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Driving change in rural workforce planning: the Medical Schools Outcomes Database

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Abstract. The Medical Schools Outcomes Database (MSOD) is an ongoing longitudinal tracking project of medical students from all medical schools in Australia and New Zealand. It was established in 2005 to track the career trajectories of medical students and will directly help develop models of workforce flow, particularly with respect to rural and remote shortages. This paper briefly outlines the MSOD project and reports on key methodological factors in tracking medical students. Finally, the potential impact of the MSOD on understanding changes in rural practice intentions is illustrated using data from the 2005 pilot cohort ($n = 112$). Rural placements were associated with a shift towards rural practice intentions, while those who intended to practice rurally at both the start and end of medical school tended to be older and interested in a generalist career. Continuing work will track these and future students as they progress through the workforce, as well as exploring issues such as the career trajectories of international fee-paying students, workforce succession planning, and the evaluation of medical education initiatives.

Introduction

In 2005, the Medical Schools Outcomes Database and Longitudinal Tracking Project (MSOD) was launched. The MSOD tracks medical students at all Australian and New Zealand medical schools from the beginning of their medical education through to subsequent years in the workforce. The MSOD consists of four phases:

- Students complete a commencement questionnaire.
- Clinical attachments, electives and student activities are tracked via medical schools.
- A student exit questionnaire is completed.
- Subsequent tracking through the intern and vocational training years is planned.

The MSOD has several distinctive features. First, the MSOD is a minimum dataset. The entry questionnaire contains information on demographics, income support, educational background, and practice intentions. A minimum dataset approach was used to maximise response rates (currently around 95% on the entry questionnaire) providing an accurate national picture of medical students.

Second, the minimal dataset is intended to be utilised in substudies and linkage studies to explore particular factors complementary to the minimum dataset. The MSOD contains information of relevance not only to rural workforce planning and rural educators, but also covers the career intentions and trajectories of other specialties and practice locations, along with data from international students.

Lastly, the MSOD is based on several internal data linkages. For example, information on medical education experiences from the medical schools can be linked to entry and exit data. The MSOD is working closely with the Australian Department of Health and Ageing to develop a linkage approach for later tracking of doctors through their working life, designed to provide maximum data with minimal survey fatigue.

The linkage of MSOD data thus far has been reasonably successful. Our 2005 pilot sample consisted of 879 participants from a potential pool of 1123 students. In 2008, 300 MSOD participants were due to graduate from three of the pilot schools. This allowed the linkage of entry questionnaire, exit questionnaire and schools data in the 2005 pilot cohort. The consort diagram (Fig. 1) shows the attrition at each stage of the program. The entry questionnaire response rate was 78%, although this has steadily risen to 95% in the 2008 entry questionnaire sample.

Very little attrition ($n = 3$) occurred due to missing schools data. Two factors ensured this low attrition rate. First, the MSOD works closely with the schools to ensure that the schools data is easily collected each year. The MSOD and the schools cooperate in checking the student IDs of MSOD participants to ensure that each MSOD participant is linked correctly to their medical school data. Second, small grants were made to the schools to ensure that procedures were put in place for the current and future collection of the schools data.

Only a portion of the 2005 cohort was expected to complete the exit questionnaire in 2008 due to different lengths of medical courses and/or delays in progression through the

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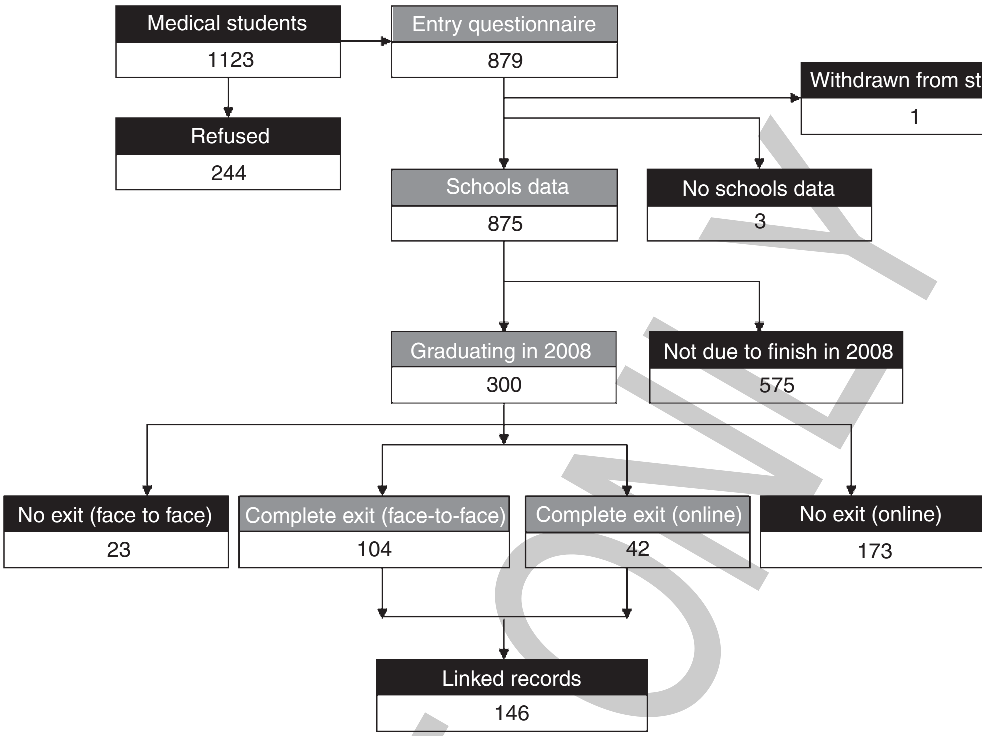

