

# The availability of clinical anatomy in postgraduate nursing education in New Zealand

Jon Cornwall<sup>1,2,3</sup>, Brian Robinson<sup>1</sup>, Dianne Sika-Paotonu<sup>1,4</sup>

<sup>1</sup>Graduate School of Nursing, Midwifery and Health, Victoria University of Wellington, Wellington, New Zealand

<sup>2</sup>Department of Physiology, University of Otago, Dunedin, New Zealand

<sup>3</sup>Centre for Health Sciences, Zurich University of Applied Science, Zurich, Switzerland

<sup>4</sup>Wesfarmers Centre for Vaccines and Infectious Diseases, Telethon Kids Institute, Perth, Australia

## Abstract

**Objectives:** Clinical anatomy is a vital subject for postgraduate training for many healthcare professions. Nurses undertaking advanced training require knowledge of clinical anatomy to guide sound clinical practice (assessment, differential diagnosis, decision-making processes) and professional interaction. The availability of clinical anatomy for nurses at postgraduate level in New Zealand was assessed to provide insight into local educational trends.

**Methods:** An audit of institutions offering postgraduate nursing education in New Zealand (five universities, four polytechnics) was performed. The availability of clinical anatomy and other science-based courses were assessed to explore science education options. Institution and departmental websites were accessed to determine course availability for clinical anatomy and science-based (pathophysiology, pharmacology) courses; telephone communication was initiated when data were unclear and to confirm course availability. Basic descriptive analyses were performed on data.

**Results:** On average, 26.3 different courses were offered per institution (range 7 to 39; total 237). From the nine institutions offering postgraduate nursing training, fifteen science-based courses were available. One institution offered no basic science courses, all others offered either pharmacology (n=10), pathophysiology (n=5) or both (n=5). Two offered two pharmacology courses. No institutions offered clinical anatomy.

**Conclusion:** The lack of clinical anatomy training options in postgraduate nursing education in New Zealand suggests this subject may be perceived as not relevant. The relevance of clinical anatomy to postgraduate nursing education is discussed to highlight how this important subject would assist educational outcomes, and to provide impetus for its implementation in future programmes.

**Keywords:** clinical anatomy; education; postgraduate; science

Anatomy 2016;10(2):138–142 ©2016 Turkish Society of Anatomy and Clinical Anatomy (TSACA)

## Introduction

A sound knowledge of clinical anatomy provides the basis for many healthcare interventions<sup>[1,2]</sup> and underpins effective medical care and safe practice for many health professionals,<sup>[3]</sup> including such professions as medicine, physiotherapy, and nursing.<sup>[3–5]</sup> Clinical anatomy is relevant to nursing practice in regards to being able to perform sound diagnoses, assessments, and commentary on clinical presentations,<sup>[6–8]</sup> perform interventions safely,<sup>[6]</sup> address occupational hazards effectively,<sup>[9]</sup> educate

patients<sup>[10]</sup> and communicate effectively with other health professionals.<sup>[11]</sup>

For many professionals clinical anatomy is taught both at undergraduate and postgraduate levels, with postgraduate level teaching providing the opportunity to undertake advanced education to acquire knowledge and skills with the improvement of clinical practice the anticipated goal.<sup>[4,12]</sup> Postgraduate education has become more widely available and accessible for many health professions. This includes access to postgraduate level courses in clinical

anatomy,<sup>[4]</sup> a topic that is increasingly becoming accepted as a relevant subject for individuals that work to multiple healthcare settings.<sup>[6,11]</sup> Nurses undertaking postgraduate education require access to clinical anatomy to acquire knowledge that underpins sound clinical practice and professional interaction.

The range of educational courses and opportunities available for postgraduate education reflects current education attitudes and trends, placing a socio-professional value on the perceived importance of course material. In New Zealand, it is unclear whether clinical anatomy - despite its obvious importance and relevance to clinical practice - is currently available as an option for postgraduate study for nurses. The availability of clinical anatomy for nurses at postgraduate level in New Zealand was therefore assessed to provide insight into local educational trends, with science-based courses other than clinical anatomy also included to provide insight into how science-based subjects are viewed as educational options.

