

ORIGINAL ARTICLE

Who wants to be a surgeon? Patterns of medical student career choice

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Abstract

Aim NZ needs a surgical workforce with the capacity to meet the increasing health demands of an aging population. This study determined longitudinal patterns of medical student interest in a surgical career and factors influencing that choice.

Method We studied medical students entering the Auckland medical programme from 2006-2008 who completed an entry and exit questionnaire on career intentions. Four notional groups were created, depending on the level of interest at entry and at exit. Demographic factors for each category were compared. Analysis of influencing factors was also undertaken.

Results Of 488 students, 310 (64%) completed both an entry and exit questionnaire. Over 50% of students had a strong interest in a surgical career at entry, dropping to 26% at exit. The 'Never Evers' (No interest at entry/No interest at exit) made up 39%, 'Divergers' (Strong/No) 35%, 'Die Hards' (Strong/Strong) 18%, and 'Convertibles' (No/Strong) 8%. Less interest in a surgical career was seen among female ($P=0.001$) and older students ($P=0.017$). Influencing factors differentiating the 'Die Hards' from the 'Divergers' were work hours and flexibility (less influence among 'Die Hards'), with procedural nature and consultants/mentors (higher).

Conclusion There is a significant reduction in interest in a surgical career over the course of the undergraduate programme, especially among female and older students. Yet the level appears sufficient for available training places. Consultant role models are an important career influence. Lack of flexibility in work and training programmes continue to provide challenges in creating a diverse surgical workforce.

An increasing and aging population in New Zealand (NZ) has led to an estimate of un-met need across all surgical specialties of 26%, with this predicted to rise to over 50% by 2026.¹ The collective productivity of surgeons will need to increase to service this need. It has been argued this will require an increase in the number of surgical trainees¹. On the other hand, the Royal Australasian College of Surgeons (RACS) believes the status quo will be sufficient, with increasing health service efficiency and an older age of retirement providing a relative and actual increase in surgeons respectively.² Regardless, it is important that there are sufficient NZ medical graduates with an interest in surgical training. The decision to undertake a surgical training pathway is not taken lightly by graduates. Possible barriers include a poor understanding of the training system by medical students³, insufficient exposure to surgical specialties, inadequate support or appropriate mentoring by surgical seniors⁴⁻⁷ and the importance of lifestyle factors to current graduates.⁸⁻¹⁰

Previous NZ studies on the career intentions of medical students¹¹⁻¹² did not focus specifically on surgical interest, nor how this changes over the programme.^{13,14} The first aim of this study was to describe the level and pattern of Auckland medical students' interest in a surgical career from entry through to exit from the programme. The second aim was to identify any student or programme factors that may be associated with either a persistently strong interest in surgery, or a change towards or away from surgery over the course of the programme. Planned demographic subgroups included gender, age, nationality, entry pathway, size of student loan, marital status and number of dependents. The findings may inform policies on selection and curricular experience, as well as surgical workforce planning.

Methods

Since 2006, all medical students entering the MBChB programme at the University of Auckland have been invited to join the FMHS Health Professional Student and Graduate Tracking Project (TP).¹⁵ Students fill out an entry questionnaire at the start of the second year of the medical programme and an exit questionnaire in their final (sixth) year. The survey includes basic demographics, level of interest in various careers in medicine, as well as questions on factors important in career choice. This project has ethical approval from the University of Auckland Human Participants Ethics Committee. The data was accessed via the project manager for the tracking project after filling out the required confidentiality agreement.

Longitudinal data for students who completed an entry survey in years 2006-8 and an exit survey in years 2010-12 were linked using the student ID number, then anonymised using dummy IDs before further analysis. Two of the eighteen career categories in the survey were relevant to surgery, namely 'general surgery' and 'surgical sub-specialties.' A 'strong interest' in either or both of these categories was taken to mean the student had a 'strong interest' in a surgical career path. If only 'some interest' or 'no interest' was indicated in these categories the student was said to have 'no interest' in a surgical career path. Since 2006, there have been some subtle differences in questionnaire format. The exit questionnaire in 2012 asked students to rank their top three career choices rather than denote their level of interest in every specialty. If a surgical specialty was in their top three choices they were considered to have a 'strong interest,' and 'no interest' if it was not.

