

The employment gap: the relationship between medical student career choices and the future needs of the New Zealand medical workforce

Sam Seleg, Emmanuel Jo, Phillippa Poole, Tim Wilkinson, Fiona Hyland, Joy Rudland, Antonia Verstappen, Warwick Bagg

ABSTRACT

AIMS: To determine the career decision intentions of graduating doctors, and the relationship between these intentions and the predicted medical workforce needs in New Zealand in 10 years' time. **METHODS:** A workforce forecasting model developed by the Ministry of Health (MOH) has been used to predict the proportion of doctors required in each medical specialty in 2028 in New Zealand. The future work intentions of recently graduated doctors at the Universities of Auckland and Otago were collected from the Medical Student Outcomes Data (MSOD), and compared with these predicted needs. **RESULTS:** Between 2013 and 2017, 2,292 doctors graduated in New Zealand, of whom 1,583 completed the MSOD preferences section (response rate 69%). Of these only 50.1% had decided on a future medical specialty. The most popular were surgical specialties (26.2%), general practice (20.7%), and internal medicine (11.0%). Compared to the MOH workforce forecast model there appears to be insufficient interest in general practice at the time of graduation. **CONCLUSIONS:** To shape the medical workforce to meet forecast needs, multiple stakeholders will need to collaborate, with a special focus on the early postgraduate years, as many doctors have yet to decide on specialisation.

Understanding when medical students and doctors make choices about their future medical career is of importance to universities, postgraduate colleges and for individual doctors. Choosing a career is influenced by a number of factors which are well studied,¹⁻³ including background and personal factors, as well as the nature of the job itself. Proactively shaping the career intentions of medical students is possible, albeit complex, using a holistic multi-factorial approach that begins before medical school and extends into the early years after graduation.^{4,5} A coordinated

workforce strategy involving multiple stakeholders is necessary to enable the shaping of the medical workforce to best serve the needs of the whole country.⁶⁻⁹

Workforce development is an emerging concept, at the core of which is the concept of 'learning for work'.¹⁰ The selection, education and training of medical students and graduates needs to be taken into account in shaping the workforce.^{4,11,12} Additional factors that shape the workforce are the changing healthcare needs and expectations of the public, along with frequent

technological advancements.¹³ In considering these factors, planners need to take into account the long gestation from entry to medical school until commencing work as a specialist, approximately 14 years later.

Understanding the timing of career decision-making and the career intentions of graduating medical students, and how these align with predicted workforce needs in the future is a useful starting point. This information allows individual doctors, medical educators and workforces planners the opportunity to know when career shaping might usefully occur. Limited data are currently available in New Zealand on when career decisions are made and comparing career intentions to future workforce needs, however similar comparisons have been made overseas, with interventions suggested to help shape the workforce.¹⁴

The aim of this study is to identify the career decisions intentions of graduating medical students and compare the career intentions of students (2013–2017) in New Zealand, with predicted workforce requirements 10 years later, in 2028, when these junior doctors will be practising as specialists.

Methods

We compared data from the Ministry of Health Workforce Forecasting model with data from the New Zealand Medical Schools Outcomes Database (MSOD).

Ministry of Health Workforce Forecasting Model

The Ministry's Workforce Forecasting Model uses dynamic models to forecast the medical workforce for the next 10 years (for example, 2019–2028) for each specialty.¹⁵

The model is flexible enough to test numerous scenarios by changing age, specialty-specific entry numbers or trainee numbers, career entry, exit and re-entry patterns, working hour patterns, in order to predict how many doctors need to train in order to achieve an adequate workforce in a defined specialty in the future. These predictions can be used to inform health workforce policies. An important limitation, however,

is that such predictions assume no change in models of care or scopes of practice.

