ACKNOWLEDGEMENTS

Medical Deans Australia and New Zealand Inc (Medical Deans), formerly known as the Committee of Deans of Australian Medical Schools (CDAMS) is the peak body representing professional-entry medical education, training and research in Australian and New Zealand universities. Professional-entry medical education includes undergraduate and graduate-entry courses leading to an initial Bachelor’s degree. Medical Deans comprises the Deans of Australia’s current 18 medical schools and the two New Zealand schools.

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EXECUTIVE SUMMARY

This Final Report to the Department of Health and Ageing (DoHA) documents the activities and milestones achieved by the Medical Schools Outcomes Database and Longitudinal Tracking (MSOD) Project from July 2005 to June 2010. It details the successful achievements of Stage 2 of the project as defined by the principal objectives outlined in the formal Agreement and in subsequent variations to the Agreement. It also contains explanations of some of the unforeseen obstacles met in the course of Stage 2, and a set of recommendations for the ongoing operation of the Project.

In June 2005, DoHA provided funding to Medical Deans to undertake two main tasks. The first was to finalise the MSOD’s operations by implementing the data collection process at each medical school, and initiating annual reporting processes for medical schools, stakeholders and the Commonwealth. The second was to investigate the feasibility of using the MSOD and a unique identifier as the basis for a longitudinal tracking process over the medical education/training/practice continuum.

Subsequently three variations to the original Stage 2 Funding Agreement were executed, to undertake further developmental work. The Project has been successful in meeting the Stage 2 objectives and outcomes set out on pages 23 to 26 of the original Agreement as well as those indicated in the Variations.

In summary, the Project to date has:

- Implemented a landmark medical education and workforce project of national and international significance;
- Established a national process that fully engages all key interest and stakeholder groups, consolidated and overseen by Medical Deans Australia & New Zealand, an organisation independent of workforce planning and recruitment;
- Developed a nationally accepted approach across all Australian medical schools for the collection of student data;
- Obtained support for participation by students and their representative body (Australian Medical Students Association) resulting in a greater than 95% completion rate for the commencing students questionnaire;
- Attained an ethically approved process for data collection, linkage and research;
- Developed an agreed minimum data set to be adopted by all medical schools, underpinned by nationally consistent definitions for key terms and concepts;
- Maintained a stringent, robust and rich data set which includes data from the:
  - 2005 cohort (Years 1-4), 2006 cohort (Years 1-3), 2007 cohort (Year 1-2), 2008 (Year 1) Medical Schools Data;
  - 2005 and 2006 commencing cohorts Exit Questionnaire data for eight medical schools and
  - 2009 PGY 1 Questionnaire administered to the 2005 commencing cohort that graduated from medical school in 2008 and completed their internship in 2009;
- Initiated the development of a comprehensive, relational national database that can be used for evaluating Government initiatives; provide an information resource for researchers, track medical students longitudinally with the potential for linkage and adding value to developing databases for the purpose of ongoing workforce planning;
- Generated data reports and analyses to the medical schools, the Australian Government and stakeholders, that contribute to medical education research as well as provide accurate, up-to-date information for the purposes of effective long-term medical workforce planning;
- Completed a feasibility study investigating different methodological approaches to longitudinal studies, to ensure that the data collected as part of the MSOD can be of most value to workforce planning; and
• Formulated a data collection model that has the ability to be transferred to other contexts, particularly where these have the potential to impact on the Australian medical workforce, such as medical schools in New Zealand, PNG and Fiji and for tracking students in other health professions in Australia.

There has been a demonstrable high level of progress in the project to date, and the MSOD Board is pleased with the achievements so far and excited by the future potential. This landmark initiative has yielded invaluable dividends for all key stakeholders - governments, universities and professional organisations.

Most importantly, the Board acknowledges the ongoing commitment of the Deans of Australian medical schools who have taken the globally unprecedented step of working collaboratively to support the project and guarantee its successful development and implementation.

The funding provided to date by the Department has ensured that the role of the central team guiding this multi-site project was maintained in order to fulfil all its objectives and to enable progress through its developmental stages. Medical Deans is deeply appreciative, and values the support and vision of the Department and the stakeholders of this Project.
INTRODUCTION

The Medical Schools Outcomes Database (MSOD) and Longitudinal Tracking Project is the Australian Government’s main data collection tool for medical student information.

Through Medical Deans Australia and New Zealand (Medical Deans), the 18 medical schools in Australia have initiated a longitudinal process that will allow tracking of individual medical graduates throughout the education/training/practice continuum to evaluate the long-term outcomes of medical education programs and assist in medical workforce planning.

The Project was originally developed in response to a proposal by the federal Department of Health and Ageing (DoHA) five years ago to survey the effects of rural clinical schools and other rural programs on getting doctors into rural practice. Medical Deans proposed a much broader study, which the Government later backed with $250,000 in seed funding (Stage 1) and an additional $1.5 million over three and half years to continue the next stage of the project.

The objectives of the Project are to:

- Provide the Commonwealth and medical schools with an effective, reliable evaluation mechanism for assessing actual, long-term outcomes of educational programs, and in particular those aimed at increasing the recruitment and retention of a rural medical workforce;
- Provide the Commonwealth with a secure, reliable source of accurate, up-to-date data for the purposes of effective long-term medical workforce planning;
- Determine the effectiveness of various Commonwealth and university programs and interventions in influencing the career decisions of medical students;
- Promote strategic reform of medical education policy and programs at the university, State and Commonwealth levels in order to match program and policy frameworks with national health priorities; and
- Provide an information resource for research projects for Australian medical educators which will contribute to the national and international literature on medical education.

This Final Report on Stage 2 (and variations) of the MSOD Project outlines the significant achievements that have been accomplished over the last five years.

The Final Report is divided into five main sections: Achievements Against Objectives of Project and Outcomes; Difficulties in Meeting Objectives; Recommendations for Future Achievements; Financial Management; and Conclusion. The first section gives summary details of the major milestones achieved as defined by the two principal objectives in Item A in the Agreement. This section also details the administrative, developmental, consultative and networking operations of the project.

