



Surgical inclination in senior medical students from the University of Auckland: results of the 2005 Senior Students Survey

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Abstract

Aims To determine the proportion of senior medical students who are surgically inclined and to assess whether gender differences exist in surgical inclination.

Study design Cross-sectional survey. Twenty-five point questionnaire. Likert scale response ranking.

Setting University of Auckland Medical School, New Zealand.

Participants 218 surveys were emailed to functioning addresses of fourth and fifth year students. 156 students emailed responses (71.60% response rate).

Results Twenty percent of students were found to be surgically inclined (95% CI 0.15–0.26). The proportion of surgically inclined males was significantly higher than females ($p < 0.01$). A greater proportion of surgically inclined students found time spent in the operating theatre educationally valuable than non-surgically inclined students ($p < 0.01$). No difference exists in the number of different procedures undertaken by students ($p > 0.05$).

Conclusion Males are significantly more likely to be surgically inclined than females at the University of Auckland Medical School.

“Surgically inclined” is a term often used to describe medical students who show a clear preference for surgery over other specialties whilst at medical school.

Interest in surgical training is declining in the United States and elsewhere.¹ It has been suggested that surgical lifestyles, family pressures, indemnity protection costs, and the increasing proportion of female medical students are contributing to this trend. Females are less likely to enter surgical training than males.³ Females make up more than half of New Zealand medical students.^{2–4}

Long hours are necessary for surgical trainees to gain operative experience.⁶ Whilst reforms have decreased this time demand, surgical training remains the most time-intensive of all specialties.⁷ This is dissuasive, as medical students are more likely to choose specialties less demanding of their time.⁸

Factors shown to be associated with medical graduate’s decision to pursue a surgical career have included: a willingness to work long hours; affinity for procedural tasks; the ability to focus for long periods on a task; enjoyment of surgical rotations; and interest in a surgical career whilst at medical school.^{9–11}

Students will generally show a preference toward a specialty during medical school.¹² Fifty-three percent of fifth year students at the Dunedin Medical School have been shown to have a strong idea of their career direction.¹³ 90% of Malaysian medical

students (a number of which come to New Zealand for their clinical training and subsequent employment) have already decided on their future specialty before graduation.¹⁴ Surgeons may decide their career direction earlier than those working in other specialties.¹⁵

Method

Creating the definition—A literature review was conducted searching Medline, the Cochrane Library, and BMJ.com. Search terms included: *medical students AND career decisions AND surgery; female medical students AND surgery; gender AND medical students.*

Significant factors which were repeatedly identified in the literature as being strongly predictive of medical graduates pursuing post-graduate surgical training were included in our five point definition for the surgically inclined medical student.^{11–13}

Meeting four out of the following five criteria positively identifies a surgically inclined student:

- Explicit interest in a surgical career.
- Preference for surgical attachments over medical attachments.
- Enjoyment of procedural challenges.
- Ability to focus for long periods on a single task.
- Willingness to engage in long working hours.

Development of the survey—Ethical approval was sought from the Multi-regional Ethics Committee. After reviewing a summary of the project's aims and proposed methodology, the Committee's Chair consented to completion of the project without formal ethical review, under the proviso that responses would be made anonymous.

The anonymous survey questionnaire included 25 items. These items were either tick box replies or a five-point Likert scale ranking (1 = strongly agree; 5 = strongly disagree). Demographic information included only gender and year of medical study. Five items targeted the definition directly.

Three pairs of control questions were included to provide a measure of reliability in responses. If answers were reliable, the response to each item per pair clearly correlated and the response was included in the analysis. Responses with no or only one consistent pair were to be excluded from the analysis. Other items examined perception of the role of basic medical sciences, the perceived amount of knowledge of basic sciences, and methods of learning. These questions served to control bias potentially created through a questionnaire which was overtly surgically.

A focus group of four medical students evaluated the survey prior to pre-testing with a pilot survey. Pre-testing was conducted using a sample of 10 fifth-year medical students who were also included in the final sample. These respondents were asked to comment on content, consistency, clarity, appearance and potential for bias in the questionnaire. Potential ambiguities and inconsistencies in scales which were identified were corrected prior to the study sample being completed.