## Materials and Methods

We performed an audit of institutions offering postgraduate nursing education in New Zealand. There are five universities and four polytechnics offering postgraduate nursing courses. These institutions are geographically spread around the New Zealand (Figure 1). Publicly available institution and departmental websites were accessed to determine course availability for all courses, clinical anatomy courses, and science-based courses (pathophysiology, pharmacology), including course frequency. Telephone communication was initiated when website data were unclear and to confirm course availability. Data were entered into an Excel (Microsoft Corp., Palo Alto, CA, USA) spreadsheet where basic descriptive analyses were subsequently performed.

## Results

On average, 26.3 different courses were offered per institution (range 7 to 39 courses; total 237 courses). From the nine institutions offering postgraduate nursing training, fifteen science-based courses were available. Basic science courses that were offered across the different institutions included pharmacology, offered as 10 different courses from nine institutions (two offered two courses), and pathophysiology (five courses from five different institutions) (Table 1). Five institutions offered both pharmacology and pathophysiology. One institution offered no basic science courses. No institutions offered clinical anatomy as a study option at postgraduate level.



**Figure 1.** Location of available postgraduate nursing programmes offering science-based courses in New Zealand. 1. Auckland University of Technology; 2. Auckland University; 3. Eastern Institute of Technology; 4. Western Institute of Technology; 5. Massey University; 6. Victoria University of Wellington; 7. University of Otago; 8. Southern Institute of Technology. [Color figure can be viewed in the online issue, which is available at [www.anatomy.org.tr](http://www.anatomy.org.tr)]

## Discussion

There are no options for nurses to study clinical anatomy at a postgraduate level in New Zealand. This finding is interesting given the obvious importance and relevance of clinical anatomy to the nursing profession. While almost all institutions offer pharmacology and pathophysiology at postgraduate level, none offer clinical anatomy, suggesting that basic science is viewed as important and relevant by all tertiary providers of postgraduate nursing education in this country. This presents an interesting situation that perhaps suggests that the subject of clinical anatomy is currently viewed by tertiary institutions as potentially having limited applicability or relevance in practice, possibly as not being of interest to students who are looking to study at a postgraduate level, or perhaps a lack of staff either inclined towards teaching clinical anatomy or

skilled in this area. Given advanced knowledge of clinical anatomy may facilitate improved clinical practice skills, these data provide the foundation for exploring whether delivery of this subject is required at a postgraduate level in New Zealand. In the following paragraphs, we discuss the potential for clinical anatomy as a future option in postgraduate nursing education by highlighting distinct clinical and healthcare areas that illuminate the potential for this clinically relevant subject to be adopted as a postgraduate option by tertiary institutions.

### Administration of medications

Clinical anatomy is related directly to safe clinical practice when performing intramuscular (IM) injections.<sup>[13-15]</sup> An example of this can be seen with deltoid IM injections, a procedure commonly performed by many clinicians, including nurses. There are dangers associated with incorrect placement of deltoid IM injections, such as damage to the axillary and radial nerves which can cause significant physical disability to patients. Understanding the correct location for injection placement and details of the adjacent anatomical structures is therefore relevant to safe IM injection practice, and is consequently vital knowledge for good nursing practice. Indeed, even undergraduate nurses have poor anatomical knowledge of not only deltoid IM practice<sup>[16]</sup> but also gluteal anatomy relevant to IM injections in this area.<sup>[17]</sup> Furthermore, some nursing texts differ in their descriptions of how to perform such common techniques,<sup>[18]</sup> therefore indicating that advanced training in clinical anatomy may benefit some users and avoid potential errors being derived from commonly accessible sources of information such as textbooks. This further highlights the necessity for postgraduate level nurses to be able to access training in this sub-

ject so as to provide an accessible platform for improving clinical performance.