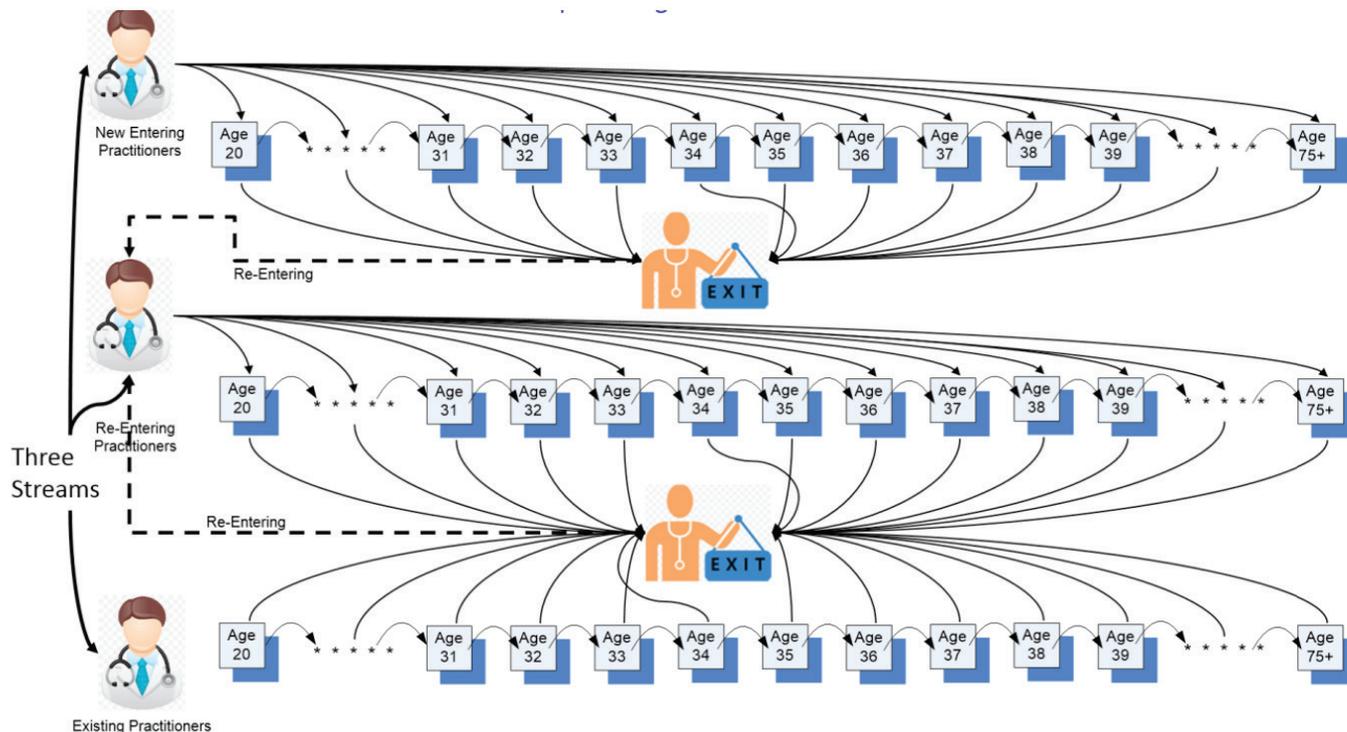
Medical workforce data were obtained on every doctor holding an Annual Practising Certificate (APC) in New Zealand from 2003–2018. The APC data were sourced from the Medical Council of New Zealand's 2003–2018 registration database and the 2016 Workforce Survey.

The model focuses on three streams within each specialty (Figure 1). The first stream consists of "Existing Practitioners", defined as senior medical officers (SMO) currently practising in their specialty. The second stream consists of "New Entering Practitioners", defined as senior medical officers newly entering the specialty after completion of vocational training and registration as fellows of their respective training college. This group also includes migrant doctors entering the SMO workforce. Doctors in each of these streams are characterised by age as there are different entry and exit rates by age, and tracked over time.

The third stream, "Re-Entering Practitioners", comprises doctors from either of these two streams who exit and then re-enter the workforce. This includes SMOs leaving the workforce for overseas fellowship training, or for personal reasons such as family or sickness, who then re-enter. The third stream also allows SMOs to exit and return to the third stream again. Medical Council practising certificate renewals were used to determine exiting specialists. The lack of renewal of annual practising certificate was taken as evidence that a doctor had exited the New Zealand workforce.

Data presented include workforce data in 2018, expressed as both full time equivalents (FTE) and headcount (HC). Using the forecasting model, an algorithm was devised to allow for the calculation of the required annual new SMO entry between 2018–2028 to maintain the current workforce in FTEs of SMOs per population for the year 2028. We highlight that the assumption that the workforce required per population in 2028 will be similar to the level in 2018 is dependent on a similar model of healthcare delivery.