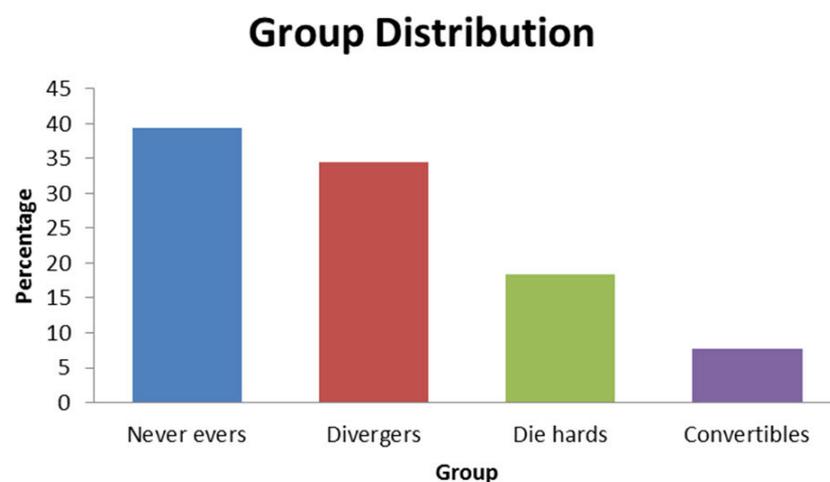
The four Q's model developed by Stagg (2009)¹⁶ described four groups of graduates based on the longitudinal match between rural career background and eventual rural career destination. We applied this concept to interest in a surgical career at entry and exit, dividing the study population into four notional groups: 'Never Evers' (no interest on entry or exit); 'Convertibles' (no interest on entry but a strong interest at exit); 'Die Hards' (strong interest on entry and exit); and 'Divergers' (strong interest on entry but no interest on exit). Gender, age, nationality, entry pathway, size of student loan, marital status and number of dependents, were quantified for each group. The 2012 exit questionnaire listed 23 potential influencing factors on career choice, asking students 'how much did the following factors influence your most preferred area of medicine?' on a scale of 1= not at all, to 5= a great deal. This data was also analysed among the groups.

Data analysis was performed on SPSS v19 software, using summative statistics, Chi-squared tests and ANOVA. A p-value of <0.05 was deemed statistically significant.

Results

Of a potential 488 students, 310 completed both an entry and exit questionnaire, for a 64% response rate. Over 50% of students had a strong interest in a surgical career at entry, but only 26% at graduation. The number of students in each of the four predefined groups are shown in Figure 1.

Figure 1. Patterns of longitudinal student interest in a surgical career



The largest group was 'Never Evers' 122(39%), followed by 'Divergers' 107(35%), 'Die Hards' 57(18%), and 'Convertibles' 24(8%). The only significant differences in demographic variables among the four categories were gender and entry age. Female and older students had less interest in a surgical career (see Figures 2 and 3).

