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GRADUATE NURSES IN AOTEAROA NEW ZEALAND: HOW WELL IS UNDERGRADUATE PHARMACOLOGY EDUCATION PREPARING THEM FOR PRACTICE?

Lucy Nolan, Philip Lopez and Judith Honeyfield

INTRODUCTION

Safe and effective medication administration is a fundamental component of nursing practice and directly influences patient outcomes (Donaldson et al., 2017). Nurses are required to interpret prescriptions, calculate dosages, recognise interactions, monitor therapeutic and adverse effects, and educate patients (Nursing Council of New Zealand, 2025b). These responsibilities demand pharmacological knowledge and sound clinical judgement. Therefore, concerns persist regarding the preparedness of newly graduated nurses to manage medications safely in increasingly complex clinical environments.

Within the Bachelor of Nursing programme at Toi Ohomai Institute of Technology, Bay of Plenty, pharmacology was initially embedded alongside pathophysiology within an integrated bioscience course. Anecdotal observations by educators suggested that the breadth and complexity of pharmacological content created challenges for knowledge retention and its application in clinical practice. To provide greater focus on key concepts, pharmacology was subsequently developed into a stand-alone one semester paper covering drug classifications, mechanisms of action, pharmacokinetics, pharmacodynamics, dosage calculations, and adverse effects. Although this increased focus was associated with improved student achievement, concerns regarding content volume and delivery intensity persisted. The paper's compressed delivery over one semester and completion before clinical placements limited opportunities for students to consolidate learning and apply pharmacological knowledge within clinical practice settings. Consequently, pharmacology content was further reviewed, streamlined, and integrated across bioscience and clinical nursing papers within the programme to strengthen links between theoretical knowledge and clinical application.

Despite these developments, anecdotal observations by educators continued to identify challenges in students' ability to retain and apply pharmacological knowledge, particularly during OSCEs and clinical placements. Similar concerns have been noted among newly graduated nurses, suggesting an ongoing theory-practice gap. As healthcare becomes increasingly complex, understanding

graduates' perceptions of their pharmacology preparation is important for informing ongoing curriculum development and ensuring nursing programmes adequately prepare nurses for safe and effective medication management.

International literature also highlights deficiencies in pharmacological readiness among new graduate nurses (Athanasakis, 2021; Braiki et al., 2024; Jung & Park, 2025; Webb et al., 2025). Graduates frequently report feeling underprepared when transitioning to practice, citing limited applied learning opportunities, an overemphasis on theoretical content, and inconsistencies in pharmacology curricula (Baharum et al., 2023; Kreedi et al., 2021). The theory-practice gap refers to the difficulty students and newly qualified nurses may experience when applying theoretical knowledge learned in education to complex, unpredictable clinical situations. This gap remains a persistent challenge in nursing education, particularly when students are required to transfer theoretical knowledge into complex clinical situations (Shoghi et al., 2019). These gaps contribute to medication errors, a leading preventable cause of patient harm worldwide (Khristy, 2025). Inadequate pharmacological knowledge has been associated with an increased risk of these errors (Preston et al., 2019). Difficulties translating theory to practice can also negatively affect nurses' confidence, job satisfaction, and retention (Kallerhult Hermansson et al., 2024).

This concern is reinforced by McCabe et al.'s (2023) meta-analysis, which found that only 46 percent of nurses demonstrated adequate or above-adequate knowledge of acute pain management. These findings suggest that existing educational approaches may not adequately prepare all nurses to apply pharmacological knowledge safely in practice.

The transition from student nurse to registered nurse is a particularly important point at which the theory-practice gap becomes evident. In pharmacology, this gap occurs when nurses can perform medication-related procedures but are less confident applying deeper knowledge of drug mechanisms, interactions, contraindications, and adverse effects to patient-specific decision-making (Shoghi et al., 2019).