### Occupational health and safety

Nurses must have an understanding of some basic human clinical anatomy in order to help avoid common occupational hazards such as low back strains, an occupational hazard that is becoming increasingly prevalent for nurses who work in New Zealand.<sup>[9]</sup> A sound knowledge of clinical anatomy may assist in being able to identify when a work activity, such as lifting, may be dangerous or require alteration to ensure physical harm is not encountered. In this way, good knowledge of clinical anatomy may facilitate a decrease in the rate or prevalence of some of the many frequent injuries that are encountered by nurses in the workplace.<sup>[19-22]</sup> Furthermore, such practical knowledge of clinical anatomy and anatomical structures may also assist in the prevention of injuries to patients, such as iatrogenic nerve injuries that are suffered by patients who are incorrectly positioned or moved during surgery.<sup>[23]</sup>

### Diagnosis and assessment

In New Zealand, nurses transition to registered Nurse Practitioners under the regulations and postgraduate qualifications established by the New Zealand Nursing Council. Included within the definition of the nurse practitioner scope of practice is the statement that 'They provide a wide range of assessment and treatment interventions including differential diagnoses, ... for the management of potential or actual health needs.' (p2)<sup>[8]</sup> As nurse practitioners, nurses are therefore expected to be able to provide differential diagnoses in the clinic, and a sound knowledge of clinical anatomy is therefore required to enable differential diagnosis across many clinical scenarios.<sup>[6]</sup>

**Table 1**

Institutions offering science-based courses in postgraduate nursing education in New Zealand. 'Yes' indicates an option is available for study, 'No' indicates the option is not available.

	Clinical Anatomy	Pharmacology	Pathophysiology
<b>Universities</b>			
Auckland University of Technology	No	Yes (x2)	No
Auckland University	No	Yes	Yes
Massey University	No	Yes (x2)	Yes
Victoria University of Wellington	No	Yes	Yes
University of Otago	No	Yes	No
<b>Polytechnics</b>			
Eastern Institute of Technology	No	Yes	Yes
Western Institute of Technology	No	Yes	No
Whitireia Community Polytechnic	No	No	No
Southern Institute of Technology	No	Yes	Yes

### Communication: Education, and professional communication and inter-professional interaction

Nurses are also responsible for educating patients and delivering information that is accurate and understandable to patients can impact on the quality of healthcare outcomes.<sup>[10,24]</sup> Many nurses are involved in roles where education may be a core component of their duties, such as education of patients pre-surgery for total knee replacement. In this scenario, effective healthcare entails being able to clearly communicate and articulate information on anatomical structures to patients so that exercises and information on ambulation can be carried out correctly and safely. Similarly, diabetics may require education from nurses on elements such as insulin injections,<sup>[10]</sup> and a thorough understanding of clinical anatomy in regards to injection sites and methods that will contribute to both education and healthcare decisions, thus impacting the delivery of care patients receive within the hospital and primary care settings. Research has shown clinicians untrained in clinical anatomy can also overestimate the knowledge that patients have of anatomy,<sup>[24]</sup> and enhanced knowledge of clinical anatomy therefore provides further support for effective clinician-patient communication.

Communicating effectively with other health professionals requires a common language in order to facilitate understanding and deliver precise information that will assist in effective and timely healthcare decisions. In describing what is wrong with the human body, this comes in the form of anatomical terms and terminology.<sup>[25]</sup> Correct utilisation of recognised terms not only contributes to an improved healthcare experience for patients by virtue of the potential precision it may bring to clinical situations and interactions,<sup>[24]</sup> it facilitates a strong professional culture where the language of anatomy contributes as a 'common tongue' in a healthcare context, promoting understanding and improving inter-professional interaction.<sup>[11,24]</sup>

### Limitations

This brief audit of existing postgraduate course options is limited to New Zealand data and does not include comparison with undergraduate clinical anatomy options. Undergraduate nursing courses often include basic clinical anatomy within a 'bioscience' course,<sup>[5]</sup> and it was therefore not feasible to assess how undergraduate clinical anatomy courses or training may relate to postgraduate course options in New Zealand. Further, it contains cross-sectional data from one calendar year only, opening the possibility that clinical anatomy has been offered on other occasions. However, personal communication with experienced nurses from the New Zealand Nursing Council suggests that, anecdotally, postgraduate nursing education in

clinical anatomy has not previously been offered through tertiary education providers in New Zealand.

