Influence of rural background and rural medical training on postgraduate medical training and location in New Zealand

William Shelker, Tony Zaharic, Branko Sijnja, Paul Glue

Abstract

Aims To evaluate the influence of the Otago Medical Programme’s rural entry pathway and rural immersion programme on postgraduate medical training and location.

Methods Retrospective cohort study of 2008–2011 medical school graduates. Rural background/training included students gaining preferential entry to medical training based on rural residence or schooling, and/or those who spent a year training in a rural setting. Postgraduate medical training and location were obtained from the NZ Medical Register in December 2013.

Results 112/733 students (15.3%) had rural background/training. Significantly more students with rural background/training were training in rural hospital medicine or general practice after graduation. Multiple logistic regression identified both variables (rural background and rural training) as independently statistically significant (Odds Ratios (95%CI); rural background OR 2.1, 95%CI 1.2–3.6; rural training OR 2.5, 95%CI 1.4–4.5; p=0.002). Almost twice as many students with rural background/training were working in non-Major Urban Centres.

Conclusions These findings are similar to international reports on the influence of medical schools’ rural initiatives on postgraduate training choices and practice location. University policies aimed at increasing the proportion of medical graduates practising in rural areas appear to be working as intended.

Recruitment and retention of the rural medical workforce has been highlighted as both a national and global issue, and that increasing numbers of rural doctors is an important step in improving the quality of healthcare delivered to rural populations. Internationally the strongest predictor to increasing graduates training in rural medical practice has been to recruit medical students from rural backgrounds, and to provide undergraduate medical training in rural settings.

Both the Otago and Auckland Medical Programmes have put in place initiatives to graduate doctors who are more likely to work in the rural sector. The Otago Medical Programme has two approaches. The Rural Origins Sub-Category admissions pathway, started in 2003, offers preferential entry to students from rural backgrounds (determined by their residence and/or location of their primary/secondary school), who also meet academic admission standards.

The Rural Medical Immersion Programme (RMIP), started in 2007, sends 5th-year medical students to train in rural communities for one year. This research assessed the influence of the Otago Medical Programme’s two rural initiatives on the proportion of
graduates training in rural hospital medicine or general practice, their location of practice, and postgraduation retention of these doctors in NZ.

**Methods**

This retrospective cohort study was approved by the University of Otago Ethics Committee (13/216). A database was created with the names of medical students graduating from the University of Otago from 2008–2011, along with whether they entered through the Rural Origins Sub-Category pathway and/or took part in the RMIP.

Data regarding year of birth, gender, entry pathway into medical school (Health Sciences First Year (HSFY) vs the two graduate entry pathways\(^1\)) and year of graduation were obtained from the University of Otago student database, under the supervision of an authorised staff member.

The NZ Medical Register was accessed in December 2013 to identify which graduates were registered in NZ and their postgraduate information. This included their vocational training programme and current geographical location within NZ. Sponsored foreign students were not included in the database, nor were graduates who were one year postgraduation. Training programmes of interest to this project included the Rural Hospital Medicine Programme and the General Practice Education Programme.

Graduates’ geographical location was taken from the MCNZ register as the doctor’s location of practice. This was divided into one of two categories, either Major Urban Centre or non-Major Urban Centre, as described by Statistics New Zealand\(^1\). Anonymised data were analysed using summary statistics.

The influence of undergraduate rural exposure (graduates coming through the Rural Origins Sub-Category pathway and/or the RMIP) on training programme selection, geographical location and remaining on the NZ Medical Register were evaluated using chi square tests.

The influence of medical school entry pathway and undergraduate rural exposure on being in rural hospital medicine/general practice after graduating was evaluated using multiple logistic regression (Stata v11.2 software).

**Results**

The demographics of graduates, grouped by presence/absence of undergraduate rural exposure, are shown in Table 1.

<table>
<thead>
<tr>
<th>Rural background/experience</th>
<th>N</th>
<th>Mean (SD) age at graduation (y)</th>
<th>% Male</th>
<th>% HSFY</th>
<th>Number (%) remaining in NZ in Dec 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>621</td>
<td>25.2 (3.2)</td>
<td>45.4%*</td>
<td>77.3%†</td>
<td>497 (80%)</td>
</tr>
<tr>
<td>Yes</td>
<td>112</td>
<td>24.8 (2.4)</td>
<td>33.1%*</td>
<td>87.5%†</td>
<td>94 (84%)</td>
</tr>
</tbody>
</table>

HSFY: Health Sciences First Year entry pathway. *p=0.02;†p=0.02.