New graduates must also adjust to unfamiliar clinical environments, increased workloads, hierarchical team structures, and the expectations of independent practice. Hallaran et al. (2023) found that new nurses commonly experienced feelings of being unprepared, limited confidence, stressful workplace cultures, and a lack of support during this transition. Although supportive teams and opportunities to develop confidence can facilitate a successful transition, insufficient mentorship and unrealistic workplace expectations may increase stress and undermine safe clinical decision-making. These pressures may be especially significant when new nurses are required to administer medicines, recognise adverse effects, and make timely clinical judgments. Bridging the theory-practice gap in pharmacology is therefore essential to helping nurses develop the confidence and pharmacological acumen required to make safe clinical decisions in challenging work environments.

Medication related incidents can have a profound emotional impact on novice practitioners. Recent nursing graduates have reported that their education did not always adequately prepare them to respond to medication errors (Treiber & Jones, 2018). A literature review by Nydoo et al. (2020) found that healthcare professionals involved in adverse events may experience significant emotional distress, including sadness, guilt, anxiety, and symptoms consistent with post-traumatic stress. These effects may be particularly significant for new graduates, who are still developing their professional identity and clinical competence.

In Aotearoa New Zealand, these concerns are increasingly important because of the Nursing Council of New Zealand's (2025b) revised Registered Nurse scope of practice. Consequently, nursing education must support graduates to develop sound clinical reasoning, confidence, and emotional resilience, along with the pharmacological knowledge required for safe practice in increasingly complex healthcare environments.

The aim of this study was to explore newly graduated Registered Nurses' perceptions of how effectively their undergraduate pharmacology education prepared them for safe medication practice. The study also aimed to identify gaps between theoretical learning and clinical expectations and inform future curriculum development.

METHODOLOGY

Study design

Data were collected using a questionnaire designed to capture both quantitative and qualitative information about newly graduated Registered Nurses' perceptions of pharmacology education sufficiency. The survey included demographic items (age, gender, ethnicity, and practice setting) and a series of closed-ended Likert-scale questions assessing the perceived importance of pharmacology knowledge domains. Open-ended questions invited participants to elaborate on their experiences of integrating pharmacology theory into practice, the sufficiency of their preparation, and recommendations for improving the pharmacology course. The combined quantitative data were analysed through descriptive statistics, with qualitative responses subjected to thematic analysis. This mixed-methods design allowed for the identification of both numerical trends and deeper contextual insights into participants' experiences.

Participant recruitment and survey administration

Surveys were distributed using a convenience sampling approach to 45 graduates from the total cohort of 68 newly graduated Registered Nurses in 2024. The participants had completed a Bachelor of Nursing degree at Toi Ohomai Institute of Technology, were working in the Bay of Plenty region of Aotearoa New Zealand, and were within their first year of professional practice. The 45 graduates were selected based on their accessibility and availability during the data-collection period. Of the 45 surveys distributed, 42 (93 percent) were returned. Of these, 38 were fully completed and included in the analysis. The completed responses represented 56 percent of the total graduate cohort (38/68) and 84 percent of the graduates who received a survey (38/45).

Surveys were administered in hard-copy format and de-identified to protect participant confidentiality. The instrument included closed-ended questions that collected demographic information and assessed participants' perceptions of their pharmacology knowledge. Open-ended questions invited participants to describe their experiences of pharmacology education and explain how they applied this knowledge in clinical practice.

Data analysis

A mixed-methods survey design was used to gather quantitative and qualitative data. The quantitative component consisted of closed-ended questions that collected demographic information and assessed participants' perception of pharmacology education and confidence

in medication-related competencies. Responses were transcribed into an Excel database and analysed using descriptive statistics, including frequencies and proportions. This analysis identified patterns across participants' responses and provided an overview of their characteristics, perceived pharmacology knowledge, and confidence in applying pharmacological skills in practice.

