Self-sufficiency in intern supply: the impact of expanded medical schools, medical places and rural clinical schools in Queensland

Diann S Eley, Jianzhen Zhang and David Wilkinson

Abstract

Objective: The doctor shortage in Australia generally, and the rural shortage in particular, has led to an increase in medical schools, medical places and rural training. If effective, these strategies will first impact on the intern workforce. We studied the source of interns in Queensland.

Methods: Analysis of number, source and location of interns by Rural, Remote and Metropolitan Area (RRMA) classification (an index of remoteness) from university and health department records (2003–2008). Odds ratios compared the likelihood of intern supply from Queensland universities and rural clinical schools.

Results: Most interns in Queensland graduated from Queensland universities in 2007 (287 [72%]) and 2008 (344 [84%]). Proportions increased across all three RRMA groups from: 82% to 93% in RRMA1; 56% to 68% in RRMA2 and 67% to 79% in RRMA3. The University of Queensland (UQ) provides most interns in all RRMA locations including RRMA3, and this increased from 2007 (n = 33 [35%]) to 2008 (n = 57 [58%]). Interns from interstate decreased from 61 (15%) in 2007 to 40 (10%) in 2008. Interns from overseas fell from 53 (13%) in 2007 to 27 (7%) in 2008. Rural clinical schools compared with traditional urban-based schools were more likely to supply interns to RRMA3 than RRMA1 hospitals in 2007 (OR, 8.8; 95% CI, 4.6–16.7; P < 0.0001) and 2008 (OR, 6.5; 95% CI, 3.5–12.2; P < 0.0001).

Conclusions: Queensland is close to self-sufficiency in intern supply and will achieve this in the next few years. Rural clinical schools are playing an important role in producing interns for RRMA3 hospitals. Due to its large cohort, UQ remains the major provider across all RRMA groups.


What is known about the topic?
Commonwealth Government initiatives to address the doctor shortage have led to an increase in medical schools, rural training and, most recently, medical places. If effective, these strategies will first impact on the intern workforce.

What does this paper add?
Our data suggest that Queensland will become self-sufficient in interns in the next few years. The number of interns from interstate and overseas is declining. Findings imply that as long as training opportunities are made available, Queensland’s recent reliance on interstate and especially international medical graduates for its workforce will wane. Data also indicate that most rural clinical school students undertake internships in RRMA3 (Rural, Remote and Metropolitan Areas classification group 3) hospitals, giving further support to this initiative.

What are the implications for practitioners?
An end to the reliance on graduates from outside Queensland (especially for regional hospitals) is welcome. These data reinforce the importance of a closer alignment between the number of medical students, clinical placement opportunities and available internships. Considering the imminent increase in student enrolments this is a point of note to all Australian medical schools.

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THE MOST RECENT government policy to address the doctor shortage entails a substantial increase in student numbers across Australian medical schools, and the creation of new schools. Coincident with the call for more doctors is the importance of preparing them for work in a range of geographical areas — in particular, rural areas.\(^1\)\(^2\)\(^3\) The Commonwealth Government has implemented several initiatives with a rural focus at medical schools,\(^4\) such as establishing rural clinical schools (RCS), with the expectation that students will work in rural areas after graduation. If effective, these strategies will first impact on the intern workforce.

Choosing internship location is the first major career decision made by medical graduates and one that is typically contemplated midway through undergraduate training.\(^5\) Furthermore, this decision will become more important as numbers of medical graduates and competition for intern places increase in the future. In Queensland, internship preference is afforded to graduates from its own universities, but places are also filled by graduates from interstate and overseas.\(^6\)

The aim of this study was to determine where Queensland’s interns come from, how this is changing over time and the particular contribution to rural internships that the RCS play.\(^7\)

**Methods**

A retrospective analysis of data from Queensland Health (QH) and the University of Queensland (UQ) was done in July 2008. The source of interns (Queensland, interstate or overseas), number of graduates and their intern destination was collated and categorised by the Rural, Remote and Metropolitan Area (RRMA)\(^8\) classification of each training hospital. The RRMA is an index of remoteness based primarily on population density and an average distance of residents from one another. Seven categories are included in this classification — two metropolitan (RRMA 1 and 2), one regional/rural (RRMA 3), two rural (RRMA 4 and 5) and two remote (RRMA 6 and 7). Only hospitals in RRMA 1–3 train interns.\(^6\) Two separate investigations were undertaken.

