

# Career outcomes of students of an intercalated MBChB/PhD: experience from New Zealand

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## ABSTRACT

**BACKGROUND:** Medium- and long-term outcomes of an intercalated medical/PhD degree are less well-characterised for non-North American programmes than North American ones. We report on the career choices and academic accomplishments of MBChB/PhD students at one university 17 years after the programme's introduction.

**METHODS:** A list of all past and current intercalating students at the University of Otago was obtained. Participants were asked for details of their current position, scientific publications and career plans, as well as their opinions on the intercalated programme.

**RESULTS:** A total of 25 students (of whom eight were current students) had enrolled in the intercalated programme between 2001 and 2018. Ten students (40%) were women. The rate of enrolment remained relatively steady through the years at  $1.4 \pm 1.0$  students/year. The rate of completion was high at 88.2% (15/17). The congruence between students' PhD research topic and clinical specialty of interest was 52.4%. Most students (72%) published their research findings in local and international journals.

**CONCLUSIONS:** The programme is considered worthwhile by our students, most of whom continue (at various capacities) in academic work and produce a significant research output, although potentially in a field that is different to their PhD research.

Warnings of a globally declining cohort of physician-scientists have appeared in the literature over 15 years ago.<sup>1</sup> For example, the number of physician-scientists in British universities dropped by 12% between 1996 and 2001;<sup>2</sup> similar trends have been observed in other countries, including the US and Sweden.<sup>3</sup> Part of the solution has been the introduction of intercalated medical and research degrees by tertiary institutions. One of the aims of such programmes is the production of clinician-scientists who are well-established in research from an early stage and who (it is hoped) might continue on an academic/research-intense track. We have previously reviewed the various physician-scientist programmes around the world.<sup>4</sup> Among the unaddressed issues were medium- and long-term outcomes of such combined programmes—especially from outside North America.<sup>4</sup>

At the University of Otago, the MBChB/PhD programme commenced in 2001. It is open to “the most able of [Otago] medical undergraduates”.<sup>5</sup> Applicants are required to have had prior research experience, usually in the form of BMedSc(Hons) degree. The PhD component of the intercalated degree is generally completed in one of two ways. The first option entails two research years, followed by research time interspersed with MBChB time (this choice is often used by students who decide to intercalate after their third medical year). The second option is three years of full-time research (students intercalating after their fifth medical year often opt for this). Once admitted into the intercalated programme, the student's clinical and academic progress is regularly reviewed by both the Academic Board of the Otago Medical School and the Graduate Research Committee.<sup>5</sup>

Since its introduction upwards of 17 years ago, the outcomes of Otago's MBChB/PhD programme, in terms of student characteristics and career/academic achievements, have not been ascertained. Therefore, the aims of the present study were to evaluate career choices and academic accomplishments of students of the intercalated programme, and to compare such parameters with those of other intercalated programmes internationally.

## Methods

### Study setting

A list of all past and current intercalating students was obtained from the Dean's Office, Otago Medical School, Dunedin, New Zealand. Potential participants were invited to complete an online survey via email. Two additional reminder emails requesting participation were sent in six-week intervals. This study was approved by the University of Otago Human Ethics Committee (reference D18/019).

### Survey details

Participants were asked for details of their current position, scientific publications and career plans. In addition, they were asked for their opinion about the intercalated programme by rating statements on a 5-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree). Each participant was assigned a unique code in order to preserve anonymity and prevent data duplication.

### Statistical analysis

Descriptive statistics were used to analyse the data (expressed as means  $\pm$  standard deviations, or medians and ranges). All analyses were performed using SPSS Statistics® software package (version 22.0.0.0).

## Results

### Student characteristics

Between 2001 and 2018, a total of 3,605 medical students graduated from the University of Otago. Over the same period, 25 students had enrolled in the intercalated programme. Of those, 22 responded to the survey (response rate 88%). Ten students (10/25; 40%) were women. Three (12%) were international students, with the remainder being New Zealand citizens or residents.

### Admissions and graduations

The rate of enrolment remained relatively steady through the years at  $1.4 \pm 1.0$  students/year. All but two students (23/25; 92%) entered medical school after high school; a similar majority (23/25; 92%) enrolled in the PhD degree after completion of the third year of the MBChB degree (the other two students intercalated after completion of the fifth year).

At the time of the study, eight students were in the research phase of their intercalated degree. Of the remaining 17, only two students withdrew from the programme, giving an attrition rate of 11.8%. The median total duration (full-time and part-time) from enrolment to thesis submission was 4.7 years (range, 3.2–10 years). It was difficult to ascertain an accurate full-time equivalent duration of PhD study in our students as some had alternated between full-time and part-time especially near thesis submission.