Section Two outlines unforeseen obstacles encountered during the operations of the project. Section Three provides the Board’s recommendations on the continuation of the MSOD project. The final two sections give a brief summary of the final budget position; and a summary of the MSOD project. The Board commends the Final Report to DoHA, and looks forward to continuing its collaborative work on this landmark project.

References have been made to documents which are available on the Project’s website www.medicaldeans.org.au/MSOD_Webpages
SECTION ONE: ACHIEVEMENTS AGAINST PROJECT OBJECTIVES AND OUTCOMES

The Stage Two Agreement (1 July 2005 – 28 February 2008) between Medical Deans (through The University of Sydney) and DoHA sets out two principal short term and three long term objectives for the project.

The short term objectives are to:

- Finalise the MSOD's operations, implement the data collection process at each medical school, and initiate annual reporting processes for medical schools, stakeholders and the Commonwealth.
- Investigate the feasibility of using the MSOD and a unique identifier as the basis for a longitudinal tracking process over the medical education/training/practice continuum.

The long term objectives specified are to:

- Provide medical schools and the Commonwealth with an effective, reliable mechanism for evaluating the long-term outcomes and determining the effectiveness of Commonwealth and university educational programs, particularly those aimed at addressing future medical workforce needs (rural health, areas of workforce need, Indigenous health, specialty areas, and others as they arise or are implemented);
- Provide an information resource for research projects for Australian medical educators which will contribute to the national and international literature on medical education; and
- Provide the Commonwealth with a secure, reliable source of accurate, up-to-date data for the purposes of effective long-term medical workforce planning.

There were three variations to the Stage Two Agreement.

First Variation (1 March 2008 – 31 December 2008)

The first variation\(^1\) comprised a ten month extension to the Stage Two processes, as a number of unforeseen obstacles had delayed progress in some areas of the Project. The original project time period scheduled to conclude on 28th February 2008, needed to be extended to successfully accomplish the main objectives. It was only through ongoing work on the project and by reaching certain benchmarks that previously unforeseen barriers which slowed progress had become apparent and which resulted in the need to reprioritise and further develop certain areas of the Project. The ten month extension enabled the Project to:

- Commence cleaning and release of datasets — the delay in releasing the data was due to a lack of adequate resources; prolonged development of protocols on data access and usage and implementing the complex process of the Medical Schools Data Collection;
- Consider the Feasibility Study Report findings and implement the longitudinal tracking;
- Comprehensively plan, design and pilot test an exit survey on the 2005 pilot cohort; and
- Align the timelines between the Medical Schools Support Funding Agreement\(^2\) and Stage Two Agreement to ensure the monitoring and successful outcomes of the Stage 2 objectives, and successful acquittal of the funds provided to the medical schools.

Second Variation (1 January 2009 – 31 December 2009)

The second variation was the Commonwealth’s response to a submission from Medical Deans to extend the Project. Following a series of discussions with the Department from May to June 2008 and a meeting with Minister Roxon, a recommendation was made by the Department to Medical Deans, to

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\(^1\) MSOD Management Committee (October 2007) *A Proposal for an Extension to Stage 2 Agreement*

\(^2\) MSOD Management Committee (March 2007) *Consolidating and Sustaining the MSOD Project*
submit a further 12-month funding proposal for the MSOD Project. A proposal\(^3\) was submitted to the Department which outlined the achievements of the Project since its inception and contained a workplan for the Project from 2009 to 2013 and a proposal for funding the project for a further 12 months in 2009 in order to allow the implementation of the longitudinal tracking; the ongoing collection of data at the medical school level and to conduct workforce modelling on the MSOD data. The Department approved further funding for the MSOD Project for 12 months, managing it as an extension to the Stage Two Agreement. The Department also encouraged further dialogue to plan for the financial sustainability of the MSOD Project. At the time, the Department was unable to make a longer term financial commitment.

**Third Variation (1 January 2010 – 30 June 2010)**

The third variation, a further six month extension, was initiated by the Commonwealth to further plan and operationalise the longitudinal tracking component of the Project and to align the Project’s funding cycle with the financial year model. In early 2009, Medical Deans was informed of the change in the Department’s management of the MSOD Project with responsibility shifting from the Regional Training Models Section in the Medical Education and Training Branch to the Data Analysis and Program Evaluation Section in the Workforce Development Branch. The Department considered, that as the MSOD Project moves from a developmental stage to an implementation stage, the Data Analysis & Program Evaluation Section, responsible for policy development will be better positioned to create the linkages between MSOD, National Health Workforce Agency, national registration and the rural programs managed by the Regional Training Models Section (i.e. RCS, UDRH, RUSC). The Department also indicated that it would like to change its funding cycle for the MSOD to synchronise with the financial year model. The Department secured an additional funding of six months for the Project to continue to the end of this financial year in support of the continuation of the MSOD Project.

Stage 2 (July 2005 – June 2010) has built upon the achievements of Stage 1 as well as identified and developed a longitudinal tracking process that utilises the MSOD in order to evaluate outcomes of medical education programs, assist in medical workforce planning, and to provide a national research resource.

Key outcomes have been described in the next few pages. It is to be noted that the Project’s 2009-10 funding contract ends on 30th June 2010 and that some outcomes are to be achieved over the next two months.

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\(^3\) MSOD Board (August 2008) *Project Plan 2009-2013 including Funding Proposal for 2009*
1. Developed and maintained a stringent, robust and rich national data set

1.1. Commencing Medical Students Questionnaire

From 2005 onwards, all students commencing at an Australian medical school are asked to voluntarily complete a questionnaire known as the Commencing Medical Students Questionnaire (CMSQ). The 17-item questionnaire containing demographic and career intention questions, takes approximately 15 minutes to complete. Questionnaires are administered to the students by the medical school. Completed questionnaires are returned to the MSOD Project team who arrange for scanning and cleaning of the data.

The questionnaire was piloted in 2005 at the following six medical schools: University of Sydney, University of New South Wales, University of Melbourne, Monash University, Flinders University and Griffith University. A series of focus groups were conducted with medical students at every medical school to test and improve the reliability of the questionnaire. The results from the focus groups were used to revise the questionnaire and to identify strategies to increase response rates.