Figure 1: Conceptual diagram of workforce simulation.



Medical Schools Outcomes Database

Data from the New Zealand Medical Schools Outcomes Database (MSOD) were used to determine graduating medical students’ workforce intentions. The MSOD project is a collaboration of Australasian medical schools, founded with the intent of tracking students from all Australian and New Zealand medical schools from selection through their medical school programme, and through their postgraduate years.¹⁶ As the world’s first bi-national workforce study, it continues to explore the interaction between students’ background, demographics and the medical curriculum, and how this shapes their future career choices.¹⁶

We focused on New Zealand data. The University of Otago began enrolling participants into MSOD in 2007, and University of Auckland in 2012, although Auckland medical students had participated in that university’s Health Career Pathways Project since 2006, and these data have been used to backfill the MSOD database. A New Zealand MSOD Steering Committee was established in 2012 to coordinate the project with financial support from Health Workforce New Zealand. All medical

students are invited to complete a questionnaire at both entry to and graduation from the programme. Questionnaires are also administered one, three, five and, from 2019, eight years after graduation. For the purposes of this study, we collated data from the *National report on students graduating medical school in New Zealand in 2013–2017*, which analysed responses to the Exit Questionnaire from New Zealand medical students.¹⁷ At this time in their training, about half the students indicated a firm career preference, with the remainder less certain, but still able to indicate preferences. We focused specifically on those students who had indicated that they had decided on a training specialty. Given the expected progression through training in New Zealand, we anticipate that these students would have entered or be entering the medical workforce as SMOs in 2028. A key assumption is that graduating medical student intentions translate to long-term vocational choices.

The comparison required that smaller non-surgical vocations listed in the MSOD questionnaire be grouped together: these are represented as ‘other’ in Table 1. MSOD data collects all surgical specialties under the category of ‘surgery’, therefore

Table 1: Exiting students preferences compared with current and predicted New Zealand workforce requirements in 2028 (FTE).

	A*	B*	C*	D	E	F	G
	2018 current SMO distribution (FTE) (%) N=10,174	2018 current SMO distribution (HC) (%) N=10,120	Required proportion of annual new SMO entry from 2019–2028 to maintain 2028 doctors per population at 2018 levels (%) N=515 per year	Distribution of 2013–2017 graduate intentions (%) N=806	Graduate intentions vs current SMO FTE workforce (D-A)	Graduate intentions vs current SMO HC workforce (D-B)	Graduate intentions vs required new SMO entry (D-C)
Specialty							
Adult medicine/internal medicine	12.2%	10.8%	8.9%	11.0%	-1.3%	0.1%	2.0%
Anaesthesia	9.0%	8.1%	7.5%	6.7%	-2.3%	-1.4%	-0.8%
Diagnostic and interventional radiology	5.1%	4.8%	4.8%	3.0%	-2.1%	-1.8%	-1.8%
Dermatology	0.7%	0.7%	0.8%	0.9%	0.2%	0.2%	0.0%
Emergency medicine	3.0%	3.0%	2.1%	4.7%	1.7%	1.7%	2.6%
General practice	30.2%	35.7%	37.4%	20.7%	-9.5%	-14.9%	-16.7%
Intensive care medicine	1.3%	1.0%	0.4%	1.3%	-0.1%	0.3%	0.9%
Obstetrics and gynaecology	3.4%	3.1%	3.2%	5.7%	2.3%	2.6%	2.5%
Ophthalmology	1.5%	1.5%	1.1%	2.3%	0.8%	0.9%	1.2%
Oral and maxillofacial surgery	0.3%	0.2%	0.2%	0.9%	0.6%	0.6%	0.6%
Paediatrics and child health	4.1%	4.0%	2.7%	6.1%	1.9%	2.1%	3.4%
Palliative medicine	0.5%	0.6%	0.9%	0.6%	0.1%	0.0%	-0.3%
Pathology	3.2%	3.0%	3.0%	1.0%	-2.2%	-2.1%	-2.0%
Psychiatry	6.2%	6.1%	7.3%	3.5%	-2.8%	-2.7%	-3.8%
Public health medicine	1.6%	1.7%	2.6%	0.5%	-1.1%	-1.2%	-2.1%
Rural and remote medicine	1.3%	1.2%	1.1%	2.2%	1.0%	1.1%	1.2%
Sports medicine	0.2%	0.3%	0.2%	1.5%	1.3%	1.2%	1.3%
Surgical - excluding O/Max	11.5%	9.4%	10.3%	26.2%	14.7%	16.8%	15.9%
Other	4.5%	4.9%	5.6%	1.3%	-3.2%	-3.6%	-4.3%
Total	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%

