about the pharmacists' skills (Al Alooia et al., 2020). The absence of recognition regarding pharmacists as adequately trained and professionally capable immunisation providers might be a reason for restrictions on pharmacist immunisation authorities (Bach & Goad, 2015). Hence, formal training and certification are deemed necessary for such integration.

4. University initiatives on immunisation training

Students offered varied opinions on incorporating immunisation module into the pharmacy curriculum. Some suggested making it optional, citing Malaysia's current low demand for immunisation services. They emphasised that pharmacists primarily need knowledge to address vaccine-related myths, while the practical skills may not be immediately necessary. Others suggested making immunisation an elective rather than a core subject.

They argued that, as the demand for vaccination services is not widespread, those interested in the field should have the option to delve deeper into it. Making it an elective course would allow individuals in community pharmacy or industry, who may not be directly involved in vaccine administration, to explore the topic leisurely without pressure.

Some students proposed integrating immunisation as subtopics within existing courses, such as immunology. This approach would allow for a gradual introduction of the subject without making it a heavy core requirement. Some participants also noted that direct immunisation administration

Table 1: Domain in Focus Group Discussion Guide

No.	Domain
1.	Demographic data
2.	Student's experience, challenges and learning perceived during workshop and training on immunisation.
3.	Students' gaps and barriers in the interaction and communication with lecturers, patients, preceptor and among team members during training.
4.	Students' perceptions on the effectiveness of workshops on immunisation provided by the university.
5.	Students' opinion to improve the strategies to provide immunisation knowledge and skills for pharmacy students.

Table 2: Demographic characteristics of the participants (n=17)

Characteristics		N (%)
Gender	Male	6 (35.3%)
	Female	11 (64.7%)
Age (years)	22	13 (76.5%)
	23	4 (23.5%)
Ethnicity	Malay	17 (100%)
Level of education	B.Sc. Pharmacy	17 (100%)
Marital status	Single	17 (100%)

might be applicable mainly in community pharmacy settings, as hospitals typically involve doctors and nurses, and the industry may not directly administer vaccines.

"Maybe we can make it optional because the demand for this is still low in Malaysia. For now, pharmacists just need the knowledge of immunisation to counter the vaccine-related myth – vaccination skills are still not needed" (Participant 17, Female 11)

"I think we should include immunisation in the curriculum as an elective course. If we start with an elective course we can see if people are interested or not" (Participant 9, Female 3)

"We learn about viruses and vaccines in our immunology course so all that's needed is to address the practical aspects of administering vaccines. If pharmacists were allowed to administer immunisations, I think it would only apply only to community pharmacists since doctors and nurses administer vaccines in hospitals and the pharmaceutical industry focuses on the manufacture rather than the administration of medicines" (Participant 2, Male 2).

Some students suggested having lecturers teach the administration process, followed by assessments where students practice vaccine administration on a manikin (similar to Objective Structured Clinical Examination (OSCE) assessments). The idea was to emphasise the importance of evaluation in fostering understanding and skills development as well as countering the perception that a lack of traditional written exams implies a lack of seriousness.

To enhance the credibility of pharmacists in immunisation programmes, participants recommended the introduction of a special certificate, akin to the smoking cessation certificate, accredited by relevant authorities. This certificate could be obtained by pharmacy students or pharmacists who have completed an immunisation course, enabling them to actively participate in immunisation programmes. Collaboration with other disciplines, such as nursing and medicine, was proposed to enhance the learning experience, to improve pharmacy students' injection skills.

