Original Research

Barriers and enablers of James Cook University Bachelor of Medicine, Bachelor of Surgery graduates pursuing a research career

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Abstract

Objective: The period 2000–2011 has seen a decline in medical graduates participating in research. However, significant change has taken place in recent years at the James Cook University (JCU), with a sharp increase in medical graduates enrolling in the Honours course. Our study aims to explore the involvement of JCU medical graduates in research, including ‘barriers’ and ‘enablers’ of this involvement.

Design: Cross-sectional questionnaire to the first six cohorts of JCU medical graduates.

Setting: Survey distributed online via SurveyMonkey to graduates who had previously consented to be contacted for future studies.

Participants: Three hundred thirty-eight early-career doctors from PGY (postgraduate year) 4 to PGY9 (n = 185, response rate = 55%).

Main outcome measures: Current research participation.

Results: Fifty-six (30%) of the responding 185 JCU medical graduates were currently undertaking research. Graduates who completed an Honours degree by research (P = 0.001) and students who received some form of research training and mentoring during their undergraduate studies (P = 0.024) were statistically more likely to be currently involved in research. Vocational training requirements were both a significant barrier and enabler to research participation.

Conclusions: Participation in the Honours program and receiving training and mentoring during undergraduate studies predict future research involvement by JCU medical graduates. However, many postgraduate barriers for involvement in research exist. This study highlights potential areas for improving medical graduate involvement in research, including medical schools promoting student research training and mentoring in their curriculum, and specialty colleges incorporating a research component in their selection or training requirements.

KEY WORDS: graduate, medical education, research.

Introduction

There has been much discussion over the past two decades regarding the decline in medical graduates choosing research and academic careers.¹,² This has been a trend seen globally and has resulted in growing concern about anticipated future shortages of medical doctors interested in pursuing a career in research or academia.³,⁴ A commonly reported deterrent to a research career is the perception that researchers are isolated from patients and a research career reduces interactions with people.¹,³ Other reported disincentives are the expected levels of income, barriers to funding, inadequate training and mentoring, lack of protected time and lack of flexibility to interrupt training for family considerations.³,⁵,⁶

However, it is encouraging to note that the interest for research among medical students at James Cook University (JCU) has increased substantially in recent years. JCU, the first of Australia’s ‘new’ medical schools, was established to produce graduates equipped with knowledge, attitudes and skills to respond to the health needs of northern Australia. An important part of this mandate is producing graduates equipped with the skills and inclination to conduct research into the health and health service problems affecting populations in the north of the country. The number of students commencing Honours at JCU over the last 4 years has increased significantly: 2011 (4); 2012 (18); 2013 (24); and 2014 (33). Anecdotally, the argument often mentioned by the enrolling students is that
research experience such as an Honours degree advances the academic qualifications of Bachelor of Medicine, Bachelor of Surgery (MBBS) graduates in an increasingly competitive field.

Given the significant implications in terms of both clinical and research workforce of the graduates from JCU and the other new regional medical schools, it is important to understand the barriers and enablers for graduates to participate in research. Whilst studies in the past have explored the interest of research as a career in medical students, there is a scarcity of data about the actual involvement in research of medical graduates, especially in their early careers. While the JCU medical school has surveyed the research intentions of each graduate at exit from the course, finding overall that 28% of medical graduates in the first six cohorts had a ‘strong’ interest (reported a 4/5 or 5/5 on a Likert scale) in a career involving medical research,\(^7\) the JCU medical school does not know if this intention has progressed into research participation.

This study explores the current involvement in medical research of the first six cohorts of JCU MBBS graduates, as well as major barriers and enablers to this involvement they experienced during their undergraduate years and early career, and linking this to their intention at graduation for having a research career.

Methods

Design

The JCU MBBS program has now produced nine graduate cohorts from 2005 to 2013. This cross-sectional study, involving a logistic regression plus a thematic analysis of open-ended questions around barriers and enablers to research involvement, collected data from respondents among the first six graduating cohorts (2005–2010) who had previously given their consent to be contacted for tracking purposes and further studies.

Consent for further contact was obtained from an annual exit survey of year 6 students, which has been conducted since 2005. This exit survey included a page requesting students to provide their personal contact details (email and mobile phone) as part of a JCU longitudinal tracking project on medical graduate outcomes. Overall, 338 of the total 444 medical graduates in the first six cohorts gave their consent to be contacted for further studies, such as the present study. Ethical approval for the study was obtained from the JCU Human Research Ethics Committee (approval # H1804).

Data collection

In the yearly exit survey, final-year students were asked to rate on a Likert scale their level of interest for becoming involved in medical research as part of their medical career, with 4 or 5 being a ‘strong’ and ‘very strong’ interest, respectively.