Survey administration—Fourth- and fifth-year class email lists were obtained through class representatives from the University of Auckland Medical School. 284 email addresses were mailed a pilot message; 66 messages were returned to sender by service providers stating permanent failure (thus suggesting those email addresses were no longer valid). Thus, those 66 undeliverable addresses were not sent surveys. The survey form was sent to 218 email addresses; 156 responses were received. These responses were organised with any personally identifiable information removed by a third party.

Statistical analysis—Questionnaire responses were manually entered into an electronic spreadsheet. Responses were divided into two groups for each item (1=strongly disagree/disagree/neutral, 2=strongly agree/agree). Statistical analysis was performed using Microsoft Excel and SPSS software. Confidence intervals for proportions were calculated using a continuity correction for categorical data. Differences were tested for significance using the standard error and a continuity correction for categorical data. P values of less than 0.05 were defined as significant.¹⁶

Results

Responses—In response to the email, 156 of 218 (71.60%) medical students returned a completed survey (Table 1).

Table 1. Response rate (by study year and gender) of the 218 medical students who received the survey

Medical students	Responses
4 th -year males	28
4 th -year females	44
5 th -year males	34
5 th -year females	50
Total	156
Response rate	71.60%

In all responses, at least two of the pairs of control questions were consistent, thus no responses were excluded from the analysis.

Surgical inclination—As shown in Table 2, the proportion of all respondents meeting the criteria was 0.20 (20%). The proportion of males was significantly greater than the proportion of females meeting the criteria ($p < 0.01$).

Table 2. Proportion of students surgically inclined

	Surgically inclined respondents (total)	Male surgically inclined respondents	Female surgically inclined respondents
Proportion*	0.20	0.32	0.12
95% CI	(0.15–0.26)	(0.22–0.45)	(0.07–0.20)

*meeting criteria.

Interest in surgery—Students were asked to rate their interest in a surgical career (1=highly disagree/not at all interested, 5=highly agree/highly interested).

Forty percent of students agreed that they were interested in a surgical career (95% CI 0.32–0.48). Not surprisingly, more students meeting the criteria were interested in a surgical career ($p < 0.01$). No statistically significant difference was found between males and females for this item ($p > 0.05$) (Table 3).

Table 3. Interest in a surgical career

	Surgically inclined	Non-surgically inclined	All males	All females
Proportion* (95% CI)	0.84 (0.66–0.94)	0.29 (0.21–0.38)	0.53 (0.40–0.66)	0.31 (0.22–0.41)

*meeting criteria.

Lifestyle—Students were asked to rate the importance of lifestyle as a factor in choosing a career within medicine (1=highly disagree/not at all a factor, 5=highly agree/very important factor).

Fifty-six percent of all students agreed that lifestyle was an important factor in choosing a career (95%CI 0.48-0.64). A significantly smaller proportion of surgically inclined students agreed with this item ($p<0.01$). No statistically significant difference was found between males and females for this item ($p>0.05$) (Table 4).

Table 4. Importance of lifestyle as a factor in choosing a career

	Surgically inclined	Non-surgically inclined	All males	All females
Proportion (95% CI)	0.23 (0.1-0.42)	0.94 (0.56-0.73)	0.48 (0.36-0.61)	0.62 (0.51-0.71)

Procedural exposure—Students were asked to report how many procedures they had performed from a list of five procedures commonly performed by medical students (IV cannulation, LMA/ETT intubation, Foley catheter insertion, suturing, minor surgical).

There was no statistically significant difference in the number of procedures performed by surgically inclined medical students and non-surgically inclined medical students ($p>0.05$). No statistically significant difference found in the mean response between males and females for this item ($p>0.05$) (Table 5).

Table 5. Number of procedures performed by students

	Surgically inclined	Non-surgically inclined	Females	Males
Mean number of procedures (95% CI)	3.97 (2.77–5.18)	3.25 (3.07–3.43)	3.39 (3.21–3.62)	3.00 (2.74–3.26)

Educational value of theatre attendance—Students were asked to rate the educational value of time spent in the operating theatre (1=highly disagree/not at all useful, 5=highly agree/ very useful).