Figure 2. Composition of groups by gender

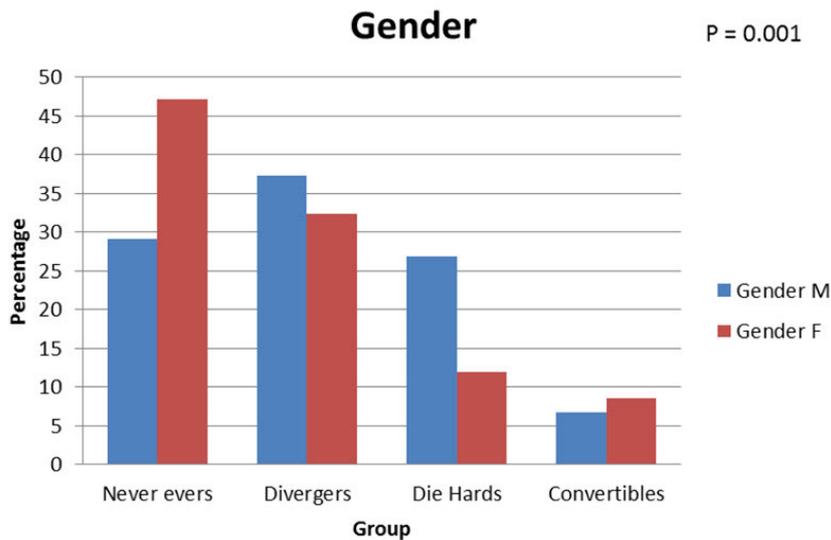
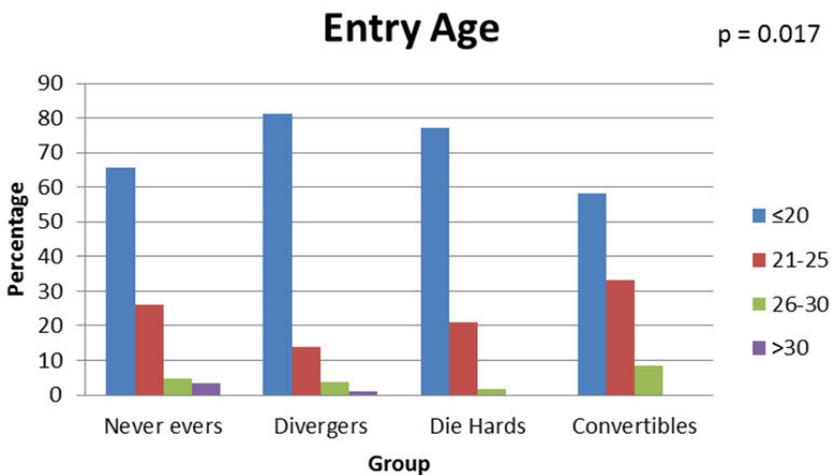


Figure 3. Composition of groups by entry age



There were 112 students who completed the 2012 survey containing questions on influences on career choice of whom 34% were 'Never Evers'; 19% 'Die Hards'; 43% 'Divergers', and 4% 'Convertibles' (see Table 1).

Table 1. Effect of influencing factors on preferred specialty, averaged by group (Scale: 1=not at all, 5=a great deal).

Influencing Factor	Never Evers (n=38)	Divergers (n= 48)	Die Hards (n=21)	Convertibles (n=5)	Divergers vs Die Hards (P value)
Interest in helping people	4.2	4.2	4.0	4.0	0.652
Atmosphere/work culture typical of the discipline	4.1	4.2	4.1	4.0	0.624
Intellectual content of the specialty	3.8	4.2	4.3	4.6	0.595
Experience of specialty as a medical student	3.7	4.1	4.4	4.4	0.149
Opportunity to work flexible hours	3.8	4.0	2.9	1.8	0.001
Hours of work typical of working in the specialty	3.6	3.9	3.0	2.2	0.003
Influence of consultants/mentors	3.6	3.9	4.4	4.2	0.018
Opportunity for procedural work	3.5	3.5	4.4	3.8	0.001
Appraisal of own skills/aptitudes	3.9	3.8	4.0	2.8	0.241
Type of patients typical of the discipline	3.6	3.6	3.8	3.0	0.503
Appraisal of own domestic circumstances	3.6	3.5	3.1	2.0	0.153
Availability of a vocational training placement	3.2	3.3	3.2	2.0	0.646
Perceived job security	3.1	3.3	3.5	2.4	0.635
Number of years required to complete training	3.1	2.6	2.2	1.4	0.13
Perceived career advancement prospects	3.1	3.3	3.7	3.2	0.133
Geographical location of most preferred specialty	3.0	3.2	2.9	2.0	0.256
Opportunity for research and/or training	2.8	2.9	2.9	2.6	0.868
Perceived financial prospects	2.5	2.7	2.9	1.6	0.494
Perceived prestige of the discipline	2.3	2.5	3.0	2.6	0.081
Risk of litigation and associated insurance costs	2.2	2.3	2.1	1.4	0.371
Financial costs of medical education and/or debt	1.9	1.9	1.8	1.0	0.647
Cost of training in the discipline	1.9	2.0	1.8	1.0	0.397
Influence of parents/relatives	1.9	2.0	1.9	1.4	0.707

An interest in helping people and atmosphere/work culture typical of the discipline were the largest career influences across all groups, with financial costs of education and training, and parents/relatives having the least influence. Intellectual content and experience of the specialty as a medical student were also important, but again, there were no discernible differences across the groups.