The qualitative component consisted of open-ended questions that explored participants' experiences of pharmacology education and how they transferred their knowledge into clinical practice. Responses were read and re-read to support familiarisation with the data. Similar ideas were then grouped in Excel, coded for recurring concepts, and reviewed iteratively to develop broader themes. This process identified participants' perceptions of the strengths and limitations of their pharmacology education, including factors that supported or hindered the application of theoretical knowledge in practice.

The quantitative and qualitative findings were considered together during the interpretation phase. Quantitative results showed the frequency and distribution of participants' reported confidence and perceived pharmacological knowledge, while qualitative findings provided context for these patterns by describing participants' experiences of applying pharmacology in clinical practice. Integrating both forms of evidence enabled the study to identify potential theory practice gaps in pharmacology education and develop a more comprehensive understanding of how undergraduate preparation influenced newly graduated nurses' confidence and readiness for safe medication practice.

Ethical considerations

Participants were invited via an email which included a full participant information sheet regarding the propose and voluntary nature of the study, assuring anonymous use of data and identifying lead researchers and the right to withdraw participation. This information was repeated in the introductory statement on the survey instrument confirming that questions were completely anonymous and voluntary, and that completion and submission of the questionnaire would be taken as consent for responses to be collected, analysed, and reported. All surveys were de-identified to ensure participant confidentiality, and data were stored securely in accordance with institutional research protocols. This study was approved by the Toi Ohomai Research and Human Ethics Committee (Approval Number 23046).

The study is limited by the relatively small number of completed surveys (n = 38), which restricts the generalisability of the findings. The sample was drawn exclusively from newly graduated Registered Nurses in the Bay of Plenty region. As a result, the findings may not fully reflect the experiences of graduates from other regions or training institutions. Additionally, although Māori and Pasifika nurses were represented in the sample, the perspectives of groups critical to the nursing workforce and to upholding Te Tiriti o Waitangi obligations may not have been adequately captured.

FINDINGS

Demographic profile

Most respondents were aged 20–25 years, reflecting the typical age of new graduates, with fewer participants aged 26–35 and very few over 36. The sample was predominantly female (95 percent), with 5 percent male respondents and no participants identifying outside binary

categories. Ethnicity data showed 71 percent European, 13 percent Asian, 13 percent Māori, and 3 percent Pasifika. While Māori and Pasifika respondents were fewer in number, their representation within the sample was reflective of the current ethnic composition of the New Zealand nursing workforce (Nursing Council of New Zealand, 2024).

Practice settings were varied, although most respondents worked in medical-surgical wards (39 percent), followed by primary/community health (16 percent) and perioperative care (10 percent). Smaller numbers worked in aged care, CCU, emergency, orthopaedics, and rehabilitation, suggesting most graduates entered generalist practice areas requiring broad pharmacology knowledge.

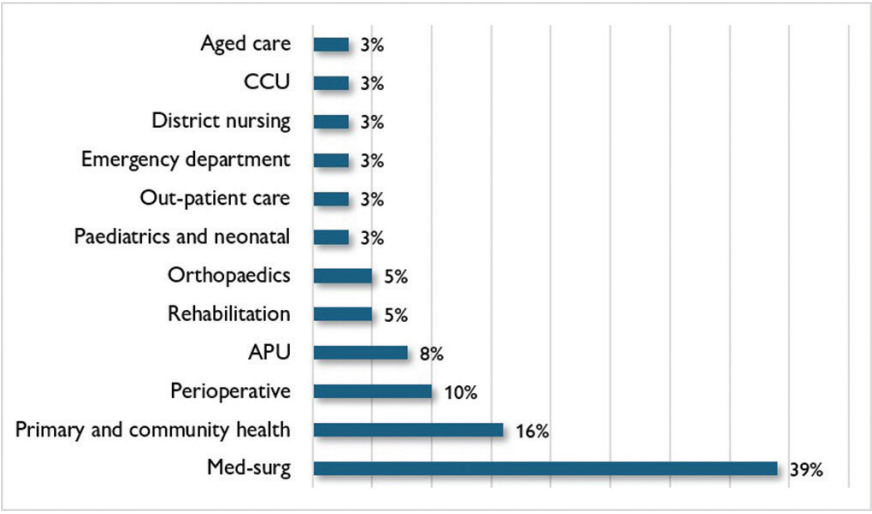


Figure 1: Practice setting.