There was a significantly higher proportion of female graduates with rural background/training (75/112; 67%) compared with those with no rural background/training (339/621; 55%; Pearson Chi\(^2\)=5.42, p=0.02), and a significantly higher proportion of graduates with rural background/training entering medical school via HSFY (98/112; 87.5%) compared with those with no rural background/training (480/621; 77.3%; Pearson Chi\(^2\)=5.33, p=0.02).
Postgraduate training choices of graduates with and without rural background/training are shown in Table 2. Graduates who had rural background/training had a higher proportion involved with Rural Hospital Medicine and General Practice than graduates with no rural background/training (Pearson Chi$^{2}$=34.2, p<0.001).

Multiple logistic regression was used to evaluate the influence of entry pathway and rural background/training on postgraduate involvement with Rural Hospital Medicine and General Practice. This showed a significant overall effect (p=0.001), with the relationship described by the formula Logit P=-2.406+(0.915 \* ruralexposure)+(0.718 \* entrypath).

Assessment of individual variables identified both rural background (Odds Ratio (OR) 2.5, 95%CI 1.4–4.5; p=0.002) and entry pathway (OR 2.1, 95%CI 1.2–3.6, p=0.01) as statistically significant.

Table 2. Effect of rural initiatives on postgraduate training choices of doctors

<table>
<thead>
<tr>
<th>Rural background/experience</th>
<th>Postgraduate Training Choices [% (n)]</th>
<th>Rural Hospital Medicine</th>
<th>General Practice</th>
<th>Other</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td>0.4% (2)</td>
<td>9.7% (48)</td>
<td>40.8% (203)</td>
<td>49.1% (244)</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>6.4% (6)*</td>
<td>13.8% (13)*</td>
<td>19.1% (18)</td>
<td>60.6% (57)</td>
</tr>
</tbody>
</table>

*=p<0.001 when combined.

The geographical location of doctors’ practices in those with and without rural background/training is shown in Table 3. Although the proportion of graduates with rural background/training working outside of a Major Urban Centre was almost twice that of graduates without rural background/training (11.7% vs 6.6%), this was not statistically significantly (Pearson Chi$^{2}$=2.25, p=0.13).

Table 3. Effect of rural initiatives on geographical location of doctors

<table>
<thead>
<tr>
<th>Rural background/experience</th>
<th>Major Urban Centre</th>
<th>Non-Major Urban Centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>93.4% (464)</td>
<td>6.6% (33)</td>
</tr>
<tr>
<td>Yes</td>
<td>88.3% (83)</td>
<td>11.7% (11)</td>
</tr>
</tbody>
</table>

There was no effect of rural exposure on graduate retention (Table 1), with 84% of students with rural background/training remaining compared with 80% of students without rural background/training (OR 1.06, 95% CI 0.61–1.87). All of the graduates (n=14) who were from rural backgrounds and who also participated in RMIP were practicing in New Zealand.

**Discussion**

The main finding of this study was that medical school graduates who were from rural backgrounds or who were exposed to rural medicine as undergraduates were more likely to be training in rural hospital medicine or general practice after graduation, compared with students without rural background/training.
Although not previously reported from New Zealand, these findings are consistent with an extensive international literature on this topic. An early systematic review of 12 US, Canadian and Australian case control or cohort studies identified rural background, rural schooling and rural undergraduate training as factors associated with subsequent rural medical practice. Further cohort studies have confirmed this report.

We anticipated that there would be a greater proportion of graduates with rural background/training working rurally (i.e. in non-Major Urban Centres) than graduates with no rural exposure. Although the proportion was almost two-fold higher (11.7% vs 6.6%, Table 3), this was not statistically significant. This could be due to the relatively small numbers of graduates in this study, and/or the relatively brief postgraduate period (up to 5 years), and should be re-evaluated in the future.

Our observation that there was 100% retention of graduates who were admitted to medical school via the Rural Origins Sub-Category pathway and who took part in RMIP is intriguing, but is based on a very small number of graduates (n=14), and may well be a chance finding.

Possible shortcomings of this study should be acknowledged. Because of the relatively recent adoption of the two rural initiatives, graduate data were only available for up to 5 years, and it is possible that some of the analyses could be underpowered due to relatively small numbers. It will be important to re-evaluate this in the future. However the main finding (that rural background/training was associated with higher rates of training in rural hospital medicine or general practice) is consistent with published findings.

In conclusion, we have identified that the proportion of medical graduates training in rural medicine and general practice in the 5 years after graduation was greater in those with rural backgrounds/experience compared with graduates without rural exposure, and this finding is consistent with international literature on this topic.

Rurally-focussed medical school admission and training schemes are important ways to increase the rural medical workforce in New Zealand. University policies aimed at increasing the proportion of medical graduates practising in rural areas appear to be working as intended.

**Competing interests:** In the past 3 years Professor Glue has been a consultant for Kinex Pharma and involved in a clinical trial from Demerix Pharma. The other authors have no competing interests to declare.

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