### Conclusion

At present, no clinical anatomy courses are offered as a postgraduate education option for nursing in New Zealand. As discussed, there are strong fundamental reasons for consideration of clinical anatomy as an educational option at postgraduate level for nurses. Across five different tertiary education providers, the science-based education options of clinical pharmacology and pathophysiology are commonly available to postgraduate nurses as education options that can lead to advanced care pathways (*i.e.* nurse practitioner, nurse prescribing). Yet, despite the prevalence of science-based courses, clinical anatomy remains unavailable. It could be argued that a formal teaching and assessment of clinical anatomy with its associated terminology is not required and the knowledge acquired through clinical experience is sufficient for clinical practice. In addition, it may also be suggested that the details and nuances of clinical anatomy do not matter, and that 'close enough is good enough' in respect to knowledge of anatomical structures, locations, and terminology. This position can be rejected by considering the retort 'good enough for what?', and whether a 'gold standard' should be strived for by our healthcare community in the service they deliver and knowledge they acquire - including knowledge of clinical anatomy. Given the lack of options available for this important subject in postgraduate nursing education in New Zealand, findings are perhaps indicative of current science-based priorities in postgraduate nursing education and this creates a perception that postgraduate level knowledge of clinical anatomy may be viewed as 'irrelevant' by the local nursing profession. A gap in New Zealand's postgraduate nursing education field therefore exists and this provides the opportunity for clinical anatomy to be considered in future postgraduate nursing programmes.

### References

1. Mirjalili SA, McFadden SL, Buckenham T, Stringer MD. A reappraisal of adult abdominal surface anatomy. *Clin Anat* 2012;25:844-50.
2. Attwell L, Rosen S, Upadhyay B, Gogalniceanu P. The umbilicus: a reliable surface landmark for the aortic bifurcation? *Surg Radiol Anat* 2015;37:1239-42.
3. Agnihotri G, Singh G. Anatomy teachers' perspective of augmentation of student interest & aptitude using multimedia versus problem based learning in physiotherapy teaching - a qualitative pilot study. *Journal of Physical Therapy* 2013;6:46-53.
4. Stringer MD, Lyall P. Design, implementation, and evaluation of a postgraduate diploma in surgical anatomy. *Anat Sci Educ* 2012;5:48-54.