The first investigation looked at trends in total intern numbers (all sources) and proportions

### Table: Queensland Health intern placements — all sources by RRMA classification

<table>
<thead>
<tr>
<th>Internship placements</th>
<th>2007</th>
<th></th>
<th></th>
<th></th>
<th>2008</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>RRMA 1</td>
<td>RRMA 2</td>
<td>RRMA 3</td>
<td>N (%)</td>
<td>RRMA 1</td>
<td>RRMA 2</td>
<td>RRMA 3</td>
</tr>
<tr>
<td>Total no. interns</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Queensland</td>
<td>401</td>
<td>204 (50.9)</td>
<td>104 (25.9)</td>
<td>93 (23.2)</td>
<td>411</td>
<td>212 (51.6)</td>
<td>101 (24.6)</td>
<td>98 (23.8)</td>
</tr>
<tr>
<td>UQ</td>
<td>287</td>
<td>167 (81.9)</td>
<td>58 (55.7)</td>
<td>62 (66.6)</td>
<td>344</td>
<td>198 (59.3)</td>
<td>69 (68.3)</td>
<td>77 (78.5)</td>
</tr>
<tr>
<td>UQRCS</td>
<td>221</td>
<td>152 (74.5)</td>
<td>36 (34.6)</td>
<td>33 (35.5)</td>
<td>288</td>
<td>181 (63.5)</td>
<td>50 (49.5)</td>
<td>57 (58.2)</td>
</tr>
<tr>
<td>JCU</td>
<td>26</td>
<td>7 (3.2)</td>
<td>6 (11.3)</td>
<td>13 (10.3)</td>
<td>23</td>
<td>2 (0.9)</td>
<td>2 (2.0)</td>
<td>19 (19.4)</td>
</tr>
<tr>
<td>Other states</td>
<td>61</td>
<td>18 (8.8)</td>
<td>33 (31.7)</td>
<td>10 (10.7)</td>
<td>40</td>
<td>9 (4.2)</td>
<td>23 (22.7)</td>
<td>8 (8.2)</td>
</tr>
<tr>
<td>New South Wales</td>
<td>20</td>
<td>6 (2.9)</td>
<td>7 (6.7)</td>
<td>7 (7.5)</td>
<td>18</td>
<td>5 (2.4)</td>
<td>9 (8.9)</td>
<td>4 (4.1)</td>
</tr>
<tr>
<td>Victoria</td>
<td>20</td>
<td>5 (2.5)</td>
<td>13 (12.5)</td>
<td>2 (2.2)</td>
<td>12</td>
<td>3 (1.4)</td>
<td>8 (7.9)</td>
<td>1 (1.0)</td>
</tr>
<tr>
<td>Tasmania</td>
<td>16</td>
<td>7 (3.4)</td>
<td>8 (7.7)</td>
<td>1 (1.1)</td>
<td>3</td>
<td>0 (0.0)</td>
<td>2 (2.0)</td>
<td>1 (1.0)</td>
</tr>
<tr>
<td>South Australia</td>
<td>4</td>
<td>0 (0.0)</td>
<td>4 (3.9)</td>
<td>0 (0.0)</td>
<td>4</td>
<td>0 (0.0)</td>
<td>2 (2.0)</td>
<td>2 (2.0)</td>
</tr>
<tr>
<td>Western Australia</td>
<td>1</td>
<td>0 (0.0)</td>
<td>1 (0.9)</td>
<td>0 (0.0)</td>
<td>3</td>
<td>0 (0.7)</td>
<td>1 (0.5)</td>
<td>2 (2.0)</td>
</tr>
<tr>
<td>IMGs</td>
<td>53</td>
<td>19 (9.3)</td>
<td>13 (12.5)</td>
<td>21 (22.6)</td>
<td>27</td>
<td>5 (2.4)</td>
<td>9 (8.9)</td>
<td>13 (13.3)</td>
</tr>
</tbody>
</table>