Fig. 1. Consort diagram of the Medical Schools Outcomes Database 2005 pilot sample in 2008.

course. Only 300 students from the pilot sample were expected to graduate in 2008. The other 579 participants are still completing medical school due to longer programs, or have not yet completed due to deferring a year ($n = 38$) or withdrawing ($n = 47$). One student withdrew from the study. We expect to pick up other students who deferred or repeated years of medical school in the 2009 and 2010 exit questionnaire administration.

There was significant attrition at the exit questionnaire but this may be due to mode of administration. Online administration resulted in a response rate of 24% while face-to-face administration resulted in a response rate of 82%. Future exit questionnaires will be administered face-to-face on the final day the students are at university.

Linkage of entry questionnaire and schools was able to be done by student ID only as schools had already checked over the IDs. Linkage of exit data proceeded first by student Q1 ID, then used date of birth and sex if the student ID was non-unique or did not match a known entry questionnaire record.

Following linkage of entry data, schools data and exit data, 146 complete records remained, for an overall response rate of 13% (146/1123 = 13%). Although this may appear low, the attrition rate is comparatively low once we take into account how many students were expected to complete in 2008 ($n = 300$) and the low response rates when the exit questionnaire was administered online. With the change to face-to-face administration of the exit questionnaire we expect overall response rates of around 75% in future years.

Illustrative data

The MSOD may inform many aspects of medical education and workforce planning but one critical area is rural workforce shortages. Rural workforce shortages are a key challenge facing primary health care in Australia. Doctors are in short supply in rural and remote areas (Wilkinson 2000) and understanding the drivers for a career in rural practice is critical.

Previous studies in Australia have suggested that rural on-call arrangements, professional support and practice variety were drivers for practice in rural areas (Humphreys *et al.* 2002). However, these data were cross-sectional snap-shots limiting the value of the results for training initiatives and workforce planning. Data from a Pennsylvania tracking study suggested that rural background and generalist intentions were important predictors of rural practice (Rabinowitz *et al.* 1999). Aside from the broader definition of generalism in that study (including paediatrics and internal medicine alongside the traditional GP role) their data may not necessarily apply to the Australian workforce due to marked differences in geography and demography. A comprehensive study of career intentions of Australian medical students from commencement was therefore a priority.

Initial analysis of the MSOD entry questionnaires from 2005 to 2007 revealed that generalist intentions, previous rural residence and scholarship income are the strongest predictors of intention to practice in rural areas at entry to medical school (Jones *et al.* 2009). This finding is useful in developing strategic selection criteria for medical school but it did not utilise longitudinal data, it only used entry data. Student intentions may change over time and analysis of any change in intentions is important.

Method

The linked entry, exit and school data records from the 2005 pilot sample were used to conduct a longitudinal analysis of rural practice intentions. The records were coded into four categories based on the preferred practice location at the start and end of medical school. The four categories were:

- staying city ($n = 66$),
- staying rural ($n = 7$),
- going city ($n = 30$), and
- going rural ($n = 9$).

These categories were constructed by dividing the preferred practice location, measured using rural remote and metropolitan areas (RRMA) categories into urban (RRMA1 and RRMA2) and rural/remote (RRMA3 through RRMA7) and tabulating whether a student stayed in the same category or switched over time. There were 24 participants who failed to complete either the entry or exit intentions questions.