The major benefits of collecting demographic and career intention data via a questionnaire are (i) to standardise the collection of data across medical schools and to maintain national definitions; (ii) to avoid the logistically complex task of connecting different data storage systems at the medical schools; and (iii) to lessen the impact on the workload of medical school staff as information will be collected directly from students. The direct survey of all commencing medical students also facilitates the process of informing students about both the project and the longitudinal tracking project, and gaining their informed consent to participate in both aspects.

The CMSQ has achieved an 88% average response rate over the last six years. Refer to Figure 1.

![Response rates for CMSQ from 2005 – 2010](image)

* The 2010 response rate is based on a preliminary field count

*Figure 1: Response rates for CMSQ from 2005 – 2010*

It has been found that paper-based questionnaires achieve better response rates than online questionnaires. For example, Australian National University’s response rate decreased by 9% when they changed from paper-based questionnaires in 2006 to an online version in 2007. The University of Sydney increased their response rates by 32% when they changed from the online questionnaire in 2006 to a paper-based version in 2007.

Copies of the 2005 to 2010 CMSQs are available on the Project’s website.
1.2. Medical Schools Data (Placements and Electives)

The Medical Schools Data is collected annually for every student who completes the CMSQ. The data is collected from medical schools between January to June (for the previous year) until completion of the students’ medical program. There are three components to the Medical Schools Data - (i) Student Records, (ii) Placements and (iii) Electives. The Student Records component captures information on the students’ annual enrolment status, movement between medical schools, rural club membership and any rural or bonded scholarships acquired since commencement of medical school. The Placements and Electives components collect information on allocated and/or chosen clinical and non-clinical placements and elective experiences, including the location, duration, type, discipline and infrastructure resourcing of the placement or elective.

Medical education studies acknowledge that the evidence for the impact of duration and location of placements on career outcomes is sporadic and inconsistent. In addition, attempts to collect clinical placement information at universities have been relatively unsuccessful previously. The MSOD Project conducted through Medical Deans involves a close working relationship with medical schools to enable collection of this information cost effectively and accurately.

The Medical Schools Data links with the CMSQ data to provide a complete portrait of the experience of medical students during medical school. Medical Schools Data is collected directly from each medical school in Australia via systems put in place under the Department’s funding to the medical schools (see Section 1.6).

The MSOD data is collected on a per student basis. Each year, medical schools are sent the student IDs of the MSOD participants and asked to provide a comprehensive, individualised account of the placements, electives and study status for each student in the previous year. These data are screened by the MSOD project team and data queries are resolved in consultation with the medical schools. The data is collected via a smart Excel document. A template of the smart Excel document is available on the Project’s website.

The Medical Schools Data items were developed in close consultation with the faculty managers of the medical schools who deal closely with students and their study experiences. A half-day workshop was conducted in 2005 to bring together the faculty managers to finalise the Medical Schools Data items. The outcome of the workshop was a revised and shortened Medical Schools Dataset which was intended to be broad enough to capture all necessary core information on clinical and rural placements, but flexible enough to accommodate the wide range of differences across medical schools vis a vis the management of those placements.

When the Medical Schools Data collection was in full operation, the complete data collected was reviewed and a number of issues were identified. These were addressed through another workshop held in 2009, specifically for the MSOD data collectors. It explored reasons for under-reporting of information on placements and electives and ways to manage the complexity and volume of data including how the process can be automated to make it easier. The workshop also provided participants an opportunity for feedback on the data templates used for collating the Medical Schools Data. Some of the other issues discussed at the workshop included the management of data on students who transfer between medical schools and those who are temporarily away from their medical course. Privacy issues, especially in regard to the collection of rural club membership and RAMUS and John Flynn scholarships were also examined with solutions identified.

At a national level, the Medical Schools Data collection has the capability to aggregate the total number of hours undertaken in placements and electives (to evaluate the benefits of short and long term placements) and to monitor the impact related to the stage during the medical program the placements are undertaken. The dataset can also identify the geographical location and setting of the placements and classify the funding source of the placement. Over time, this data can evaluate the outcomes of educational initiatives aimed at influencing career decision-making. It will provide reliable evidence for the long term educational and workforce outcomes of medical education.
programs with particular reference to addressing proactively serious gaps in medical workforce and to influence educational program development, curriculum design and evidenced based decisions on resourcing new cost-effective initiatives.

Medical Schools Data is currently available for the 2005 to 2008 calendar years. The 2009 collection is due for submission by the medical schools at the end of June 2010.

1.3. Exit Questionnaire

In the final year of the Medical Program, an Exit Questionnaire (EQ) is administered to the medical students. The 12-item questionnaire collects the following details:

- Name and state of the hospital (first preference only) of their intended internship placement;
- Name and postcode of the hospital of their internship placement allocation;
- Additional tertiary qualifications since commencing medical program;
- Overall satisfaction with medical program and preparedness for internship;
- Factors influencing most preferred type of future medical practice and repeat of some demographic and career intentions questions from the CMSQ; and
- Future contact details such as e-mail addresses and details of a relative or friend who will be able to help researchers find the participant for ongoing tracking.

The data from the EQ is vital for determining changes in career intentions that may have resulted during the training program within medical schools. It provides the information required to identify any career plans that have developed or changed since the commencement of the medical program and provides a springboard (including forward contact details) from which to longitudinally track the students after they leave medical school.

The response rates for the EQ are far more challenging to achieve as a process than the CMSQ due to the fact that medical students are frequently dispersed in their final year of medical school. Therefore, the EQ is made available as both a paper-based questionnaire and online, to provide flexibility to students.

It is important to retain high response rates to the EQ as there is anticipated attrition as participants leave medical schools and tracking becomes more challenging. The MSOD Project has developed various successful strategies to maintain high follow-up and response rates to the EQ. The first EQ was administered in 2008 to the medical students who commenced in 2005 (pilot cohort) and were enrolled in a four year medical program. Lessons were learnt from this pilot cohort to further improve response rates in future cohorts. For a report and discussion of the response and retention rates of the EQ, refer to the 2008 EQ National Data Report.

Copies of the 2008 to 2009 EQs are available on the website.