**Notes:**

- IMG = International Medical Graduate (medical degree obtained outside Australia and New Zealand).
- JCU = James Cook University.
- RRMA = Rural, Remote and Metropolitan Area.
- UQRCS = University of Queensland Rural Clinical School.
across each RRMA category of hospital in 2007 and 2008 (we were unable to obtain data from earlier years). Data were also analysed to compare only the two Queensland universities from which doctors have graduated (UQ and James Cook University [JCU]), as well as the UQ Rural Clinical School (UQRCS), between RRMA3 and RRMA1, RRMA2 and RRMA 1, and RRMA 3 and RRMA2 for both years. The odds ratios (OR) and 95% confidence intervals were calculated using SAS software, version 9.1 (SAS Institute, Cary, NC, USA).

The second investigation observed the number and proportion of graduates’ intern destinations from UQ only, across a 6-year period (since the inception of the UQRCS in 2003). We report the trends in intern destinations of those students who had spent all of Year 3 and/or Year 4 at one of the regional locations of the UQRCS, with those Year 3 and Year 4 students who were Brisbane based. The medical program at UQ is a 4-year program, with Years 3 and 4 devoted to clinical training through a sequence of ten, 8-week-long clinical rotations.

Results
The first investigation (Box 1) showed that Queensland universities produced most of Queensland’s interns in 2007 (72%) and 2008 (84%). The numbers and the proportions increased across all three RRMA groups: from 82% to 93% in RRMA1; 56% to 68% in RRMA2; and 67% to 79% in RRMA3.

The number of interns from interstate declined from 61 (15%) in 2007 to 40 (10%) in 2008 (Box 1), as did the number of interns from overseas — from 53 (13%) in 2007 to 27 (7%) in 2008. These changes occurred across all RRMA categories.

Comparison of JCU and UQ for 2007 between RRMA3 and RRMA1 hospitals show an OR of 8.9 (CI, 4.3–18.4; \( P < 0.0001 \)), indicating JCU was more likely than UQ to supply interns to RRMA3 hospitals compared with RRMA1. The OR
between JCU and UQ for 2008 shows a similar trend (3.7; 95% CI, 1.8–7.6; \( P = 0.0001 \)). Comparing RRMA3 and RRMA1 internships of JCU with UQRCS in 2007 showed no significant difference, but UQRCS was more likely to supply RRMA3 interns in 2008 (OR, 0.12; 95% CI, 0.03–0.61; \( P = 0.0045 \)).

Comparison of intern supply to RRMA3 and RRMA2 hospitals showed only one significant relationship, between JCU and UQRCS (OR, 0.11; 95% CI, 0.02–0.54; \( P = 0.0024 \)), indicating that UQRCS was more likely than JCU to supply interns to RRMA3 hospitals compared with RRMA2.

Finally, we compared JCU, UQ and UQRCS for intern supply to RRMA2 and RRMA1 hospitals. We found that JCU was still more likely to supply interns to RRMA2 hospitals compared with RRMA1 hospitals than UQ in 2007 (OR, 6.2; 95% CI, 2.9–13.1; \( P < 0.0001 \)) and 2008 (OR, 4.05; 95% CI, 1.9–8.4; \( P < 0.0001 \)). However, there was no difference between JCU and UQRCS across this period. Rural clinical schools (JCU/UQRCS) were more likely to supply interns to RRMA3 than RRMA1 hospitals in 2007 and 2008 (OR, 8.8; 95% CI, 4.6–16.7; \( P < 0.0001 \); OR, 6.5; 95% CI, 3.5–12.2; \( P < 0.0001 \)).