### Research topics and outcomes

Topics of PhD research varied widely; the most common supervising departments were: surgery and anaesthesia (n=7), medicine (n=5), pathology (n=3) and anatomy (n=3). The type of research was almost equally divided between basic science (8/18; 44.4%) and clinical (10/18; 55.6%) research. Most studies (72%) were published in local and international journals. The median number of all publications per individual was 3 (range, 0–62).

### Postgraduate careers

Of the 15 students who had graduated from the MBChB/PhD programme, two had completed, and 10 were still undertaking, medical specialty training. The remaining three alumni elected to continue on the research track: two as post-doctoral fellows and the third as a research associate professor. All students remain in New Zealand except four: three are in Australia and one in Canada.

For 21 students whose long-term specialty of choice was known (as expressed by the student or noted from specialty training choice), the congruence between their PhD research topic (eg, Parkinson's disease research) and specialty of interest (eg, choosing neurology or neurosurgery) was 52.4%. Of the 22 students who responded to the survey, three (13.6%) wanted future

**Table 1:** Summary of responses to survey questions on student attitudes towards the intercalated MBChB/PhD programme at the University of Otago.

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean (SD)
The MBChB/PhD programme is clearly advertised as an option for interested students	5 (22.7%)	7 (31.8%)	5 (22.7%)	3 (13.6%)	2 (9.1%)	2.8±1.3
The MBChB/PhD at Otago University is well set-up	2 (9.1%)	10 (45.5%)	3 (13.6%)	5 (22.7%)	2 (9.1%)	2.9±1.3
The allotted duration for research (PhD component) is adequate	0 (0%)	8 (36.4%)	7 (31.8%)	3 (13.6%)	4 (18.2%)	3.2±1.2
The support (financial, intellectual/supervision, integrating with MBChB component) from the University is adequate	1 (4.5%)	6 (27.3%)	7 (31.8%)	6 (27.3%)	2 (9.1%)	2.9±1.1
The university should continue to offer this intercalated MBChB/PhD programme	0 (0%)	2 (9.1%)	1 (4.5%)	7 (31.8%)	12 (54.5%)	4.4±1.0
If given the chance, I would do it again	1 (4.5%)	3 (13.6%)	4 (18.2%)	7 (31.8%)	7 (31.8%)	3.9±1.2

involvement in research to make up <25% of their time, 12 (54.5%) for 25–50% of their time, five (22.7%) for 50–75% of their time and two (9.1%) for >75% of their time.

### Attitudes towards the intercalated programme

Agreement was relatively high among the 22 respondents that the University should continue to offer the intercalated programme, and most agreed that they would do it again. Responses in general were more neutral or unfavourable with regards to the current programme's set-up and support available for students. The results are summarised in Table 1.

## Discussion

### Overall remarks

In the present study, we report the career choices and academic accomplishments of students of Otago's MBChB/PhD intercalated programme. As far as the authors are

aware, the combined MBChB/PhD degree at the University of Otago is one of the longest continuously running such programmes in Australasia. Hence, our findings may be of interest to institutions contemplating establishing such intercalated programmes. We compare the outcomes presented in the present study with those of other programmes in Table 2.

Despite a relatively steady rate of enrolment, the total number of current and previous MBChB/PhD students remains low compared with other combined programmes. For example, the University of Sydney enrolled 31 MBBS/PhD students between 1998 and 2003 before the University discontinued the programme in 2014 after changing its primary medical degree to 'MD'.<sup>6</sup> New Zealand medical students were also shown to intercalate (including non-PhD research degrees) less frequently than their counterparts elsewhere. Park and colleagues reported on the

**Table 2:** Comparing outcomes of three medical/PhD intercalated programmes.

	University of Otago	University of Cambridge <sup>10</sup>	Medical Scientist Training Programme <sup>14</sup>
Location	New Zealand	England	24 centres in the US
Established	2001	1989	Various (as early as 1964)
Cohort size* (n)	25	153	5,969
Proportion of female students	40%	32.7%	37%
Completion rate	88.2%	91.6%	90%
Estimated proportion expressing plans for significant future research involvement	86.4% ( $\geq 25\%$ full-time equivalent)	90%	77.3%

\*At the time of reporting.

low uptake of intercalated research degrees by medical students at the University of Auckland.<sup>7</sup> Myriad reasons were proposed, including financial, organisational and the selection process among others. We are in the process of collecting qualitative data from MBChB/PhD students and their supervisors exploring the reasons behind the observed low uptake.