*Reference 15.

all surgical specialties are represented within this category, with the assumption that projected requirements reflect those requirements across several specialties.

In our study, we specifically compared medical student intentions versus current SMO workforce, both FTE and HC. The key comparator was that of medical student intentions and the required new SMO entry into each specialty in 2028, in order to maintain the current workforce level.

SAS® (SAS Institute Inc., Cary, NC, USA) was used for the parameter calculations.

Ethics approvals for the MSOD project were granted by the respective Human Ethics Committees of the University of Auckland and University of Otago.

Results

From 2013 to 2017, 2,292 medical students graduated from the University of Otago and University of Auckland, of whom 1,583 students completed the medical specialty preferences section (response rate of 69%). From these respondents, 806 (50.1%) indicated that they had decided on a long-term specialty. The proportion of the cohort indicating preference for a particular specialty is displayed in Table 1 (Column D).

Most popular were surgical specialties (26.2%); followed by general practice (20.7%) and adult/internal medicine (11.0%). The surgical category included cardiothoracic, general, orthopaedic, otolaryngology head

and neck, paediatric, plastics and reconstructive, urology and vascular services. We excluded maxillofacial surgery as this requires dental training in addition. The 'adult medicine/internal medicine' category includes sub-specialties broadly categorised under the auspices of the adult medicine division of the Royal Australasian College of Physicians. Examples included there are cardiology, clinical pharmacology, endocrinology, gastroenterology and hepatology, acute care medicine, geriatric medicine, haematology, immunology, infectious disease, oncology, nephrology, neurology, respiratory medicine and rheumatology.

The 'other' category included clinical genetics, family planning and reproductive health, medical administration, musculoskeletal medicine, occupational medicine, pain medicine, radiation oncology, rehabilitation medicine, sexual health and urgent care.

The Ministry of Health Workforce data are also presented in Table 1 (Columns A, B and C). The SMO workforce in 2018 comprised 10,174 FTE and 10,120 doctors by head count. With regards to both FTE and HC, general practice is the largest specialty (30.2% and 35.7% respectively) followed by adult/internal medicine (12.2% and 10.8% respectively) and surgical specialties (11.5% and 9.4% respectively).

Using the workforce algorithm, we found that 515 new SMOs are required to enter into the vocational workforce per year between 2018 and 2028 to maintain the current service provisions in 2028. It needs to be noted that this figure, and the subsequent proportions in each specialty, include new migrant SMOs as well as New Zealand medical graduates (NZMG). The specialty that requires the largest proportion of new entrant SMOs is general practice (37.4%) followed by surgical services (10.3%) and adult/internal medicine (8.9%).

Columns E, F and G compare New Zealand student career intentions with projected workforce requirements. In particular, column G highlights the direct comparison of required new SMO entrants and student intentions, given that vocational training is expected to take 14 years. There are significant differences between student intentions and the predicted workforce requirement

(Chi squared = 460.19, DF 18, $P < 0.0001$). The largest mismatch between student intention and predicted requirement is for general practice.

Discussion

This is the first study to utilise MSOD data from graduating medical students' career decisions, and Ministry of Health data and modelling to explore how medical student career preferences align with the future healthcare needs of New Zealand.

Nearly 70% of students completed the medical specialty preferences section of the survey, a satisfactory response rate for survey-based questionnaires. The most notable finding of this study is that only half of the students who completed the medical specialty preferences section had decided on a specialty at the time of graduation. Thus, maintaining a broad undergraduate medical curriculum is important for students to explore a wide range of medical specialties. Decisions made in the early postgraduate years will significantly impact the proportions of doctors training in different specialties. This may also represent a significant opportunity to further "shape" specialty choices.