The second investigation (Box 2) showed that most interns in all three RRMA categories are UQ Brisbane graduates who did not study in the UQRCS. Coincident with increasing student numbers is a general trend towards UQRCS graduates becoming interns in RRMA3 hospitals.

Discussion
These data show that Queensland is now close to self-sufficiency in intern supply. Due to its large cohort, UQ remains the major provider of interns in all RRMA categories. Over the last 2 years there has been a decline in the number of interns sourced from both interstate and overseas. The Rural Clinical Schools of JCU and UQRCS are having an important impact on the rural medical workforce, with most of their graduates working in an RRMA3 hospital.

Limitations of this study are acknowledged. The first investigation on all sources of interns would benefit from a more comprehensive picture of trends over time, including data from previous years. These data were not available and caution is advised in interpreting any trends over a 2-year period. Likewise, no data were available on the number of Queensland residents who studied interstate and returned to Queensland intern positions. This information would provide a more complete picture of the movement of Queensland medical graduates early in their careers.

While nobody would want to see the end of an opportunity for doctors from interstate and overseas to work in Queensland as interns, the end of a reliance on graduates from outside Queensland (especially for regional hospitals) is to be welcomed. For a variety of personal and professional reasons a small number of recent graduates will want and need to work interstate or, indeed, overseas. However, it is vital that there should be a much closer alignment between the number of medical students, clinical placement opportunities and internships. There remain multiple opportunities for interstate and international work and exchange during undergraduate and postgraduate training, and while in independent practice.

The myriad of personal reasons for early career choices by medical graduates cannot be overstated. For example, the percentage of UQ graduates undertaking internships outside of Queensland is variable (\( n = 8 \) [2%] in 2007; \( n = 24 \) [6%] in 2008). Eley and Morrissey found that medical students in their penultimate year were anxious about their internship choice in part because of the many other life options apparent at this same time.

The number and proportion of Queensland graduates filling RRMA3 internships increased over our study period. Overall, the contribution by both JCU, which now has Rural Clinical School status, and the UQRCS was similar over the 2-year study period. This is in light of different medical education models (ie, 6 years at JCU and 4 years at UQ). Despite these different mod-
els, both RCS provide regionally based medical education and their return of graduates to non-urban hospitals since their inception continues to be positive.\textsuperscript{7,9-13} The figures provided in this study show a higher proportion of students from RCS going to regional hospitals, despite the differences in undergraduate models. While these data may argue for more investment in regionally based medical education, the mixed model that exists, comprising large numbers of urban-based students, is responsible for meeting workforce requirements. This mixture of training locations (rural and urban) within medical schools, demonstrates that urban training will also contribute to the rural workforce. Our figures show that RCS cohorts are more likely to go rural, but the increasing numbers of students in the urban centres are equally vital to fill rural student places and, in doing so, acquire that rural exposure.

Increasing the total number of medical students means more students with a rural background entering medical school and more urban background students studying at a rural clinical school. Although the best predictors of taking up a rural career are rural background plus early and repeated exposure to rural medicine,\textsuperscript{14} evidence is mounting that indicates that a quality and enjoyable rural clinical training experience (such as through a rural clinical school) can change student attitudes and intentions toward a rural career.\textsuperscript{9,15,16} It is acknowledged that recruitment does not equate to retention, but internship location is the first indication of where graduates may be headed in the workforce. Furthermore, keeping interns local may also affect other variables related to career choice such as finding a spouse, attachment to a community, family and friends. For these reasons also, non-urban internship training can be an early indicator of non-urban practice in the future.\textsuperscript{17,18}

Our data indicate that Queensland will become self-sufficient in interns in the next few years as the number of graduates increases. Already there are more students in each year of the medical program at UQ than became interns in 2008 (and there will be 430 students in Year 1 in 2009). As long as training opportunities are made available, Queensland’s recent reliance on doctors from interstate and especially overseas for its workforce should wane. Furthermore, our data provide further support to the Rural Clinical School initiative of producing graduates who are more likely to consider a rural medical career.

**Acknowledgements**

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**Competing interests**

The authors declare that they have no competing interests.

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