1.4. PGY1 (Intern) Questionnaire

At the end of the internship (PGY1), MSOD participants are invited to complete a PGY1 Questionnaire. The questionnaire contains the following five sections:

- Demographics;
- About your Current Situation;
- Future Medical Practice;
- Internship; and
- Future Contact Details.

The questionnaire takes five minutes to complete online.
The MSOD PGY1 Questionnaire is the only national data collection that currently has the capability to track individual students longitudinally to assess their career paths, including where they practise medicine and their readiness for practice. The data from the PGY 1 Questionnaire can inform Postgraduate Medical Councils of the internship content that needs to complement the skills and knowledge learnt during respective medical courses. The internship is a time to learn to apply these skills with increasing autonomy and responsibility in the real world. Consequently, the MSOD PGY1 Questionnaire data can also assist the Australian Medical Council with information to address the ECFMG requirements to recognise the readiness of graduates of all Australian medical schools to be eligible for U.S. residency and fellowship programs that are accredited by the Accreditation Council for Graduate Medical Education (ACGME).

The first PGY1 Questionnaire was administered in 2009/10 to participants from three of the six pilot schools which commenced in 2005. Response rates are being monitored and will be reported by 30th June 2010.

The data from the CMSQ and EQ when linked to the Medical Schools Data, provides a rich dataset on each participant ranging from demographic details and educational experiences to career intentions. By the end of 2010, the dataset will be complemented by the PGY1 Questionnaire administered to interns who completed their PGY1 in 2009/10. These interns are from the MSOD 2005 pilot cohort. For the first time, this will allow the assessment of whether intentions about career location and preference are turning into behavior.

As of February 2010, the Project is tracking approximately 12,200 medical students including bonded, rural, Indigenous and international students, John Flynn and RAMUS scholarship holders and students undertaking RUSC, RCS, UDRH placements. The MSOD database is therefore a rich and robust source of recent data for accurate workforce planning, evaluation of education initiatives and medical education research.

The data is collected at the lowest level of aggregation, thereby maintaining a building block that can be melded into higher level groupings or taxonomies over a long period of time. For example, the geographical unit (birthplace, school location etc) recorded is by postcode and hence the data can be analysed using any desired classification system. The MSOD rurality data has been unaffected by the recent move by the Commonwealth from the RRMA system to the ASGC_RA system.

1.5. Design of a complete data dictionary
The Project has designed a complete data dictionary incorporating the definitions and origins of the data items to extend the data glossary commenced in Stage 1.

The MSOD Data Dictionary is a centralised repository of information about the MSOD data items and the variables that measure the data items. The MSOD Data Dictionary holds a complete list of the MSOD data items (minimum data list) and the definitions, rationale for collection, classification and source of the variables.

The Data Dictionary provides:
- A log of agreed minimum data set and a record of all the variables used to measure the data and any changes over time;
- Data users with a single point of reference for obtaining information about the variables;
- Definitions of variables to ensure quality, integrity and validation of reported data.

The Dictionary is currently stored in an Excel format and options are being explored to transfer the data into an Access database for better accessibility and maintenance of information.

The Dictionary will be available on the Project’s website by the end of June 2010.
IT Magnet, the Project’s IT Consultancy will be completing a technical data dictionary that relates to the variables in the national database as part of its current database development.

1.6. Identifying and Addressing Medical Schools’ Resource Requirements
Discussions from the 2006 national workshop and the feedback from medical schools during the pilot collection of the Medical Schools Dataset, identified that additional resources for the implementation of the MSOD at the school level were required. In 2007, the MSOD Management Committee identified these resources as additional staffing and/or upgrade of local databases to embed and consolidate the data collection processes so that it became mainstream in the medical school. It was envisaged that it will take up to two years for this infrastructure building to evolve at the medical schools.

On 12 April 2007, the Management Committee submitted a proposal4 to DoHA recommending each Australian medical school be provided with financial assistance in the form of a grant over the following two years. These funds would be used to finance resources within their schools to fulfil the objectives of Stage 2 of the Project at the school level as well as engaging at the national level.

The Commonwealth provided a grant totalling $2,062,502.48 (GST inc.) which was divided equally amongst the 18 participating medical schools to be used to finance resources within their schools to support the nominated staff members in fulfilling the objectives of Stage 2 of the Project at the school level as well as engaging with the national network. Each medical school may now have the capacity to conduct the formative work to establish the data collections processes. During this time, the Deans have also planned for the ongoing provision of financial and administrative resources within their schools to continue support for the MSOD data collection processes beyond the two years. An analysis of the use of these funds was conducted at the end of the funding period with the medical schools – a majority of them used the funds toward upgrading their database systems containing information about clinical placements.

2. Generated data reports and analyses of the data

2.1. Data Reports
Summary data reports of each of the data collections (CMSQ, EQ and Medical Schools Data) for each cohort are provided to the medical schools and made available to the Commonwealth and the Project’s stakeholder organisations for their members. These reports are informative, whilst maintaining anonymity of students in collective data.

There are two types of data reports produced for the questionnaires – national and individual school reports. The data for the national report is largely reported as frequency tables and, where possible, follows the format previously agreed by participating medical schools and endorsed by the MSOD Management Committee.

The individual school reports are also in a frequency format and are specific to each medical school. Data for the individual school reports has been categorised into four groups: data on all undergraduate-entry medical programs; data on all graduate-entry medical programs; data for all students (both undergraduate and graduate [total]); and data for the specific medical school’s students only. The format of the individual school reports is the result of consultation with and feedback from the faculty managers of each medical school. Timely provision of reports allows opportunities for medical schools to demonstrate how the MSOD can contribute to monitoring and evaluation of their programs.

4 MSOD Management Committee (March 2007) ibid
The national data reports for the 2005 to 2009 CMSQ data will be available on the Project’s website by the end of May 2010. A data report on the Medical Schools Data collected thus far will be available on the website by the end of June 2010.

2.2. Data Access and Usage
One of the primary roles of the Project’s Research and Scientific Advisory Committee (R&SAC) was to develop the policies and procedures on data usage for research purposes, conduct of sub-studies, analyses and publication of the MSOD data. The R&SAC is also the body that is responsible for the governance of data as well as managing and updating protocols which govern data access and usage.