Pharmacology knowledge needs

Respondents identified several pharmacology competencies as essential for safe nursing practice, including drug administration (86 percent), drug calculations (79 percent), prescribing and dosage knowledge (79 percent), drug classification (71 percent), contraindications (68 percent), drug interactions (61 percent), and mechanism of action (53 percent). Findings suggest a stronger emphasis on procedural and safety focused competencies, particularly medication administration and calculations, while conceptual pharmacology knowledge, such as mechanism of action and drug interactions, was perceived as important but less consistently understood.

Quality of learning resources and teaching materials

Fifteen respondents (39 percent) indicated learning resources and teaching materials were slightly influential in supporting the integration of pharmacology theory into practice, while 10 respondents (26 percent) rated them as very influential. A further nine respondents (24 percent) were neutral, three respondents (8 percent) identified a minor influence, and only one respondent (3 percent) considered them not influential. Findings suggest that learning resources and teaching materials meaningfully support the application of theory to practice.

Consolidation and integration of knowledge

Most students felt the course moderately to strongly supported consolidation and integration of knowledge. Only two respondents (5 percent) reported a minor influence, and one respondent (3 percent) considered it not influential, while nine respondents (24 percent) were neutral. Thirteen respondents (34 percent) identified the course as slightly influential and another 13 respondents (34 percent) as very influential. Overall, 68 percent perceived a positive influence, suggesting the course facilitated integration of pharmacology knowledge into practice for most participants.

Thematic analysis

Three overarching themes influencing the integration of pharmacology theory into clinical practice were identified: course structure and delivery; relevance and integration with practice, and teaching quality and support.

Course structure and delivery

Participants frequently described the three-month pharmacology course as too short in duration and delivered at a rapid pace, contributing to cramming behaviours and limited long-term knowledge retention. Respondents also reported feeling overwhelmed by the volume of medications taught, with many perceived as having limited relevance to clinical practice. Some students described pharmacology as being taught like a "foreign language" rather than being contextualised within nursing practice. Lecture slides were commonly perceived as excessive and insufficiently engaging.

Relevance and integration with practice

Participants identified a perceived disconnect between theoretical pharmacology content and the medications most encountered in clinical practice, with some drugs covered in the course viewed as outdated or less clinically relevant. Many respondents reported that meaningful consolidation of pharmacology knowledge occurred primarily during clinical placements through repeated exposure to commonly administered medications.

Teaching quality and support

Some participants acknowledged positive teaching experiences, highlighting effective tutors and supportive teaching approaches. Respondents also recommended the inclusion of more engaging and clinically focused teaching strategies to better support the integration of theory into nursing practice.

Preparedness for practice

Preparedness varied across pharmacology domains. The strongest preparedness was identified in drug calculations, with 82 percent feeling well prepared, followed by drug administration (64 percent) and drug classification (59 percent).

Lower levels of confidence were reported in conceptual pharmacology areas, including mode of action, drug interactions, contraindications, and prescribing/dosage knowledge, where many respondents identified ongoing gaps despite reporting some level of preparedness. These findings suggest that students felt more confident in procedural pharmacology skills than in applying deeper conceptual pharmacology knowledge to clinical practice.