Cross-tabulations and one-way ANOVA were used to assess various factors associated with change in practice intention. Factors chosen were those previously identified from entry intentions (i.e. age, GP intentions, and self-rurality), as well as marital status and the key new educational variable of rural placements during their medical course.[1]

Results

Considering self as rural was not associated with changes in practice intentions ($\chi^2 = 3.72$, $P = 0.75$), nor was marital status at either entry ($\chi^2 = 2.70$, $P = 0.44$) or exit ($\chi^2 = 5.34$, $P = 0.99$).

There were two factors that were significant for the staying rural group. People whose preferences stayed rural (mean = 33.86, s.d. = 28.80) were on average 10 years older than the other categories (means = 23.33, 23.00 and 23.37, s.d. = 8.19, 3.03 and 3.08, $F_{3,108} = 2.72$, $P = 0.048$). Similarly, entry GP preference was significantly higher in those staying rural but was not significantly higher in the going rural category ($\chi^2 = 9.70$, $P = 0.02$; Table 1).

Rural placements were associated with a change towards rural practice intentions. The mean RRMA classification of placements in the staying rural (mean = 2.00, s.d. = 0.71) and going rural (mean = 2.15, s.d. = 1.48) categories were significantly higher than the means for staying city (mean = 1.71, s.d. = 1.19) or going city (mean = 1.31, s.d. = 0.71, $F_{3,108} = 3.38$, $P = 0.02$).

Discussion

The results from these pilot data are best seen as illustrative and not conclusive due to low numbers in the going rural and staying rural categories. The present analysis is limited by the sample size, coming as it does from our pilot cohort of only six universities with only a portion of students reaching graduation thus far. Future years will show whether the relationships discovered in these data hold in a national sample. Despite this, our results confirm previous research on rural practice intentions at entry to medical school. The staying rural group had higher GP intentions, replicating the finding of Jones *et al*. (2009). Perhaps the most interesting significant finding from this analysis is that rural placements are associated with significant shifts towards rural practice intentions, replicating past exploratory findings (Orpin and Gabriel 2005) with stronger methodology.

The current analysis using four groups also revealed an interesting age effect. Those staying rural are likely to be older, while the going rural group is the same age as the city groups. This suggests that age is a good entry criterion if the applicant already intends to practice rurally. However, being older doesn't make one more likely to change to more rural preferences during medical school. This will be investigated in future years as the sample size increases.

Future MSOD analyses on rural workforce and rural education initiatives will examine other factors (e.g. whether the school is metropolitan or regional) and other potential moderators of rural placement effectiveness such as the timing and length of the placement. Another example is to examine the factors associated with the going city category. The shift of one-quarter of the students towards a more urban practice intention may appear disheartening. However, there is some evidence that doctors may wish to complete vocational training in urban areas before returning to a rural/remote setting (Lee 2009) and the MSOD will track whether the going city group eventually returns to the bush.

Beyond this, the MSOD will be used to explore many other aspects of medical education and workforce planning.

Workforce succession planning can be helped by MSOD projections from entry student numbers and matching these to demand projections in areas of key shortages. For example, only 1% of commencing students intend to specialise in pathology (Gerber 2009), potentially leading to a shortage of trained pathologists in the long term.

Table 1. Entry GP practice intentions and changes in intended practice location

	Stay city		Stay rural		Going city		Going rural	
	n	%	*n*	%	*n*	%	*n*	%
No GP intention	62	93.9	4	57.4	27	90.0	8	88.9
Initial GP intention	4	6.1	3	42.9	3	10.0	1	11.1

[1]An analysis of rural clinical schools was not possible due to low frequency because only three students indicated time spent in rural clinical schools.

The MSOD will be able to assess the impact of other types of medical education initiatives. Differences between integrated and specialist placements, between regional and metropolitan schools, and between different educational philosophies can all be assessed via MSOD data.

As a final example, the MSOD can inform work on international students. An MSOD substudy is underway to explore the student experience and career trajectories of international fee-paying students.

The MSOD is a key investment in understanding the medical workforce and medical education. While tentative, our preliminary results give an early indication of the utility of the MSOD in helping to define innovations that impact on rural workforce recruitment and planning. Future analyses in coming years will see the consolidation of these findings and reveal more of the dynamics of medical education and the Australian medical workforce.

Conflicts of interest

None declared.

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AUTHOR QUERIES

1. As ‘SID’ is only used twice in the paper there is no need to define it. Also, DOB has been spelt out as date of birth. Is this OK?