Mechanisms are now in place through the existing policies and protocols for access and use of MSOD data for research purposes to ensure that all specific research projects undertaken using the MSOD database are adequately justified and have the required ethics approval. Recent versions of these policy documents are on the Project’s website for easy access by potential researchers. These policies and protocols are regularly monitored and updated by the R&SAC.

A record is kept of all research projects undertaken using the MSOD data, and is available on the Project’s website. This serves as an important record of research projects undertaken using the MSOD data.

2.3. Analyses & Outputs
The R&SAC has also been responsible for processing requests for use of the data for research purposes. Over the last five years, the R&SAC has received several requests for data for minimal analysis and approved six research studies so far.

In 2007, the R&SAC proposed a Research Reference Group to bring together enthusiastic researchers who are interested in conducting research with the MSOD data or as a sub-study of the MSOD. This informal reference group was formed to generate research interest in the MSOD at the medical schools and has been used as a resource to consult for any research related issues. An e-mail list server was set up to encourage dialogue and networking amongst the members.

One of the long-term objectives of the Project is to provide a foundation for research projects, which will contribute to the national and international literature on medical education and its relation to workforce needs. As part of the 2009 MSOD Agreement, Medical Deans had agreed with the Commonwealth to establish some target research projects on the MSOD data that will contribute to national medical workforce planning. The 2009-10 MSOD budget included some seed funds to undertake these target research projects. Australian medical schools, medical students and the Project’s stakeholder organisations were invited to apply for these funds to undertake these research projects.

A complete list of all approved studies are listed on the website, including the title of the study, its progress status and abstracts (when completed).

The Project celebrated a milestone when two pioneering papers were accepted for publication in 2009. The first was a leading editorial in the Medical Journal of Australia:

Humphreys JS, Prideaux D, Beilby J, Glasgow NJ ‘From medical school to medical practice – a national tracking system to underpin planning for a sustainable medical workforce in Australia.’ Medical Journal of Australia, 191(5), pp244-245.

A second research paper was accepted by Medical Education, a leading international journal in this field. Details of the paper:

This research paper demonstrates the potential applications of the MSOD data in relation to workforce planning. The researchers modelled the independent determinants of intention to enter rural practice and also demonstrated that a predictive index of intention to enter rural practice can be created and monitored over time.

More recently, a third paper has been published in the *Australian Journal of Primary Health*:


This paper explores the potential impact of the MSOD on understanding changes in rural practice intentions by using data from the 2005 pilot cohort. The linked CMSQ, EQ and Medical Schools Data records from the 2005 pilot cohort were used to conduct a longitudinal analysis of rural practice intentions.

Copies of these articles are at Appendices A, B and C.

Medical schools and MSOD’s stakeholder organisations have been interested in using the MSOD data for analyses targeted to their organisation needs. In addition to the analyses being conducted through the Project grants described above, the following is a list of other analyses of the MSOD data:

- **FRAME RCS Evaluation** – The first substudy to be approved by the R&SAC is the FRAME’s (Federation of Rural Australian Medical Education) Rural Clinical Schools Evaluation.

- **Clinical Placements Report** – This report will provide valuable information in understanding clinical placements in Australia and may inform the work of the Health Workforce Agency’s (HWA) and in planning clinical placement reforms and developing appropriate policy and inform medical schools in developing training reforms consistent with strategies defined to address medical education and workforce initiatives. This report will be completed by the end of May and made available on the Project’s website.

- **A Longitudinal Study of the Effectiveness of Rural Education Experiences in Modifying Rural Practice Intentions** – This paper will present the first assessment of the impact of RUSC initiatives on modifying student intentions to practice in rural locations. The research and analyses is in progress and will be submitted to a peer-reviewed journal for publication shortly.

- **Factors Influencing Generalist Intention across Medical School Years** – This paper examines the factors associated with change in general practice intentions using data from the 2005 commencing cohort. The research and analyses is in progress and will also be submitted to a peer-reviewed journal for publication shortly.

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The Federation of Rural Australian Medical Educators (FRAME) has developed a common national questionnaire to evaluate student perceptions about the Australian Rural Clinical Schools Program (RCS). The questionnaire is administered to students in their final year of study at medical school and contains all items from the MSOD Commencing Medical Students Questionnaire in addition to evaluation questions on the RCS. The FRAME RCS Questionnaire was piloted in 2005 with final year medical students. Cohorts that completed the FRAME RCS Questionnaire in 2005, 2006 and 2007 do not overlap with the cohorts that the MSOD Project is tracking. However, those students enrolled in a four year medical program who completed the 2005 MSOD Commencing Medical Students Questionnaire will be in their final year of studies in 2008. This cohort will also be approached by FRAME to complete the FRAME RCS Questionnaire at the end of 2008. Hence there will be an overlap. The R&SAC has approved an application from FRAME that from 2008 onwards, a collaborative process between MSOD and FRAME is undertaken to avoid duplication in processes and the consequent questionnaire fatigue amongst medical students which could impact on the response rates of both studies. The FRAME study is conducted as a sub study of the MSOD where the MSOD project team and the FRAME researchers agree to the questionnaire data items that will be linked.
3. Designed and developed a comprehensive, relational national database

3.1. IT Consultancy
Monash University was contracted to undertake the IT Consultancy and Development for Stage 2 of the MSOD Project. This engagement built upon Monash’s original contract, following an EOI process, to provide IT Consultancy Services to Stage 1 of the Project (2004-2006).

Consequently, IT Magnet has been contracted to further develop a database that is relational and that will enable automated systems for cleaning and linking datasets.

3.2. National Database
The MSOD database developed by Monash was a central repository system for data collected from the CMSQ. In July 2009, the Data Management & Analysis Centre (DMAC) based at The University of Adelaide was engaged to assess the current and future needs of the MSOD Project, and based on this assessment to prepare a specifications paper. A Report on the current and future requirements of the MSOD database was provided to the MSOD Project Board for consideration.