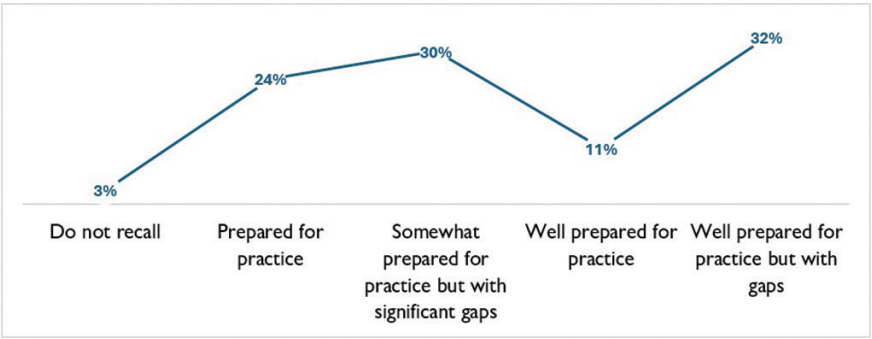


Figure 2: Perceptions of pharmacology preparedness based on conceptual pharmacology knowledge.

Sufficiency for practice

Respondents frequently reported that confidence and competence developed primarily through clinical placements, workplace experience, and self-directed learning rather than through coursework alone. Students highlighted the importance of understanding drug actions, dosages, interactions, and contraindications for safe nursing practice, although some content was perceived as lacking direct relevance to their clinical settings. Perceived preparedness was strongly influenced by placement quality, clinical exposure, and individual effort. Many participants recommended extending pharmacology education across the nursing programme and increasing integration between theoretical content and clinical practice.

Most respondents (63 percent, n=24/38) reported that their pharmacology education sufficiently prepared them for their role as a Registered Nurse, while 37 percent (n=11) felt it was insufficient.

Recommendations for improvement

Respondents recommended extending pharmacology teaching across all three years of the Bachelor of Nursing programme rather than within a short three-month course. Participants also suggested increased hands-on learning opportunities, including drug calculations, IV medications, monitoring, and real-life patient scenarios. Stronger integration of theory and clinical practice was recommended, particularly regarding mechanism of action, side effects, interactions, and contraindications. Students also emphasised the importance of supportive placements, clinically relevant teaching, clearer learning outcomes, and more interactive teaching approaches.

DISCUSSION

The findings of this study reinforce the persistence of the theory-practice gap in pharmacology identified in both national and international literature. Although participants reported confidence in procedural competencies, they expressed lower confidence in their conceptual understanding of pharmacology. This disparity suggests that newly graduated nurses may be able to perform medication-related tasks, such as administration and dosage calculations, without feeling equally confident applying the theoretical knowledge required to explain or evaluate those actions. Similar differences between practical competence and theoretical understanding have been reported in previous studies (Caboral-Stevens et al., 2020; Irvine et al., 2024). Lim and Honey (2017) likewise found that new graduates felt confident calculating medication doses and monitoring adverse

effects but were less assured in explaining mechanisms of action and drug clearance. These findings support the concern outlined in the background to this research that pharmacology education does not always translate effectively into clinical practice. Nursing education frameworks must therefore integrate practical medication skills with deeper conceptual learning and opportunities to apply knowledge to patient-specific situations, thereby supporting sound clinical reasoning, confidence, and medication safety in nursing practice (Santiago et al., 2021; White et al., 2023).

Participants of this study also described pharmacology courses as too short and content-heavy, limiting opportunities for integration of knowledge into practice. Similar concerns have been reported internationally, where students have trouble transferring theoretical pharmacology knowledge into clinical settings (Preston et al., 2019). Respondents highlighted the value of clinical placements and ongoing workplace learning, consistent with literature supporting simulation, experiential learning, and continuing professional development as strategies to strengthen pharmacology competence and medication safety (Irvine et al., 2024; Lim & Honey, 2017; Shahzeydi et al., 2024).

In response to the data analysed in this study and ongoing student feedback, the institute at which this study is based has implemented enhancements aimed at improving pharmacology education. Lecture content has been revised to be more accessible and less content-dense, with a focus on clarity and student engagement. Tutorials incorporate real-life clinical scenarios, supporting the application of pharmacological knowledge to practice. In addition, a computer-based, exam-style component was introduced to a written assessment, requiring students to independently write a conclusion under controlled conditions. This approach was designed to better demonstrate students' actual acquisition, integration, and application of knowledge, rather than reliance on externally generated content. These developments highlight the need for ongoing data collection and continuous improvement of pedagogy in pharmacology education to ensure it remains responsive, effective, and aligned with real world clinical practice demands.