The proportion of female students in our cohort (40%), on the other hand, is very encouraging as it is higher than most medical/PhD cohorts reported elsewhere (typically between 25–35%).<sup>6</sup> The PhD completion rate in our cohort (15/17; 88.2%) is almost identical to that of other health sciences-related PhD (88%) at the University of Otago, and is comparatively very high with respect to many other tertiary institutions.<sup>8</sup>

### Academic achievements

Our students have been very successful in publishing in peer-reviewed journals. It is expected that students who graduated several years ago and chose an academic career would produce more publications than current students or those who chose research-light careers. The overall rate of publications (72%) is substantially higher than our previous report of published BMed-Sc(Hons) students at Otago (32.7%).<sup>9</sup> Data on publication rates of other medical/PhD programmes are relatively scarce: “most” of the University of Cambridge MB/PhD students published their findings<sup>10</sup> while 93% of Swiss MD/PhD students were co-authors in at least one peer-reviewed article.<sup>11</sup>

### Postgraduate careers

The retention rate (ie, remaining within New Zealand) of the students was high (21/25, 84%). In 2016, the Medical Council of New Zealand reported the mean retention rate of New Zealand graduates 10 years after graduation to be 65.7%,<sup>12</sup> although this figure includes both intercalating and non-intercalating medical graduates.

Most MBChB/PhD students (17/22, 77.3%) wanted to continue to be heavily involved in research ( $\geq 25\%$  full-time equivalent). Only half of our students had matching research field and specialty choice. Although the reason(s) underlying this are unclear, we propose an explanation: whereas the specialty of choice is likely significantly driven by personal interest,<sup>13</sup> the area of research is limited by the advertised list of proposed topics from supervisors. Hence, we suspect students who have a strong personal interest in one specialty (eg, orthopaedic surgery) will choose corresponding research topics (eg, radiological evaluation of the human pelvic anatomy) should one be available. For those who have no personal interest in any one specialty, they may choose a research topic that interests them at the time, with the choice of future specialty left until completion of the clinical component of their MBChB degree and/or working as a doctor in the future. This is because a PhD may be viewed as an “apprenticeship” into research, and the skills obtained are not necessarily restricted to the investigated research topic.

Data on specialty choice of medical/PhD students elsewhere are heterogeneous and indicate a complex interaction of academic (eg, focus of degree-awarding institution) and non-academic (eg, amount of debt and perceived specialty-earning potential) factors.<sup>14</sup> Relatively little data exist on the direct comparison of a student's PhD research topic to their clinical specialty of choice. In an analysis of 24 MD/PhD programmes in the US, the majority of students had completed their PhD research in laboratory-based biology/medicine, and most students decided to train in internal medicine, neurology, paediatrics or pathology—without an apparent correlation between the two.<sup>15</sup> The authors speculated that these specialties have historically provided trainees with protected research time compared with other specialties.<sup>15</sup> Similarly, most graduates of University College London's intercalated programme were reported to choose a career in internal medicine without reference to their PhD research topic.<sup>16</sup>

### Attitudes towards the programme

Overall, the students were satisfied with and supportive of the intercalated programme—although we realise this view could be biased as it is of individuals who have heavily invested time, psychological and cognitive resources. More students than not agreed that the programme was under-advertised as an option for interested medical students, and several were hopeful of better execution of the combined degree—both in terms of structural integration with the MBChB degree, as well as increased supports (financial and supervisory) for the students.

There are several potential reasons for the reported difficulties by students. Given the small number of students who had enrolled in the combined-degree programme, it is possible that administrative staff are not as cognisant of such difficulties experienced by students. However, the programme may be expected to improve over time as problems are identified and resolved. One of the benefits of surveying the programme's students is the identification of limitations and ways to rectify them. Similar problems have been reported from even more established intercalated programmes. For example, up to 44% of MD/PhD graduates

of Swiss universities reported suboptimal supervisory mentoring during their course of study/research.<sup>11</sup> In addition, financial constraints remain an obstacle for most intercalated medical/PhD programmes.<sup>3</sup> Given the apparent need to elaborate on these responses about the programme, a future qualitative study of intercalating students and their supervisors has been planned.

### Limitations

There are a number of limitations to our study that warrant consideration. The results presented originate from a single institution in New Zealand, and may therefore not be generalisable. In addition, while every effort was made to obtain a 100% response rate, this was not achieved. However, the response rate in this study far exceeds response rates (35–45%) typical of graduate medical education research.<sup>17</sup> Finally, a significant number of the intercalating students were current students (8/25; 32%). Although their perspective and experiences may differ from those who had completed the programme, their inclusion was necessary in order to provide a fuller reflection of the programme at our institution.

## Conclusions

The outcomes of this intercalated MBChB/PhD programme help fill a research gap by showing some of the medium-term benefits.<sup>3</sup> While some of the measured career outcomes are similar to those of well-established intercalated programmes elsewhere, we also found unique insights into the MBChB/PhD cohort. The programme is considered worthwhile by our students, most of whom continue (at various capacities) in academic work and produce a significant research output, although potentially in a field that is different to their PhD research. Future studies should focus on acquiring qualitative data in order to probe why students and alumni of the programme made the career choices they did. In addition, comparative data about the make-up of intercalating students—both locally (ie, the proportion of indigenous medical students) and internationally (eg, comparison with Australia) ought to provide meaningful and robust comparisons in order to identify keen and capable students early, as well as target students from under-represented groups.

**Competing interests:**

Nil.

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