In 2014, the annual graduate survey was administered via SurveyMonkey (SurveyMonkey Inc., Palo Alto, CA, USA) or telephone to all 338 graduates who had given their consent for future contact. The survey asked respondents for their name, if they were currently involved in research, if they were currently involved in teaching medical students or recent graduates, if they would like to be involved in research activities if not currently and if they had participated in any research or research training or mentoring (including the Honours course) during the undergraduate course. The respondents were also asked to make free-form comments about what exactly their current research role entails,
what barriers prevented them from being involved in research and what has enabled them to be involved in research. As each respondent’s name was obtained in the annual graduate survey, this was linked to their university student identification number to then access their level of intention for medical research from the yearly exit survey records.

Data analysis
All data were coded numerically and entered into the computerised statistical package for social sciences, SPSS Release 20 for Windows (IBM Corp., Release 2011, Armonk, NY, USA). Data on intention at graduation to ‘become involved in medical research as part of your medical career’ was able to be linked for 116 out of the total 185 (63%) respondents. Univariate logistic regression was performed to assess the association between each of the independent variables and the dependent variable ‘JCU MBBS graduates being currently involved in research (yes/no) in postgraduate years 4–9’. Forward stepwise logistic regression (with additional backward deletion and stepwise regression) was then performed to identify and confirm independent predictors of JCU MBBS graduates being currently involved in research (yes/no) in postgraduate years 4–9. Only independent significant predictors were accepted into the final logistic regression model. The area under the receiver operating characteristic (ROC) curve was performed to validate the multiple logistic regression model. Results of the logistic regression analysis are presented as odds ratios together with 95% confidence intervals (95% CI).

‘A priori’ content analysis was also undertaken to group the variety of responses given as either barriers or enablers to graduates being involved in research (displayed in Table 1). The content analysis of open-ended questions was conducted by the author A. C., and this analysis was checked by T. W. for investigator triangulation; differences were resolved through discussion between the two authors.

Results
Description
A total of 185 JCU MBBS graduates responded to the survey from a possible 338 who had reached at least PGY4 and had provided current contact details in their exit survey at graduation (response rate = 55%). Of these, 34 (18%) graduated in 2005, 29 (16%) graduated in 2006, 30 (16%) graduated in 2007, 27 (15%) graduated in 2008, 24 (13%) graduated in 2009 and 41 (22%) graduated in 2010 (and thus were at the beginning of their PGY4 when the study was undertaken). Fifty-six of the responding 185 JCU medical graduates (30%) were currently undertaking research; and of the 129 who were not, a further 47 (25%) wished they were involved in research.

Content analysis
Several barriers and enablers to involvement in research were reported (Table 1). The most common barriers were time constraints (14 responses) and their extensive postgraduate training requirements (13). The most frequently reported enablers (or motivators) for participation in research were requirements of the college or specialist training programs (26 responses), followed by a genuine interest in their respective research field (19).

Multivariate analysis
Multivariate logistic regression identified that the likelihood of JCU MBBS graduates currently being involved in research
in research was predicted by having undertaken an Honours degree (13 times more likely to be currently involved in research activities; \( P = 0.001 \)), and receiving research training or mentorship during their undergraduate studies (4.0 times more likely to be currently involved in research activities; \( P = 0.024 \)) (Table 2). The ROC was 0.62 (95\% CI, 0.53–0.72; \( P = 0.008 \)).

**Discussion**

This is the first study to highlight the involvement of early-career Australian graduate doctors in research activities. The high proportion – almost a third – of our JCU graduates currently undertaking research was approximately the same proportion as those that indicated a ‘strong’ interest in research at time of graduation. As our findings show that intentions to do medical research at graduation is not significantly associated with currently undertaking research, there must exist significant barriers and enablers to undertaking research in Australia.

Our study highlights the more significant barriers and enablers. Lack of protected time and inadequate training and mentoring were common themes, as has been previously reported in the literature.\(^5,6\) In particular, time limitations appear to be the greatest obstacle, with 49\% of responses identifying that busy clinical jobs and focusing their efforts on postgraduate training and associated examinations are key barriers. While JCU’s medical program caters towards producing graduates to practise in rural and remote communities and many graduates do indeed practice in these areas,\(^9\) interestingly (and importantly in terms of our mission), geographical remoteness did not appear to be a major hindrance to involvement in research.

Although many identified time limitations due to fellowship requirements (training and preparing for examinations) as a barrier, college and specialist training program requirements were also reported as the most common enabler for participation in research activities. These findings suggest that colleges and specialist training programs can play a significant role in increasing physicians’ research involvement. Incorporating research activities within the fellowship requirements can allow more doctors who are focusing on their training pathways to access and become involved in future research. Indeed, it will also provide an opportunity for clinicians without significant interest in research to gain critical evaluation and research-literacy skills; skills which that also be invaluable to their professions. Capitalising upon this desire for variety among young graduates might be worthwhile in terms of building up a cadre of ‘clinician scientists’ having portfolio careers consisting of part clinical work and part public health or research.

When it comes to predictors of JCU MBBS graduates participating in research during their early career, being selected into the undergraduate Honours program in years 5 and 6 appears to be the strongest factor. Interestingly, even those who received some form of research training or mentoring during their studies were also more likely to participate in research, although simply participating in a research project was not predictive of future research involvement.

This suggests that medical schools can promote future research careers without the costs and effort of running a large Honours program by providing greater opportunities for students to experience mentored research in their undergraduate curriculum, a finding that is in line with previous research.\(^6\) Early exposure to research in the curriculum, research mentoring and positive research role models is also related to becoming an ‘academic’ doctor.\(^2,10\) JCU has responded through both broadening our Honours program and expanding research opportunities throughout the curriculum. Furthermore, for graduates, a mentored Cohort Doctoral Research scheme allows doctors and other health professionals to continue to work clinically while pursuing a higher degree research program.

**Limitations**

The findings might be limited to JCU medical graduates. The nature of the JCU MBBS program – a regionally located, undergraduate medical course focused on producing graduates to meet the health needs of northern Australia – might not be representative of all medical schools across Australia. However, many other Australian medical schools offer research programs to high achieving students in a similar concept to JCU. Although it remains to investigate, our results seem reasonable and similar results might be found for other universities.

While no difference in age and gender were noted between responders and non-responders (e.g. 58\% of JCU medical graduates participating in the current study were women compared with 59\% present overall in the first six cohorts), the possibility of response bias related to research involvement cannot be excluded. In addition, while our findings show having undertaken Honours has a large predictive value for later research participation, a potential confounding bias is that only those students with high marks are offered Honours, and high-achieving students would also be more likely to undertake research after graduation. Thus, while these study findings are interesting, more research is needed from other Australian medical graduates, and JCU medical graduates later in their careers, before we can draw firm conclusions about research participation.
<table>
<thead>
<tr>
<th>Independent variables</th>
<th>n</th>
<th>P-value</th>
<th>OR (95% CI)‡</th>
<th>P-value</th>
<th>Current research involvement (%)</th>
<th>OR (95% CI)‡</th>
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<tr>
<td><strong>Univariate logistic regression analysis per independent variable</strong></td>
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<td>High intention at graduation to undertake research (4 or 5 on Likert scale; where 4 = high; 5 = very high)</td>
<td>116</td>
<td>0.053</td>
<td>2.3 (1.0–5.5)</td>
<td>—§</td>
<td>—§</td>
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<td>7–9 years practising since graduation</td>
<td>185</td>
<td>0.122</td>
<td>1.7 (0.9–3.1)</td>
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<td>Completed Honours by research during undergraduate years</td>
<td>171</td>
<td>0.002</td>
<td>12.3 (2.6–58)</td>
<td>0.001</td>
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<td>18%</td>
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<td>Yes</td>
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<td></td>
<td>13 (2.7–62)</td>
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<td>Received undergraduate research training or mentoring</td>
<td>171</td>
<td>0.029</td>
<td>3.7 (1.1–12)</td>
<td>0.024</td>
<td>4%</td>
<td>14%</td>
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<td>4.0 (1.2–13)</td>
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<td>Participated in research projects during undergraduate years</td>
<td>171</td>
<td>0.084</td>
<td>2.6 (0.9–7.5)</td>
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<td>0.001</td>
<td>6.0 (2.7–13)</td>
<td>—§</td>
<td>—§</td>
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</tr>
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</table>

†Only the data of graduates with no missing values for all predictors accepted into the model were analysed (14 graduates had missing data for ‘undergraduate research training’). ‡OR (95% CI) = odds ratio (95% confidence interval). §Independent variable not accepted into the final model (P > 0.05).
Conclusions

Understanding the main barriers and enablers of medical graduates' research participation is the first step in the JCU medical school taking a more targeted approach to increasing the percentage of our graduates having a research career. Completing an Honours project and receiving research training and mentoring appear to be good predictors of future research involvement, and highlight potential areas where medical schools can best promote student involvement in research activities.

In addition, the findings suggest specialty colleges can also play a significant role in further promoting medical research careers by incorporating a research component in their selection or training requirements. Further studies into the research practices of the wider medical community and of JCU medical graduates in their mid and late careers are needed to confirm these recommendations.

Acknowledgements

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References

1 Burgoyne LN, O’Flynn S, Boylan GB. Undergraduate medical research: the student perspective. Medical Education Online 2010; 15: 5212.