Forty-six percent of all students agreed that time spent in the operating theatre was educationally valuable (95%CI 0.38–0.54). A greater proportion of surgically inclined medical students agreed that time spent in the operating theatre was educationally valuable ($p<0.01$). No significant difference was found between males and females for this item ($p>0.05$) (Table 6).

Table 6. Educational value of the operating theatre

	Surgically inclined	Non-surgically inclined	All males	All females
Proportion	0.94	0.34	0.45	0.47
(95% CI)	(0.77–0.99) p<0.01	(0.26–0.43)	(0.33–0.58); p>0.05	(0.37–0.57)

Discussion

Methodological issues—As selection of the sample was not randomised, systematic biases are possible. More females responded to the survey than males, yet this is reflective of medical student demographics in New Zealand.⁵ The response rate to this email survey was higher than the mean response to such survey published in medical journals.¹⁷

Because this survey did not overtly seek surgical respondents, the non-respondents were unlikely to adversely bias the results. Non-respondent bias was thus felt to be well controlled. Socially desired response bias was probably an issue for some items. Still, reliability in student responses was pleasing as tested by responses to control question pairs. Caution should be applied when generalising the results of this survey and proportions should be interpreted as trends rather than absolute values.

The definition—When students were asked if they were interested in a surgical career, 40% of students agreed. As this is considerably higher than the actual proportion of medical graduates who enter surgical training, it may reflect socially desired response bias in this item. The five-point definition of medical student surgical inclination appears to give a more reliable estimate of the true proportion of students who are likely to enter surgical training.

Gender bias in surgical inclination—Females are less likely to enter surgical careers than males.³ In the United States, the number of females entering medical school has increased, yet the number of females applying for surgical training has remained relatively constant.¹⁸ Thus the proportion of female medical graduates entering surgical careers has actually decreased.

The findings of this investigation suggest these American trends may be generalisable to New Zealand. Thirty-two percent of males surveyed were found to be surgically inclined compared to 12% of females (p<0.01). Kato et al (2004), who investigated the opinions of female surgeons from Japan, commented that the demands of marriage and family on women were probably a major factor in the under-representation of women undertaking a surgical career.¹⁹ Our investigation, like others in the literature, was unable to demonstrate that female medical students are significantly more concerned with lifestyle when choosing a career than males.^{3,10}

Encouraging interest in surgery—The busy surgical lifestyle has been shown to be a deterrent for medical graduates.⁹ Our analysis suggests that a significant difference between those students who are surgically inclined and those who aren't is the importance they place on lifestyle.⁸

Reforms in the United States have significantly restricted the long hours that trainees are expected to work.⁹ While it is hoped that this will increase in surgical careers, there is also concern that shorter hours will lead to inadequate operative experience.⁸

Mentoring for students has been advocated as another way to improve interest in a surgical training.¹¹ Some medical schools have established surgical interest societies for this purpose.²⁰ Consultants and trainees who make a concerted effort to teach students on the ward and operating theatre have been shown to motivate students to consider surgical careers.¹¹

Our analysis showed that less than half of the students surveyed found operating theatre attendance educationally valuable. Several respondents noted that theatre was useful *when* they could see into the operative field and were being spoken to.

It is the belief of the investigators that identifying and fostering student interest in surgery is important to the future of New Zealand's surgical workforce.

Future study—We propose that future studies look at the experiences of surgically inclined versus non-surgically inclined students as well as experiences of male versus female students during surgical attachments.

Limitations—We encountered difficulty in capturing a higher response rate as unsolicited emails are frequently blocked or put into junk-mail folders by service providers, and treated as spam.

Another limitation was subjectivity in the interpretation of evidence relating to surgical inclination in the formulation of this study's criteria.

Conclusions

Of senior (fourth and fifth year) medical students at University of Auckland Medical School:

- 20% are surgically inclined.
- Males are more likely to be surgically inclined than females.
- Surgically inclined students place less importance on lifestyle in their career choice.
- There is no difference between males and females in the importance placed on lifestyle in career choice.
- Surgically inclined medical students are more likely to agree that time spent in the operating theatre is educationally valuable.

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