Recommendations included the need to enhance the database to meet the increasing scale and scope of the data collection. Currently a manual process is used to link the questionnaire datasets to the Medical Schools Dataset and linking between the years for the latter. DMAC recommended that to manage a dataset of increasing size and complexity over a long period of time requires that the current database is further developed into a relational database management system. This will enable automated systems for cleaning and linking datasets. The Report also strongly recommended that adequate Information and Communications Technology (ICT) skills and resources are put in place to support the current system and to ensure the long term viability of the MSOD.

Based on DMAC’s recommendations, the Board explored options to implement a relational database. It determined that an external IT company be subcontracted for the task. Approval for the subcontract was sought from the Department. IT Magnet has been sub-contracted to (i) implement a relational database to support more effectively and with data integrity all versions of the hard-copy and on-line questionnaires and medical schools’ data to enable end users to link and download data sets; (ii) provide facilities for the input, storage and tracking of the relationship between raw and cleaned data and facilities that will improve data cleaning efficiency and to (iii) provide a data dictionary and user documentation. The relational database is scheduled for completion at the end of June 2010 with migration of existing data to occur at the same time.

A proposed Data Collectors Workshop is to be held in July to provide training and demonstration of the new processes for submitting the Medical Schools Dataset, using the upgraded MSOD National Relational Database. The Department has approved the remaining interest of the Medical Schools Support Funds of $26,846.89 to conduct this workshop.

3.3. Data Security, Ownership, Access, Privacy and Confidentiality
National and state-based privacy legislation has been taken into consideration during the design of the database. The database design has taken security considerations into account by establishing different types and levels of user access. Access to the complete records in the national database will be restricted to nominated MSOD Project team members (at this stage the MSOD Data Manager). The nominated medical school staff will have access to the data for their school only, for the purposes of annual data uploads. This overall approach will preserve the confidentiality of students’ information.

Other measures that will be taken to assure data security include the provision for the data to be transferred between the system and the users (i.e. Project staff and medical schools) using a secure encrypted communications protocol (HTTPS). The database will also be built behind a firewall, rendering it inaccessible outside of the IT Magnet network for the time it is hosted by IT Magnet.
4. Attained an ethically approved process for data collection, linkage and research

All research projects with human participants must comply with a set of stated values and principles and require ethics clearance; the protection of participants is considered paramount. It is necessary that the MSOD Project ensures that the process of data collection, storage, linkage, research and analysis comply with these values and principles and that the highest standards are applied.

4.1. Initial Ethics Application

Since its inception, the MSOD Project has been required to ensure that all participants have been asked for their consent to data collection during medical school.

In late 2005, ethics applications were prepared at each of the medical schools prior to the administration of the 2006 CMSQ. Student information sheets and consent forms were developed at the same time for ethics approval. Templates for an ethics application form, information sheet and consent form were prepared by the MSOD Project Manager for medical schools to use in preparation for their submissions to their ethics committees. Medical School staff reported that these templates were useful and facilitated the preparation of their ethics applications. Ethics applications were submitted to their respective Human Research Ethics Committees (HRECs).

Ethics application processes were standard across the medical schools but the outcomes varied slightly. Some medical schools initially received conditional approval and were required to submit amendments and/or clarifications. Amendments were in relation to the wording of the Information Sheet and Consent Form. Clarification was requested with regard to confidentiality of students and access of data. There was an exceptional request from the ethics committee at one medical school, for the Project to prepare and provide an institutional (medical school) participant information sheet and consent form. The length of time for which each medical school had received approval and the regularity of reporting requirements differed between HRECs.

For all medical students who completed a CMSQ between 2005 to 2008, their consent was sought for the collection of data using the CMSQ, the EQ, and the Medical Schools Data collection.

4.2. Ethical Clearance for a Longitudinal Study (cohorts 2005-2008)

Consent for longitudinal tracking beyond medical school is required from all participants in cohorts who commenced between 2005 and 2008. An ethics modification is submitted to each HREC requesting approval to seek this consent from participants. This modification is only necessary once, that is, when the first cohort at each university reaches their final year. The required ethics modification allowing longitudinal tracking must be obtained in a timely manner to allow these students to be asked for their consent as they complete the EQ.

Students in their final year are asked for their consent to longitudinal tracking, to prospective data linkage, and to provide a means of maintaining contact after they graduated from medical school.

At the same time students are asked for their prospective consent for future linkage with the Medical Register, and for consent to accessing additional data sources for tracking those participants who leave medical practice of their own volition or become lost to follow up.

4.3. Streamlining the Core Ethics Application

Since the MSOD Project commenced, each of the medical schools across Australia has obtained separate ethical clearance through their own HRECs. A simpler process using the National Ethics Application Form (NEAF) was initiated during 2008. The NEAF application applies to all cohorts commencing from 2009 onwards.

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6 NMHRC (2007), *Challenging Ethical Issues in Contemporary Research on Human Beings*
The NEAF was a new initiative for obtaining ethics approval for multi-centre studies, cosponsored by the NHMRC, the Australian Research Council and the Australian Vice Chancellors’ Committee. Advantages in using the NEAF application were that:

- It allowed the preparation of a joint ethics application across all the universities which accept NEAF applications;
- Being web-based, it facilitated coordination across medical schools, particularly for undertaking the review process;
- NEAF was accepted by the majority of universities; 12 HRECs accepted it outright; five more agreed to accept the form for the sake of consistency with the majority; and only two refused to accept a NEAF application; and
- An improved version (NEAF version 2) was released in June/July 2008, thus allowing adequate time for the joint application to be prepared, submitted, approved in time to be used for the 2009 commencing students.

In preparing the application, the Dean was identified as the Chief Investigator, and a senior medical education researcher nominated as the Principal Investigator and key contact person for each research site (i.e. medical school).

The joint application allows students from 2009 onwards to be invited to consent to both data collection during Medical School and to longitudinal tracking after graduation.

The joint application will simplify the approval process for any future required ethics modification to the Project. It should be noted that the length of time for which each medical school has received approval and the regularity of reporting requirements differ between HRECs. A progress report is prepared by the Project team to be made available to each Principal Investigator.

The two medical schools whose university HRECs did not accept NEAF were provided with the completed NEAF application and attachments to assist them in preparing their own ethics application, and both received approval.