The second significant finding of this study is that if graduating medical students who have decided on a career maintain their graduating choices, and if those who are undecided have ultimate career choices in similar proportions to those who are decided, then there may be a mismatch of specialty intentions and future health workforce needs. This is an especially important finding as there appears to be "over interest" in certain specialties, eg, surgical specialties. Conversely, there is potential "under interest" for specialties such as general practice and psychiatry. However, these findings need to be interpreted with caution as they relate to only a third of students surveyed. Nevertheless, these results provide valuable information to guide workforce strategies to shape the medical workforce. Given that graduating students indicated that the atmosphere, work culture and the experience they have of a specialty during medical school are the most important factors influencing career decisions, there is potential for

enhanced efforts to be made to attract more specialists in these areas.¹⁷ Personal interest is another factor that has been reported to heavily influence career decisions locally.² Furthermore, training cost and medical student debt do not significantly influence New Zealand medical student career choices,¹⁸ therefore initiatives focused towards students' experience and perceptions of a specialty as well as employment prospects and conditions of working in those areas may help to shape the future workforce. Previous literature suggests that a multifactorial approach, involving selection criteria and targeted curriculums, can be used to influence, to some degree, medical students' career paths to match workforce requirements.¹⁹

This study has also highlighted that the provision of a general practice workforce for New Zealand appears to be particularly problematic, due to the combination of relatively low student interest in the profession, and an overall aging general practitioner workforce nearing retirement. Primary care workforce predictions from the US report a significant undersupply, with a 21% increase in resident or trainee registrar positions required to meet the primary health needs in 2035.²⁰ A recent New Zealand Government initiative to double the number of registrar training places in general practice is likely to assist in meeting the need. High-quality general practice attachments with experienced GP tutors have been found to be effective at attracting early graduates into the profession, and community-based attachments in the early postgraduate years are now being undertaken by an increasing number of house officers. Further evaluation of these interventions using post-graduate data would be valuable for stakeholders to improve general practice numbers. Psychiatric workforce sufficiency

in New Zealand is another challenge, with shortages projected. As similar shortages are projected in Australia, joint efforts could be made to increase student interest and recruitment to meet future needs.²¹

A limitation of this study is that only half of graduating students who completed the medical specialty preferences section of the survey had decided on a career (35% of the total cohort). Secondly, the assumption that the career preferences of graduating students remain constant, and translate into corresponding vocational training pathways. The dynamic and rapidly evolving nature of medicine, and consequent alterations in models of care and/or scopes of practice make workforce modelling and predictions less accurate. This is evidenced by recent data demonstrating that graduates consider more specialties at graduation than they did previously, and up to a quarter of graduates end up in different specialties than those decided at graduation.^{22,23} This means stakeholders need to remain dynamic in their projections and efforts to shape the workforce.²⁴ A third limitation of the study is that MSOD does not collect data on the medical and surgical subspecialty career intentions, nor can we further break down the general practice intentions and workforce into urban and rural patterns.

Conclusion

At graduation only half of New Zealand medical students have decided on a future medical specialty. There is thus a significant opportunity to "shape" the medical workforce in the early postgraduate years. This opportunity could be used to influence doctors to select specialties that are needed to match the future health needs of New Zealand. Strategies to address predicated shortages in vulnerable workforces may be particularly important.

Competing interests:

Dr Bagg was Head of the Medical Programme at the University of Auckland until February 2019. Ms Verstappen and Dr Poole report grants from Health Workforce New Zealand during the conduct of the study.

Acknowledgements:

We would like to thank Health Workforce New Zealand, Ministry of Health and Medical Schools Outcomes Database project.

Author information:

Sam Seleg, Clinical Medicine Education Fellow, School of Medicine, University of Auckland, Auckland; Emmanuel Jo, Manager, Analytics and Modelling, Health Workforce New Zealand, Ministry of Health, Wellington; Phillipa Poole, Head, School of Medicine, University of Auckland, Auckland; Tim Wilkinson, Director, MBChB Programme, Otago Medical School, University of Otago, Dunedin; Fiona Hyland, Assessment Manager, Otago Medical School, University of Otago, Dunedin; Joy Rudland, Director, Faculty Education Unit, Otago Medical School, University of Otago, Dunedin; Antonia Verstappen, Research Fellow, School of Medicine, University of Auckland, Auckland; Warwick Bagg, Department of Medicine, School of Medicine, University of Auckland, Auckland.