We compared the responses of the 'Die Hards' and the 'Divergers' as the 'Convertibles' group was too small for meaningful conclusions. The majority of influencing factors were similar for 'Die Hards' and 'Divergers', with only four factors that were significantly different. The largest absolute difference was in the opportunity to work flexible hours, 2.9 vs 4.0.

The main factors influencing career choices of 'Divergers' were the hours of work and flexibility; for the 'Die Hards' it was the opportunity for procedural work and the influence of their consultants during medical school.

Conclusions

About one-quarter of Auckland medical students have a strong interest in a surgical specialty at the time of graduation. Another third diverged from a 'strong interest' at entry to 'no interest' at exit, with only 8% moving in the opposite direction from 'no interest' towards 'strong interest' at exit. Thus, four times as many students move away from a surgical career choice than towards it. Female and older students were more likely to diverge from a surgical career intention. Influences that differentiated those committed to surgery from the outset from those who diverged were lifestyle factors, nature of surgical work, and consultants / mentors. Reassuringly, levels of debt or remuneration seemed to have little influence on a surgical career choice.

Strengths of this study include a moderately good combined entry and exit response rate which yielded a longitudinal view of student interest in surgical careers. One weakness is the possibility of under-reporting of interest through our conservative approach to determining it. Another is that there was a change in questionnaire format in 2012 asking students to give their top three ranked specialties rather than their level of interest in each of a comprehensive list of specialties. We believe the impact of this change to be small as data from the 2010–11 questionnaires showed students only ranked an average of three specialties in which they had a 'strong interest'. Finally, the analysis on influences on student choice was underpowered as it included only the 112 students who completed the exit survey in 2012. Yet we believe it does point to possible areas for programme development or further research.

The study measured career intentions, which need to be followed up to see to what extent intentions match future specialty of practice. Nonetheless, for surgery, strong intentions may be a good approximation. In one of the largest longitudinal tracking studies to date the overall match between PGY1 career intention and career destination was over 50%, with this higher in those intending a career in surgery (over 60%) or in those who were definite about their career choice at that time point (74%).¹⁷ Furthermore, nine out of ten doctors who became surgeons had specified surgery as their first choice in PGY1.

Based on our findings, we estimated whether or not there would be enough interested students to provide the future NZ surgical workforce. In 2012 there were 403 graduates from NZ medical schools: 244 from Otago and 159 from Auckland.^{18,19} Assuming the rate of strong interest of 26% in a surgical career at graduation applies equally to graduates from Otago, 105 NZ graduates would be interested in a surgical career. In 2012, 42 trainees were accepted onto RACS training programmes,² suggesting an oversupply for each training position. If it were decided to increase the number of surgical training places in NZ it is likely there will be sufficient applicants to fill them. What this estimate does not take into account is the attrition that will occur through change of career choice, or failure to be accepted onto or progress through surgical training programmes.

Furthermore, our data suggest that the proportion of women is unlikely to increase in the future surgical workforce. Whether or not this is a concerning issue needs to be debated among stakeholders more widely. However, it should be noted that men as well as women are seeking more flexibility in training and work in surgery,^{8–10} which may impact on the composition of the future surgical workforce. Longer term tracking is essential to clarify how well intentions in medical school translate into career outcomes for the current generation of students.

Our data are similar to another local study that used cross-sectional methods and found 20% of fourth and fifth year students were surgically inclined.¹⁴ What qualified as surgical inclination in that study was tightly defined, but it was still close to our level of 26%. Our findings are also concordant with a recent local systematic review of factors important in a surgical career for women, underscoring the importance of a positive experience in training, as well as the opportunity for flexibility in both work and training.²⁰

Our study adds to the literature by showing the longitudinal changes in career interest over the course of the undergraduate medical degree, and by using a simple model to better understand areas where enhancement of a surgical career choice may be possible. It yields insights as to what factors are or

are not important in career choice to current medical students. Even though the numbers are small, our data supports the mentoring of those with an early interest in surgery.

