Publication rates and characteristics of undergraduate medical theses in New Zealand
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ABSTRACT

AIM: Publication in peer-reviewed journals is widely regarded as the preferred vehicle for research dissemination. In New Zealand, the fate and publication rates of theses produced by medical students is unknown. The aim of this study was to examine the frequency and characteristics of publications derived from research conducted by Bachelor of Medical Sciences (BMedSc(Hons)) students at the three campuses of the University of Otago Medical School, New Zealand.

METHODS: A total of 153 BMedSc(Hons) theses accepted at the Otago Medical School during the period of January 1995 to December 2014 were analysed. Using standardised search criteria, PubMed and Google Scholar databases were searched in October 2015 to examine the number and characteristics of publications.

RESULTS: Overall, 50 (32.7%) out of 153 included theses resulted in 81 scientific publications. Ten (12.3%) publications featured in Australasian journals. The majority of publications were original articles (84%), with pathology and molecular biology (19%) being the most common research area. Although they did not reach statistical significance, publications in higher impact factor journals trended towards having a senior first author as opposed to a student first author (p=0.06).

CONCLUSION: Although higher than reported figures from previous studies, publication rates of BMedSc(Hons) theses remain lower than expected. To improve our understanding of medical student publishing in New Zealand, formal examination of the factors hindering medical students from publishing their theses is imperative.
into account by specialty training colleges in the selection process for competitive specialist training posts and additional points are awarded for publications.6,8

In addition to other undergraduate medical research activities, interested students may choose to undertake any of several intercalated research degrees, often eventuating in a thesis.8 At the University of Otago, the Bachelor of Medical Sciences with Honours ‘BMedSc(Hons)’ course is an intercalated degree involving a full-time one-year research available to medical students who have satisfactorily completed three or more years of their Bachelor of Medicine and Bachelor of Surgery (MB ChB) programme.9 The submission of a satisfactory thesis describing the results of supervised research is a prerequisite for the completion and award of the degree. Publishing the project findings in peer-reviewed journals, while encouraged, is not required for the award of the degree.

It has been argued that research-degree theses must be made publicly available.10 Publication of resultant research in indexed peer-reviewed journals reflects its quality and scientific value, and the acceptability of its content to the scientific community.5,11 Despite the recognised importance of student research and publishing,8 few studies have evaluated research productivity of medical student theses.5,11-13 The fate and publication patterns of undergraduate medical thesis-related research in New Zealand is unknown. This study was aimed to assess the characteristics and publication pattern of BMedSc(Hons) theses in peer-reviewed journals conducted by medical students at the University of Otago Medical School.

Methods

Search strategy

The electronic Otago University Research Archive14 (ourarchive.otago.ac.nz) was searched for all BMedSc(Hons) theses. Furthermore, the Faculty of Medicine was contacted for additional theses that were not electronically archived. Theses accepted between 1 January 1995 and 31 December 2014 were included. The latter cut-off was set to allow for a reasonable time for any submitted publication upon thesis completion to go through the peer-review process.

During October 2015, PubMed and Google Scholar databases were searched by both authors for publications using the student's first and last names. A publication was considered relevant if the student was one of the co-authors and the publication title/abstract was related to the student's thesis topic.

Data collection

Confirmed theses were examined more closely. Information pertaining to projects' start and end dates, number of supervisor(s) as well as subject areas were collected. The main subject area was based on key words reported in the thesis. If there were no key words reported, the main research filed was defined by consensus between the authors based on the title and content of the thesis.

For each corresponding publication, author (number of authors and order of authorship) and article-related data (type of and year of publication, journal name and impact factor) were collected. Journals' impact factor was obtained using the Journal Citation Reports of the Thomson Reuters Web of Science. Journals not included in the Thomson Reuters Web of Science were allocated an impact factor of zero.

Statistical analysis

Collected data were inputted onto an Excel sheet. Descriptive statistics were used to analyse most of the data. Comparisons were conducted using an independent-samples Student t-test. Regression analysis was used to test for correlations. Statistical significance was determined if type I error rate was <5% (p-value<0.05). All analyses were performed using the Statistical Package for Social Sciences software (SPSS Statistics®, version 22.0.0.0).

Results

Study sample

A total of 154 theses were examined. Only one thesis (from 1965) was excluded as it fell beyond the time-limit set for the study. There was a mean of 7.7 theses submitted per year (range, 4-17). The number of students enrolling in and submitting BMedSc(Hons) theses has gradually increased through the study period (Figure 1). The most common subject areas of research
were pathology and molecular biology (19%), followed by community medicine (including general practice and public health, 9.8%) and endocrinology and reproductive physiology (9.8%).