"Maybe the lecturer can demonstrate how to administer vaccines using a manikin and students can learn by practicing vaccine administration using a manikin. An OSCE exam employing a manikin could be used to formally assess students' competence to administer vaccines. If there is no formal exam, people may say we have not proven our competence to administer vaccines. A formal assessment process will ensure students are

motivated to acquire vaccine-related knowledge and the skills necessary to administer vaccines" (Participant 17, Female 11)

"If Malaysia wants to recognise that pharmacists have credibility to be involved in immunisation programmes, certification could be introduced similar to the smoking cessation certificate accredited by KPT (Ministry of Higher Education) or KKM (Ministry of Health)" (Participant 4, Female 2)

"My suggestion for better improvement is to collaborate with other medical students, such as nurses and medics, because they are more exposed in practical ways on how to inject people and deal with needle things". (Participant 2, male 2)

Addressing this concern, it is notable that vaccination training in some Australian pharmacy schools was introduced before pharmacists were authorised to administer vaccinations (Bushell et al., 2020). The anticipation of regulatory changes to expand the scope of practice for pharmacist-administered vaccinations motivated both the profession and pharmacy schools to include such training (Bushell et al., 2020). Therefore, all stakeholders should play an active role to support the advanced practice in the pharmacy profession.

Additionally, providing immunisation training programmes to pharmacy students earlier in their curriculum benefits students with superior experience and develops confidence (Doyle-Campbell, C. et al., 2022). It is also worth noting that the first-year pharmacy students could complete an immunisation-training course (Kubli et al., 2017) and that immunisation training is an accreditation standard for pharmacy colleges and schools in the United States (Church et al., 2016).

Our findings are also similar to a multi-centric observational study in Germany that has highlighted that an immunisation course was highly accepted by pharmacy students, as they have also recommended the training to their colleagues (Sayyed et al., 2024). It is imperative to acknowledge and recognise the role of the university, particularly to advance the pharmacy curriculum, in this context, through integrating the immunisation training and preparing competent pharmacists meeting the local and global health care needs.

The limitation of this study could be the strategic group bias, as commonly occurred in focus group discussion sessions (Nyumba et al., 2018). It could be influenced by perceived group norms, viewpoints, or expectations, as well as the presence

of any dominant participants influencing the group opinions. For example, there were positive insights on immunisation training among pharmacy students, it is possible that other participants had a negative perspective but did not admit due to strategic group bias, and they were being recorded. To minimise this bias, the moderator has arranged the groups carefully based on age and experience to reduce power dynamics, encouraged open dialogue, and proactively and neutrally prompted on the issues to gain positive and negative insights. The groups were kept small, without hierarchical relationships among students, which could inhibit honest participation, and the moderator facilitated each session to ensure balanced participation and inclusive communication. Participants were also assured of their confidentiality. Future studies may explore data triangulation to ensure the accuracy and dependability of data.

Conclusion

Exposure to international practices where pharmacists are actively involved in immunisation inspired pharmacy students to envision a broader role for themselves in public health. Despite barriers and challenges, workshops combining theoretical review and practical application were effective in preparing pharmacy students for the evolving role of pharmacists in immunisation services. It reflected on students' professional identity and career aspirations. Therefore, equipping students with immunisation skills and knowledge is a timely and strategic educational priority.

Authors contributions

The researcher (NAAMN) designed the study, collected data, and analysed data. Other researchers (NHMT, NSAR & CJT) supervised, reviewed, and edited the writing. All authors have read and reviewed the manuscript.

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Ethical approval statement (if applicable)

This study was approved by the Ethics Committee of International Islamic University Malaysia (IIUM) (ID No.: IREC 2023-166).

Informed consent statement (If applicable)

Informed consent was obtained from all subjects involved in the study.

Conflict of interest

NAAMN, NHMT, NSAR and CJT declared no conflicts of interest in the conduct of this study and the publication of this manuscript.

Declaration of generative AI and AI-assisted technologies in the writing process

Grammarly was utilised to assess the grammar and enhance the readability of the manuscript. Additionally, ChatGPT was used to aid in formulating responses to reviewer feedback. It is essential to remember that, despite the support of AI technologies, all outputs were rigorously examined by humans to guarantee their accuracy, appropriateness, and alignment with the authors' aims.

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Appendix A

Not applicable.