4.4. Identified Ethics Coordinator

It is evident that the development and coordination of a joint ethics application requires central coordination by someone experienced in working with ethics applications and committees. For the NEAF application, this role was assumed by the then Senior Research Academic. Since then, the MSOD Statistician has taken on this role. It is recommended that this role of ethics coordinator for the Project is maintained in the future. The role will also include liaising with the nominated ethics person at each medical school. A contact list of the nominated staff is maintained by the Project.

The nominated staff member at each medical school is responsible for coordinating the ethics process at their medical school. Their duties also include liaising with the Project’s ethics coordinator in relation to ethics applications; preparing and submitting ethics applications; liaising with the local ethics office and responding to requests of amendments, annual reports, etc.

A modification to the NEAF application will be required, by which the name of the Principal Investigator and Primary Contact Person is replaced by the nominated ethics coordinator. All participating medical school HRECs will require formal notification of the change.

The Project is also planning for further streamlining of its ethics process by undertaking the HoMER (Harmonisation of Multi-centre Ethical Review) process (see Section Three).

In 2006, the Australian Health Ministers Advisory Council (AHMAC) requested the National Health and Medical Research Council (NHMRC) to facilitate the development and implementation of a national system where the single ethical review of a Human Research Ethics Committee (HREC) would be recognised by all institutions participating in a collaborative research project. The system known as HoMER, will be available from September 2010.
5. **Established a national network**

The Project has brought together key stakeholder organisations from across the medical education/training/practice continuum, including student, postgraduate education and training, rural and indigenous health, and workforce planning organisations, thus representing collaboration between education and health. It is highly commendable that medical schools, traditionally rivals, can demonstrate their collaboration in establishing a Project which can benefit all schools. Only Medical Deans Australia and New Zealand are in a position to ensure that this collaboration continues, and remain the only feasible option to auspice the Project.

Consultation with a wide range of people and organisations is an essential part of the Project’s development and successful implementation. The medical schools and the stakeholders together have formed the core of a national network that has facilitated information-sharing, cross-fertilisation of ideas, and practical support in the implementation and operation of this project.

**Medical Schools**

The individual medical schools have been instrumental in the success of the collection of the data which includes the promotion, distribution and collection of the CMSQ and EQ; the collation of the Medical Schools Data and ensuring the accuracy of all data. The one-off funding provided to the medical schools by the Commonwealth has been crucial for the establishment of processes and information technology resources and the maintenance of the quality assurance process built into the Project.

A core national network of medical school or faculty staff was established in 2006 which was responsible for the coordination and administration of the MSOD data collection processes within each school. This network of staff has facilitated practical support and information-sharing in the implementation and operation of the MSOD data collection processes at the school level. There are three areas of responsibility that staff are assigned to: (i) administration of the CMSQ, EQ and PGY1Q; (ii) collation of the Medical Schools Data and (iii) ethics application and correspondence with HRECs.

**Stakeholder Advisory Committee**

The Project has continued to engage its stakeholders through the Stakeholder Advisory Committee, which is an advisory sub-committee to provide advice and recommendations to the Board on the project. Organisational members include:

- Commonwealth Department of Health & Ageing (DoHA);
- National Health Workforce Taskforce (NHWT)/ Health Workforce Australia (HWA);
- Confederation of Postgraduate Medical Education Councils (CPMEC);
- Federation of Rural Australian Medical Educators (FRAME);
- Rural Undergraduate Support & Coordination (RUSC);
- Australian Medical Students Association (AMSA);
- Australian Rural Health & Education Network (ARHEN);
- National Rural Health Students Network (NRHSN);
- Australian Indigenous Doctors Association (AIDA); and
- Australian Medical Association Doctors In Training (AMA DIT);

It is recommended that communication and links with these groups continue to strengthen, to assist the Project to address issues across the education/training/practice continuum and for these organisations to utilise the MSOD data for their own purposes.
National Workshops
The Project has conducted five national workshops. The aim of the national workshops is twofold. Firstly it has served as a platform for planning, contributing and seeking feedback on the developmental aspects of the Project including the minimum dataset, longitudinal tracking and research and analyses. Secondly, the workshops have been an opportunity to present and share good practices.

Invited keynote speakers have included

- Professor Howard Rabinowitz, Professor of Family Medicine and Director of the Physician Shortage Area Program at Thomas Jefferson University in Philadelphia;
- Mr Robert Wells, Director of the Menzies Centre for Health Policy and Executive Director of the College of Medicine and Health Sciences at The Australian National University, Canberra;
- Professor Andrew Coats erstwhile Deputy Vice Chancellor (Community) and Dean of the Medical School at The University of Sydney;
- Mr Edward S. Salsberg, Senior Associate Vice President and Director, Centre for Workforce Studies, Association of American Medical Colleges (AAMC), Washington DC. The Centre was established in early 2004 to conduct and promote studies to inform the medical education community, policy makers and the public as to the nation’s current and future physician workforce needs;
- Professor Paul Worley, Dean of the School of Medicine at Flinders University; and
- Ms Susanne Le Boutillier, Transitional CEO, Clinical Education and Training Queensland at Queensland Health.

Keynote presentations and proceedings can be found on the Project’s website.
6. Overall design image for the Project – website, logo, newsletters

The Project has promoted and developed its profile specifically through the design of a logo, production of newsletters and website, presentations at relevant workshops and conferences and interaction with the media and government.

Logo
In 2005 a logo was designed and consequently used in letter and document templates including questionnaires, newsletters and public presentations. The logo helped build the identity of the Project by representing its profile and nature. It was crucial for the participants to readily identify with the Project.

Newsletters
Biannually, the Project produces a newsletter for medical students, stakeholders and medical schools. The newsletter describes current project events and features recent findings from the MSOD data. The newsletter is an effective tool to maintain communication with the participants of the Project and to facilitate awareness of the Project. It describes current project events and features recent findings from the MSOD data. The Project produces two editions per year. All copies are available on the website.