Consultants are an important positive influence amongst those in the 'Die Hard' category, as is the opportunity to undertake procedural work. On the other hand, there seems little mileage in trying to persuade students over 30 to enter surgical training if they had no interest at the outset. It seems surgical work and training need to be more accommodating in order to sustain interest through the undergraduate medical programme and beyond.

There are more medical students with a strong interest in surgery than surgical trainee places, but not by a large amount. Increasing the number of graduates with a strong interest in surgery may increase the quality as well as diversity of those who eventually become the future surgical workforce in New Zealand.

Competing interests: Nil.

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References

1. Raymont A, Simpson J. Projections of surgical need in New Zealand: estimates of the need for surgery and surgeons to 2026. *NZ Med J* 2008;121:11-8.
2. RACS 2013: New Zealand Surgical Workforce Projection to 2025. [PDF on internet]. Available from: http://www.surgeons.org/media/20470543/2013-06-13_rpt_nz_2025_projections_final.pdf
3. Farah S, Winter M, Smith J. Current medical students' understanding of Surgical Education and Training. *ANZ J Surg* 2012;82:12-6.
4. Ravindra P, Fitzgerald J. Defining surgical role models and their influence on career choice. *World J Surg* 2011;35:704-9.
5. Du J, Santhanathan J, Naden G, Child S. A surgical career for New Zealand junior doctors? Factors influencing this choice. *NZ Med J* 2009;122:29-37.
6. Cochran A, Melby S, Neumayer L. An internet-based survey of factors influencing medical student selection of a general surgery career. *Am J Surg* 2005;189:742-6.
7. Erzurum V, Obermeyer RJ, Fecher A, et al. What influences medical students' choice of surgical careers. *Surgery*. 2000;128:253-6.
8. Ek EW, Ek ET, Mackay S. Undergraduate experience of surgical teaching and its influence on career choice. *ANZ J Surg*. 2005;75:713-8.
9. Boyle E, Healy D, Hill ADK, et al. Career choices of today's medical students: where does surgery rank? *IJMS*. 2012;182 :337-343.
10. Dorsey E, Jarjoura D, Rutecki G. The influence of controllable lifestyle and sex on the specialty choices of graduating U.S. medical students, 1996-2003. *Acad Med*. 2005;80:791-6.
11. Gill D, Palmer C, Mulder R, et al. Medical students career intentions at the Christchurch School of Medicine. The New Zealand Wellbeing, Intentions, Debt and Experience (WIDE) survey of medical students pilot study. Results Part II. *NZ Med J* 2001;114:465-7.

12. O'Grady G, Fitzjohn J. Debt on graduation, expected place of practice, and career aspirations of Auckland Medical School Students. *NZ Med J* 2001;114:468-70.
13. Consedine N, Yu T, Hill A, Windsor J. Disgust sensitivity and the 'non-rational' aspects of a career choice in surgery. *NZ Med J* 2013;126:19-26.
14. Insull P, Kejriwal R, Blyth P. Surgical inclination and anatomy teaching at the University of Auckland. *ANZ J Surg*. 2006;76:1056-9.
15. Poole P, McHardy K, Janssen A. General physicians – born or made? Use of a tracking database to answer workforce questions. *Int Med J* 2009;39:447-52.
16. Stagg P, Greenhill J, Worley PS. A new model to understand the career choice and practice location decisions of medical graduates. *Rural and Remote Health* 2009;9:1245.
17. Goldacre M, Laxton L, Lambert T. Medical graduates' early career choices of specialty and their eventual specialty destinations: UK prospective cohort studies. *BMJ*. 2010;341:c3199
18. Personal communication with staff in the Medical Programme Directorate, University of Auckland, 2014.
19. Personal communication with staff in the Dunedin School of Medicine Administration, Otago University, 2014.
20. Yu TC, Jain A, Chakraborty M, et al. Factors influencing intentions of female medical students to pursue a surgical career. *J Am Coll Surg* 2012;215:878-89.