Scope and limitations

This study evaluated the perceived sufficiency of pharmacology education provided by a New Zealand tertiary education institution, as reported by nursing graduates during their first year of registered clinical practice. It specifically examined whether participants considered that curricula had equipped them with the knowledge and skills necessary for safe medication management. It explored the perceptions of newly graduated nurses regarding their preparedness, while also identifying gaps in knowledge and assessing the effectiveness of teaching methodologies.

The study was limited to entrant nurses, excluding mid-career or advanced practice nurses. It concentrated solely on pharmacology education and on the graduate nurses' perceptions of clinical readiness, patient safety, and professional confidence, without extending to other areas of nursing curricula such as anatomy or medical-surgical. The research did not account for broader systemic healthcare factors such as staffing ratios, workload, or organisational policies. By narrowing its scope, the study sought to provide a focused evaluation of pharmacology education and the perceptions of clinical preparedness among new graduated nurses. Additional limitations include a small sample size drawn from a single regional cohort, which may limit generalisability.

CONCLUSION

This study explored how newly graduated Registered Nurses in Aotearoa New Zealand perceived the adequacy of their undergraduate pharmacology education for safe medication practice. Participants viewed their education as providing a useful foundation and reported greater confidence in procedural competencies. However, they expressed lower confidence in conceptual areas. This disparity demonstrates an ongoing theory-practice gap in pharmacology, in which graduates may be able to perform medication-related procedures without feeling equally confident applying the theoretical knowledge required to evaluate medication use and make clinically informed decisions.

Participants identified the short, content-heavy course structure and limited opportunities for applied learning as barriers to consolidating pharmacology knowledge. Clinical placements, workplace experience, and self-directed learning were viewed as important for developing confidence and connecting theoretical knowledge with clinical practice. The responses support a more longitudinal, scaffolded, and clinically integrated approach to pharmacology education. Extending pharmacology teaching across the Bachelor of Nursing programme, incorporating simulation and real-world clinical scenarios, and developing closer links between classroom learning and clinical placements may help graduates develop both practical competence and theoretical understanding.

Although the study was limited by its small, convenience sample from one regional cohort, and its reliance on self-reported perceptions, it provides valuable insight into the early practice experiences of new graduates. The findings indicate that pharmacology education requires ongoing evaluation to remain relevant to contemporary nursing practice needs. Improving the connection between pharmacological theory and clinical application is important to improve graduate confidence, support sound clinical reasoning, and enable nurses to administer medicines safely within the expectations of registered nurse practice in Aotearoa New Zealand (Nursing Council of New Zealand, 2025b).

Lucy Nolan is a registered nurse with 19 years' experience across Australia and New Zealand, specialising in neurosurgery and neurology. She has experience in diverse roles including acute care, patient outcomes analysis, and clinical nurse consultant positions. Currently, she is an academic staff member at Toi Ohomai Institute of Technology in Rotorua, teaching pharmacology and pathophysiology.

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Judith Honeyfield, PhD, is Academic Leader for Te Puna Whai Ora Department of Nursing at Toi Ohomai and a Principal Academic Staff Member. She teaches across all years of the Bachelor of Nursing programme, including clinical placement supervision, and maintains strong healthcare sector networks. Her research focuses on healthcare education and aged care, including an Ako Aotearoa-funded project on preparing student nurses for culturally centred care with older adults, particularly Māori and Chinese New Zealanders. She also specialises in adult education pedagogy, with a doctoral thesis on developing tertiary teachers and professional agency. Judi has contributed widely to teaching resources and supports collaborative research and novice academics.

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