5. Taylor V, Ashelford S, Fell P, Goacher PJ. Biosciences in nurse education: is the curriculum fit for practice? Lecturers' views and recommendations from across the UK. *J Clin Nurs* 2015;24:2797–806.
6. Mirjalili SA, McFadden SL, Buckenham T, Wilson B, Stringer MD. Anatomical planes: are we teaching accurate surface anatomy? *Clin Anat* 2012;25:819–26.
7. Lee MWL, McPhee RW, Stringer MD. An evidence-based approach to human dermatomes. *Clin Anat* 2008;21:363–73.
8. Nursing Council of New Zealand. Competencies for the nurse practitioner scope of practice. [Internet] April 2010. Available from: [http://www.schoolnurse.org.nz/Attachments/pdf\\_files/management/Management\\_Job\\_Descr\\_EN\\_Scope%20of%20practice\\_competencies-april10.pdf](http://www.schoolnurse.org.nz/Attachments/pdf_files/management/Management_Job_Descr_EN_Scope%20of%20practice_competencies-april10.pdf) [Retrieved July, 15; 2016]
9. Cornwall J, Melloh M. Do nurses claim more lumbar spine injuries than the general population in New Zealand? A retrospective study 1995–2009. *N Z Med J* 2012;125:112–5.
10. Krall JS, Donihi AC, Hatam M, Koshinsky J, Siminerio L. The nurse education and transition (NEAT) model: educating the hospitalized patient with diabetes. *Clinical Diabetes and Endocrinology* 2016; 2:1–6.
11. Cornwall J. Perhaps we don't know what we thought we knew: why clinicians need to re-visit and re-engage with clinical anatomy. *Australas Med J* 2013;6:339–40.
12. Heisler CA. Importance of adequate gross anatomy education: the impact of a structured pelvic anatomy course during gynecology fellowship. *Anat Sci Educ* 2011;4:302–4.
13. Gillies FH, Matson DD. Sciatic nerve injury following misplaced gluteal injection. *J Pediatr* 1970;76:247–54.
14. Greeblatt DJ, Allen MD. Intramuscular injection-site complications. *JAMA* 1978;240:542–4.
15. Mishra P, Stringer MD. Sciatic nerve injury from intramuscular injection: A persistent and global problem. *Int J Clin Pract* 2010;16: 1573–9.
16. Cornwall J, Hogarth KJ. Do nursing students demonstrate safe clinical practice for deltoid intramuscular injections? *Clin Anat* 2012;25: 532.
17. Cornwall J. Are nursing students safe when choosing gluteal intramuscular injection sites? *Australas Med J* 2011;4:315–21.
18. Carter-Templeton H, McCoy T. Are we on the same page?: a comparison of intramuscular injection explanations in fundamental nursing texts. *Medsurg Nurs* 2008;17:237–40.
19. Retsas, A, Pinikahana, J. Manual handling activities and injuries among nurses: an Australian hospital study. *J Adv Nurs* 2000;31:875–83.
20. Trinkoff AM, Brady B, Nielsen K. Workplace prevention and musculoskeletal injuries in nurses. *J Nurs Admin* 2003;33:153–8.
21. Rodriguez-Acosta R, Richardson D, Lipscomb H, Chen J, Dement J, Myers D, Loomis D. Occupational injuries among aides and nurses in acute care. *Am J Ind Med* 2009;52:953–64.
22. McCaughey D, Kimmel A, Savage G, Lukas T, Walsh E, Halbesleben J. Antecedents to workplace injury in the health care industry: A synthesis of the literature. *Health Care Manage Rev* 2016;41:42–55.
23. Zhang J, Moore AE, Stringer MD. Iatrogenic upper limb nerve injuries: a systematic review. *ANZ J Surg* 2011;81:227–36.
24. Dudenkov D, Primus J, Mayer S, Pawlina W, Lachman N. Developing competency in communication: medical student perceptions of patients' knowledge of anatomy. *FASEB J* 2013;27:S957.20.
25. Federative Committee of Anatomical Terminology (FCAT). *Terminologia anatomica*. 2nd ed. Stuttgart: Thieme; 2011.

Online available at:  
[www.anatomy.org.tr](http://www.anatomy.org.tr)  
 doi:10.2399/ana.16.022  
 QR code:



deomed®

**Correspondence to:** Jon Cornwall, PhD  
 Graduate School of Nursing, Midwifery and Health,  
 Victoria University of Wellington, Wellington, New Zealand  
 Phone: +64 4 463 6650  
 e-mail: [jon.cornwall@vuw.ac.nz](mailto:jon.cornwall@vuw.ac.nz)

*Conflict of interest statement:* No conflicts declared.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported (CC BY-NC-ND3.0) Licence (<http://creativecommons.org/licenses/by-nc-nd/3.0/>) which permits unrestricted noncommercial use, distribution, and reproduction in any medium, provided the original work is properly cited. *Please cite this article as:* Cornwall J, Robinson B, Sika-Paotonu D. The availability of clinical anatomy in postgraduate nursing education in New Zealand. *Anatomy* 2016;10(2):138–142.