Corresponding author:

Dr Sam Seleg, Clinical Medicine Education Fellow, School of Medicine,
University of Auckland, Auckland.
sseleg@gmail.com

URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1506-29-november-2019/8058>

REFERENCES:

- Hauer KE, et al. Factors associated with medical students' career choices regarding internal medicine. 2008; JAMA 300:1154–64.
- Zarkovic A, Child S, Naden G. Career choices of New Zealand junior doctors. N Z Med J. 2006; 119.
- Boyle V, Shulruf B, Poole P. Influence of gender and other factors on medical student specialty interest. N Z Med J. 2014; 127:78–87.
- Poole P. Nature and nurture: shaping New Zealand's medical workforce. N Z Med J. 2016; 129:6–8.
- Martin I. Medical workforce development: Challenges and opportunities for the next 25 years. in *Procedia - Social and Behavioral Sciences*. 2010; 2:6914–6919.
- Health Workforce Australia. Australia's Future Health Workforce – Doctors. (2014).
- Crettenden IF, et al. How evidence-based workforce planning in Australia is informing policy development in the retention and distribution of the health workforce. Hum. Resour. Health 2014; 12:7.
- Bloor K. Planning human resources in health care: Towards an economic approach, An international comparative review. (2003).
- Gorman D. Developing health care workforces for uncertain futures. Academic Medicine 2015; 90:400–403.
- Jacobs RL, Hawley JD. The Emergence of 'Workforce Development': Definition, Conceptual Boundaries and Implications. in *International Handbook of Education for the Changing World of Work*. 2009:2537–2552.
- Poole P, Shulruf B. Shaping the future medical workforce: Take care with selection tools. J. Prim. Health Care. 2013; 5:269–275.
- Witzburg, RA, Sondheimer HM. Holistic review—Shaping the medical profession one applicant at a time. N Engl J Med. 2013; 368:1565–1567.
- Weiner JP, Yeh S, Blumenthal D. The impact of health information technology and e-health on the future demand for physician services. Health Aff. 2013; 32:1998–2004.
- Fraher EP, Knapton A, Holmes GM. A Methodology for Using Workforce Data to Decide Which Specialties and States to Target for Graduate Medical Education Expansion. Health Serv. Res. 2017; 52:508–528.
- Jo EC, Mathis K, Goh J. Forecasting future medical specialty workforces supply with age distribution using health workforce annual practicing certificate data (2018).

16. Kaur B, Robertson DM, Glasgow NJ. Evidence-based medical workforce planning and education: The MSOD project. *Medical Journal of Australia* (2013).
17. The New Zealand MSOD Steering Group. National report on students graduating medical school in New Zealand in 2013–2017 (2018).
18. Moore J, et al. Student debt amongst junior doctors in New Zealand; Part 2: Effects on intentions and workforce. *N Z Med J*. 2006; 119:21–28.
19. West DC, Robins L, Gruppen LD. Workforce, learners, competencies, and the learning environment: Research in medical education 2014 and the way forward. *Academic Medicine* 2014; 89:1432–1435.
20. Petterson SM, et al. Projected primary care physician shortages by 2035. *Ann. Fam. Med.* 2015; 13, 107–114.
21. Martin I, et al. Australia's Future Health Workforce – Psychiatry. *N Z Med J*. 2016; 119:107–114.
22. Goldacre MJ, Laxton L, Lambert T. Medical graduates' early career choices of specialty and their eventual specialty destinations: UK prospective cohort studies. *BMJ*. 2010; 341:3199.
23. Svirko E, Goldacre MJ, Lambert T. Career choices of the United Kingdom medical graduates of 2005, 2008 and 2009: questionnaire surveys. *Medical Teacher*. 2013; 35.
24. Grover A, Orlowski JM, Erikson CE. The Nation's Physician Workforce and Future Challenges. *Am J Med Sci*. 2016; 351:11–19.