**Publication data**

Overall, 50 (32.7%) out of 153 theses resulted in at least one article published in indexed peer-reviewed journals. A total of 81 publications, all of which were in English, were identified (range, 1–9 publications per thesis). Original articles (84%) and reviews (14.8%) constituted the most common types of publication. In almost all publications, the student was the first (50.6%) or second (48.1%) author. The median lag between the start of research and publication of a manuscript was 176 weeks (range, 43–652 weeks).

Five supervisors were co-authors of about a third (32.1%) of the publications. Moreover, the number of academic staff supervising students (but not collaborators) has steadily increased through the years, which could explain the upward trend in the mean number of authors per publication (Figure 2). Students who published did not differ in the mean number of supervisors compared with students who did not publish (1.6 vs 1.4, p=0.08).

**Figure 1:** Number of medical students enrolled in BMedSc(Hons) programme at the University of Otago (1995–2014).

**Figure 2:** Mean number of authors per publication over time.
Publishing journals

Ten articles (12.3%) were published in Australasian journals. The mean impact factor of publishing journals was 1.67 (range, 0–30.3). Publications in higher impact factor journals trended towards having a senior first author as opposed to a student first author, although this did not reach statistical significance (p=0.06). There was a moderate but significant, direct correlation between the total number of the authors and the impact factor of the publishing journal (adjusted R²=0.14, p<0.001).

Discussion

Findings from this study provide, for the first time, an insight into the number and characteristics of publications from undergraduate theses produced by medical students in New Zealand. Adding to the existing literature on New Zealand medical student research and publishing,8,15 this study sheds light on their contribution to international scientific literature.

There are several compelling ethical1 and professional reasons for supervisors3,4 and their students6–8 to publish in refereed journals. Publication rates from BMedSc(Hons) theses in New Zealand have been found to be pleasingly high; almost one-third (32.7%) of theses led to a publication in a peer-reviewed journal. This rate is higher than figures reported by studies from developing and developed countries, with publication rates ranging from 13.9% and 30%.5,10–12,16

Nearly half of medical and health-related studies remain unpublished.2 Although regarded as a piece of literature, the visibility of a thesis is low without appropriate dissemination of its content to the wider scientific community. A recent study evaluated publication rates of Master's in Public Health theses at the University of Auckland, New Zealand, found time constraint (63%), lack of support from supervisors (35%) and low confidence in writing for peer-reviewed publication (29%) were the most commonly cited reasons for non-publication of a thesis.17

In our study, the average time taken from commencing research to publication was more than three and a half years; a finding similar to previous research.10,12 The long delay for theses to appear in publication can be explained by study demands as students commence their medical studies immediately upon the end of the one-year research programme. Moreover, student's supervisor(s) were one of the main drivers behind publication. Five supervisors were co-authors of about a third of published articles.

Findings from this study have implications for medical schools and funders of undergraduate medical research. Medical students undertaking BMedSc(Hons) research projects are supported financially by scholarships and awards from the Faculty of Medicine at the University of Otago as well as local trusts.13 Thesis writing is a valuable opportunity to teach medical students the scientific method of writing and stimulate their interest in a career in academia.8 Failure to transform a thesis into peer-reviewed publications raises questions about the scientific value of generated knowledge and the role of undergraduate medical theses in research training and education.10 Sustained commitment from supervisors, practical support in academic writing (such as writing courses) and setting the expectation that publication is part of the thesis writing process might be reasonable measures to increase publication rates from medical theses.4,17

Results from our study may underestimate publication rates from medical student theses. First, articles which are published in journals that are not indexed in the two databases used in this study may have been missed. Second, findings from medical theses might have been disseminated by other means than peer-reviewed publications including conference papers or posters, book chapters and technical reports. Third, our study examined research outputs from undergraduate medical theses produced by only one medical school in New Zealand. The BMedSc(Honours) at the University of Auckland is a full-time one-year research programme offered to medical students, similar to that of Otago's.

The overall research productivity of medical students in New Zealand cannot be judged merely based on this study. Medical student publications may arise from research activities not examined in this study which include formal research.
training projects, summer studentships, research electives/selectives and independent research. Notwithstanding the aforementioned limitations, we believe findings from this study give a fair reflection of undergraduate medical theses in New Zealand.

Conclusions
To the best of our knowledge, this is the first study to explore medical student research production from undergraduate theses in New Zealand. Publication rates of BMedSc(Hons) theses were higher than reported figures from previous studies. The role of undergraduate medical theses in research training and productivity has to be clearly defined and interventions to increase publication rates should be implemented. To improve our understanding of medical student publishing in New Zealand, formal examination of the factors hindering medical students from publishing their theses is imperative.

Competing interests:
Nil.

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REFERENCES:
9. Bachelor of Medical Science with Honours (BMedSc(Hons)). University of Otago; Available from: http://www.otago.ac.nz/courses/qualifications/bmedschons.html#regulations
12. Nieminen P, Sipliä K, Takkunen HM, Renko M, Risteli L. Medical theses as part of the scientific training in basic medical and dental education:


