Predictors of rural practice location for James Cook University MBBS graduates at postgraduate year 5

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Abstract

Objective: To describe factors which predict James Cook University (JCU) medical graduates having a rural practice location at PGY5.

Participants: JCU MBBS graduates who had completed their postgraduate year (PGY 5) in Australia (n=193).

Design: Multiple logistic regression analysis involving graduates’ application data (age, gender, location of hometown, School Leaving score, interview score, ethnicity), undergraduate data (scholarship awarded, Honours program), and post-graduation data (internship location, practice location PGY 2-5, specialty training began or completed).

Main outcome measure: Predictors of practise in a ‘rural’ Australian town (ASGC-RA 3-5) at PGY5.

Results: Practise in a ‘rural’ town (ASGC-RA 3-5) in PGY5 was predicted by: ‘internship in an ASGC-RA 3-5 location’ (POR=2.8, p=0.002); ‘began or completed postgraduate training as a General Practitioner or Rural Generalist’ (POR=4.3, p=<0.001); ‘hometown at application located in ASGC-RA 3-5 area’ (POR=3.3, p=0.008), ‘graduated in first 2 cohorts’ (POR=3.8 & 2.0 respectively, p=0.027), and NOT began or completed postgraduate training as a Surgeon (POR=9.4, p=0.040).

Conclusions: This study provides evidence that likelihood of early career rural medical practise in Australia is enhanced by education strategies such as establishing medical schools in rural locations, selecting students with a rural origin, and providing rural clinical placements and rural internship places. This early evidence supports the proposition that investing in rural medical education will produce an appropriately trained medical workforce to meet the needs of rural Australia. Findings also suggest rural workforce may be further enhanced with additional specialty training opportunities in rural tertiary hospitals; in particular, Surgery.

Background

Maintaining an adequate medical workforce in rural and remote northern Australian towns has been a challenge for many years.1 In an endeavour to address this challenge, Intern places and postgraduate training opportunities have slowly been expanded in the region, although training is currently available in only a limited range of more generalist specialties. In addition, the James Cook University (JCU), located in northern Queensland, established a medical program in 2000 with a mission to select and educate medical graduates prepared to work as doctors in rural and remote locations.2

The JCU approach is to combine several initiatives shown to increase the likelihood of graduates working in rural areas. There is evidence that rural origin at application16 and providing early and repeated exposure to rural experiences during training38 is associated with increased likelihood of rural practice. Other factors shown to increase the likelihood of medical graduates practising in a rural location include a preference for specialising in General Practice39 and rural residencies.1011

Thus, the JCU medical school chose to preferentially select student from towns across northern Australia (70% of intake), and/or from towns classified as outer regional, remote or very remote (66%) on the Australian Standard Geographical Classification Remoteness Area (ASGC-RA) index.12 Admission decisions are based on a combination of academic performance in relation to rurality of prior education11, scoring of a personal statement judged to demonstrate genuine interest in rural, remote, Indigenous and tropical medicine, and interview scores. Successful applicants then go on to experience significant rural exposure through decentralised rural clinical placements across the six years.
of their MBBS degree—generally above that occurring in other Australian medical schools—and are regularly exposed to rural mentors and role models.

While the combination of rural medical education strategies have been shown to produce different outcomes at JCU, the relative contribution of each strategy is unclear. This paper collates pre-medical school data of the JCU MBBS graduates at application, together with medical school data from their undergraduate experience and data collected after graduation on their practicing location and specialty training, and uses multivariate analysis to identify factors predicting a rural practice location at PGY5.

Methods

Design: As part of a broader longitudinal cohort study, the location of practice at PGY 5 was explored for all available medical graduates. Consent for graduate participation was obtained from an annual exit survey of final year JCU medical students, which has been conducted for all graduating cohorts. Approval was obtained from the JCU Human Research Ethics Committee (# H1804).

Participants and data sources: A total of 197 medical graduates were in the 2005–2007 graduating cohorts. A longitudinal profile of location at the fifth postgraduate year was collated for each of these graduates. Medical school application and undergraduate data were retrieved from administrative databases held by the JCU School of Medicine and the Faculty of Health, Medicine and Molecular Sciences for the following variables: date of birth, gender, hometown at application, interview score, School Leaving Score, if awarded Honours (completed an Honours research project in last 2 years of course), if awarded a scholarship (includes 22 Medical Rural Bonded scholarships and 2 Queensland Health Rural scholarships), if granted advanced standing (entered course in Year 2 or later based on previous study and experience), rural placement location (ASGC 3 to 5 location), and year graduated.

Postgraduate location and training data were accessed initially via a JCU School of Medicine Facebook page that was created specifically to maintain a current contact list for the longitudinal cohort study. Some graduates were contacted directly to provide more current information through the personal email and mobile phone details that were provided as part of an exit survey of all final year students. Additional data on practice location data was sourced from the Australian Health Practitioner Regulation Authority (AHPRA) website (http://www.ahpra.gov.au/Registration.aspx). Twenty practice locations obtained via direct contact were compared to the same graduate’s practice location listed in the AHPRA website; practice location matched for 18/20 (90%) of cases. Combining these strategies, practice location data for the first 3 graduating cohorts at PGY5 was collected from 193 of the total 197 (response rate of 98%). Postgraduate practice location data was then linked to individual student data.

Variables: The dependent variable was location of practice (Australian city or town) in the 5th year post-graduation from the MBBS program, categorised into ‘Metropolitan’ (ASGC-RA 1), ‘Inner regional’ (ASGC-RA 2), and ‘Outer regional or remote’ (ASGC-RA 3-5) based on the Australian Standard Geographical Classification Remoteness Area (ASGC-RA) index. Internship training location was similarly categorised based on the ASGC-RA index. Postgraduate variables around specialty training were created by categorising graduates who had undertaken specific specialist training (e.g., Surgery including sub-specialties, Physician including sub-specialties, and General Practice or Rural Medicine) versus graduates who had chosen other specialties or had not yet undertaken training.

Participant demographics from the application data obtained from the student database for the JCU Faculty of Health, Medicine & Molecular Sciences, except for age at graduation from medical school, which was calculated from date of birth and graduation year; and ‘rurality’ of hometown at application, which was determined by individually categorising the town into either ASGC-RA 1-2 or ASGC-RA 3-5; again based on the ASGC-RA index. Undergraduate variables for whether the student was awarded a scholarship or degree with Honours, and year graduated, were created directly from JCU SMD data sources. A complete list of the variables as they were considered for statistical analysis is given in Table 1.
Table 1  Results of multiple logistic regression analysis identifying predictors of JCU MBBS graduates (n = 167) practising in a ‘rural’ town (ASGC-RA 3 to 5) in postgraduate Year 5

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Sample (n=167)</th>
<th>Practising in rural town (%)</th>
<th>POR [95%-C.I.]*</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of internship (PGY1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metropolitan (RA 1)</td>
<td>60</td>
<td>23%</td>
<td>0.4 [0.1–1.4]</td>
<td>0.002</td>
</tr>
<tr>
<td>Inner Regional (RA 2)</td>
<td>29</td>
<td>17%</td>
<td>2.8 [1.2–6.4]</td>
<td></td>
</tr>
<tr>
<td>Outer Regional or Remote (RA 3-5)</td>
<td>78</td>
<td>55%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General practitioner (including rural GP sub-specialty) training began or completed</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No</td>
<td>98</td>
<td>24%</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>69</td>
<td>57%</td>
<td>4.3 [2.0–9.4]</td>
<td></td>
</tr>
<tr>
<td>Rurality of hometown</td>
<td></td>
<td></td>
<td></td>
<td>0.008</td>
</tr>
<tr>
<td>Metropolitan or Inner Regional (RA 1-2)</td>
<td>62</td>
<td>21%</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Outer Regional or Remote (RA 3-5)</td>
<td>105</td>
<td>47%</td>
<td>3.3 [1.4–7.8]</td>
<td></td>
</tr>
<tr>
<td>Surgery (including sub-specialties) training began or completed</td>
<td></td>
<td></td>
<td></td>
<td>0.040</td>
</tr>
<tr>
<td>Yes</td>
<td>16</td>
<td>6%</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>151</td>
<td>40%</td>
<td>9.4 [1.1–79.6]</td>
<td></td>
</tr>
<tr>
<td>Graduating cohort (calendar year)</td>
<td></td>
<td></td>
<td></td>
<td>0.027</td>
</tr>
<tr>
<td>2007</td>
<td>54</td>
<td>28%</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>59</td>
<td>36%</td>
<td>2.0 [0.8–5.2]</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>54</td>
<td>48%</td>
<td>3.8 [1.4–9.9]</td>
<td></td>
</tr>
</tbody>
</table>

* POR [95%-CI] = Prevalence Odds Ratio [95%- Confidence Interval].

Only the data of graduates with no missing values for all predictors accepted into the model were analysed (26 graduates had missing data for ‘specialty training began or completed’).

Statistical analysis: Data were coded numerically and entered in the computerised statistical package for social sciences, SPSS Release 19 for Windows. Multivariate logistic regression analysis was used to identify independent predictors of practice location during PGY5 in an ‘outer regional or remote’ town (Table 1). Results of the multivariate logistic regression analysis are presented as prevalence odds ratios (POR), together with 95% confidence intervals (95%-CI). Throughout the study, a statistical test was considered significant when the P value was below 0.05.

Results

Description: There were 58 JCU MBBS graduates in 2005, 72 in 2006, and 67 in 2007. Of the 197 JCU MBBS graduates in total, their median age on graduation day (December) was 23 years (interquartile range 23 to 24 years), with 111 (57%) female, 125 (64%) reporting a hometown at application in the ASGC-RA 3 to 5 categories, 18 (10%) were awarded a degree with Honours, 24 (12%) were awarded a scholarship, 9 (10%) were lateral entry students, and 7 (4%) identified themselves as being Aboriginal and/or Torres Strait Islander.

Practice location in PGY5 was identified for a total of 193 JCU MBBS graduates (4 graduates were working overseas or had the year off). Of the 193 graduates for whom practice location is available in PGY5, 87 (45%) were practising in a major city, 33 (17%) in inner regional centres and 73 (38%) in outer regional or remote centres (ASGC-RA index). Specialty training data was less complete; data was obtained for 167 graduates who had reached PGY5; a response rate of 85%. The most common specialty training undertaken was general practitioner (52), physician (21), rural generalist sub-speciality (20), and surgery (16); while 26 graduates reported they had not yet chosen to train in a specialty.

Multivariate analysis: Multivariate logistic regression identified that JCU MBBS graduates practising in a ‘rural’ location in PGY5 was predicted by having undertaken their internship in a rural location.
(p=0.002; POR=2.8), having undertaken training as a general practitioner/rural generalist (p=<0.001; POR=4.3), having a hometown at application categorised as an ‘outer regional’ or ‘remote’ location (p=0.008; POR=3.3), having graduated in the first or second cohorts (2005 and 2006) (p=0.027; POR=3.8 and 2.0, respectively), and NOT undertaken training in surgery (p=0.040; POR=9.4) (Table 1).

Discussion

This is the first longitudinal study to investigate the contextual, professional and personal factors that affect choice of early-career practice location for medical graduates from a rurally-oriented Australian medical school. The most significant factors identified in this study for practising in a rural location 5 years post-graduation included: training in general practice (including rural generalist) specialty; undertaking internship year in a rural location (ASGC RA 3-5); and reporting a rural hometown upon application to medical school (ASGC RA 3-5). The other two significant predictors for rural practise were being in the first two graduating cohorts (in 2005 and 2006), and not undertaking training as a surgeon.

This confirms a number of previous studies which have identified ‘nature and nurture’ factors associated with medical graduate rural practise; in particular, rural hometown upon application, training in general practice specialty, and undertaking a rural internship.5,7-11,16 Interestingly, the data shows that undertaking an internship in an inner regional location reduces (POR of 0.4) a JCU graduate’s likelihood of practising in a rural location in PGY5—even more so than a metropolitan internship. This suggests that it is not enough to provide internship places in inner regional hospitals, but that more internship places should be made available in rurally-located hospitals.

In addition, this study identifies a further factor predicting location of practice that has not been shown previously: training in surgery specialties. It is likely that training places in surgery sub-specialties and others such as intensivist, anaesthetics and radiology are more available in metropolitan and inner regional hospitals. JCU graduates who are interested in these specialties would have to relocate to major centres. Once they relocate, the possibility is high that important life decisions occur during this period of metropolitan-based training—the graduates meet partners from the city, have children who start school, etc—and so can potentially become lost to rural practise, even if they initially intended to return.

The finding that doctors in the first two graduating cohorts are more likely to practise in rural areas at PGY5 is interesting. The first cohorts of any new course may not necessarily reflect long-term trends as the course becomes established and pent-up demand is managed. Indeed, further analysis of the practice locations of the first 7 JCU cohorts show cohorts 1 and 2 always have the highest percentage of rural practitioners for any given year, while the percentage practising ruraly in cohort 3 is close to the total cohort average. A 2003 study of JCU undergraduates showed over 60% were from northern Australia, with many stating they would not have studied medicine had they not been able to study close to home at JCU because of financial pressures and family dislocation.17 Thus, the early graduate cohorts in 2005 and 2006 would not have been disposed to moving away from NQ after graduation. In addition, there may have been less workforce pressure driving these graduates to move; there were likely more vacant medical positions in northern rural communities when these graduates finished their internship than for later cohorts (2007 onwards), as it was a time of significant doctor shortages in northern Australia.19

Limitations

The study has several limitations. Post-graduation factors known to influence rural practise—access to professional development, peer relationships, spouse with a rural background or open to rural living, adoption of lifestyle/integration into rural community7,18—could not be obtained for inclusion in the analysis. Also, while the second cohort onwards had access to the MRBS scheme, the influence of Bonded Medical Places on rural practice could not be assessed as this program only became available for the fifth JCU MBBS graduating cohort. The multivariate analysis calculated predictors of practice location at PGY5—in a graduate’s early career. Practice location at PGY10 or later may be more
appropriate for showing factors associated with a long-term rural medicine career, and this will be
investigated in due course. In addition, by PGY10, a more complete dataset for JCU MBBS specialty
training should be available for more accurate assessment of its influence on practice location. Data on
greater numbers of graduates will also provide more evidence on the workforce impact of the School.

Conclusions
The new JCU medical school appears to have produced graduates who stay in rural areas during their
evary career, with many choosing general practitioner or rural generalist training. This study provides
the first Australian evidence that likelihood of rural medical practicē is enhanced by establishing a
medical school in a regional location, selecting students with a rural origin at application, having a
selection process orientated towards choosing students with a genuine desire for rural practicē, and
providing rurally located internship places.

This early evidence supports the proposition that investment in rural medical education will produce an
appropriately trained medical workforce to meet the needs of rural Australia. However, findings also
suggest that regional workforce may be further enhanced with additional training opportunities in rural
tertiary hospitals for specialties other than general practice and rural generalism; in particular, surgery
and surgical sub-specialties.

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