Website
The initial plan for the Project was to develop an independent website. A domain name for the project was registered www.msod.org.au. The Board later recommended that the MSOD Project webpages be incorporated into the Medical Deans website for better identification of the Project and this has been implemented. Medical Deans’ website is currently being upgraded and the new-look site with expanded functionality is expected to be launched at the end of May 2010.

Media releases
Interest in the MSOD Project has also been generated by the media. In 2005, a headline article on the MSOD was featured in the Higher Education Section of The Australian (see Appendix D). The article highlighted the fact that data from the MSOD will be stored in a vast database and used to inform government policy, directions in medical education and research into workforce trends.

The second issue of the newsletter which contained information and data on the increasing interest amongst commencing medical students in pursuing a generalist career generated considerable interest and resulted in a series of media interviews with the Chair of the Board.

Conferences and Workshops
Conference papers and invited meeting presentations have further facilitated awareness of the MSOD Project. Presentations in the earlier part of the Project were informative and had a methodological approach to the use of the collected data for future medical education outcome research. Since the availability of cleaned datasets, the presentations have involved more sophisticated analyses of the data with specific workforce related outcomes. These presentations were prepared by the MSOD Statistician in conjunction with the R&SAC.
7. **Longitudinal Tracking**

7.1 **Feasibility Study**

The feasibility study was completed in 2008 and investigated different methodological approaches to longitudinal studies, to ensure that the data collected as part of the MSOD can be of most value to workforce planning. After consultation with stakeholders, it was apparent that the most efficient, cost-effective and non-intrusive approach is to combine repeat questionnaire surveys in early postgraduate years with, preferably, data linkage with a national registration database. It was proposed that surveys will be sent to participants at one, three and five years after completing their basic medical studies to enable the tracking of graduates through prevocational and vocational training. This is a key time at which career choice is often made. The Feasibility Study Report\(^7\) and Supplementary Report\(^8\) are available on the Project’s website.

7.2 **Capacity for Data Linkage**

The National Registration and Accreditation Scheme provides an excellent opportunity to link, where appropriate, information gathered by the MSOD Project.

Discussions between Medical Deans and NHWT/HWA have identified a number of areas where the potential linkage between the two databases could add significant value to workforce planning. These include the linkage between (i) the National Registration Database and MSOD Database to locate participants beyond PGY 1 and (ii) the MSOD data on clinical placements with the HWA’s Clinical Placements Management System.

\(^7\) Craig P (July 2008) *The MSOD Feasibility Study Report*
\(^8\) Craig P (January 2009) *The MSOD Feasibility Study Report: Supplement*
SECTION TWO: DIFFICULTIES IN MEETING OBJECTIVES

While there have been many noteworthy accomplishments, there were a number of difficulties that made some aspects of the MSOD Project over the last five years particularly challenging. The following summarises the key areas of difficulty and how they have been overcome.

1. Short Term Funding Cycles – At its simplest level, the major difficulty in achieving all the objectives has been the short timeframes of each funding cycle since 2008. The challenges inherent in a project of this size and scope only became apparent when the project was formally under way. Short term funding can add to the burden of overseeing the project, especially with recruitment of project staff, budgeting and planning long term. Employment in short term projects is seen as work experience to gain more secure employment. Extra work involves the induction of staff, on the job training, evaluation, supervision and developing the project. There are inefficiencies and lost time in dealing with short term funding arrangements, the constant search for funds – applying and re-applying – and then establishing support infrastructure around projects. This results in stress for staff and committees generally.

The Project has dealt with these issues by developing a plan and evaluation process to re-negotiate delays or difficulties in the project and by building in support for the Project through the establishment of committees and working groups.

2. Medical Schools Data: The finalisation of the Medical Schools Dataset (i.e. placements, electives) proved to be a more complex and delicate process than originally envisaged and required extensive, ongoing communication with a wide range of key stakeholders. This required a longer than expected consultation, discussion and feedback process with the medical schools as well as having to consider recommendations made by researchers in the area of medical students’ outcomes. As a result, the Medical Schools Dataset underwent a number of changes (additions, deletions and terminology changes).

Another major challenge for the Project was to implement the Medical Schools Data collection process at every medical school. This very important phase in the process entails the collection of placement and electives data items at the medical schools followed by the seamless link with the demographic and career intentions data collected via the CMSQ and EQ.

The Australian medical deans have continually recognised and acknowledged that in order to get the MSOD data collection processes off the ground in the first few years would involve some work to establish, modify or improve internal processes within their medical schools. Deans are aware that in some instances they will have to take steps to bring their data collection processes into line with the requirements of the national database. The Deans expressed a willingness to invest in this workload because they appreciate the value of the MSOD preparing for them a central resource that will give them the opportunity to be able to build upon and to streamline the data collection processes within their medical school, which could eventually minimise workload for staff in the long run. For the national dataset to be standardised, due consideration needed to be given to difficulties for Australian medical schools to incorporate the MSOD processes into their varied core business and funding.

The Project’s Management Committee at the time concluded that the successful embedding of the MSOD data collection processes at the school level will ensure the sustainability of the Project in the long run. The Committee proposed that financial support be given to Australian medical schools to incorporate the MSOD processes into their core business and funding. However, some continued resourcing will ensure long term sustainability.
The one-off funding provided to the medical schools by the Commonwealth (see reference above) helped achieve these outcomes and was crucial for the establishment of staff, processes, information technology resources and the maintenance of the quality assurance process built into the Project.

3. Delay In Data Outputs - Delay in releasing the data for analysis and data reports was due to a number of factors including a lack of resources and processes for cleaning the datasets; slow rate of development of protocols on data access and usage and implementing the complex process of the Medical Schools Data Collection. The ten month extension (Stage 2, Variation 1) was useful in providing more time and financial resources for cleaning the datasets and generating the data reports.

4. Longitudinal Tracking – The longitudinal tracking phase of the Project has been developed through the Feasibility Study and subsequent evaluation of the recommendations and valuable discussion and plans have now been made for its implementation. However, its implementation has been on hold related to the outcome of several national data collection initiatives. The National Registration & Accreditation Scheme (NRAS) was still in its infancy stage and plans for MSOD longitudinal tracking could not be confirmed through this process. While there are few precedents for data linkage to a national registration database, it is preferred as the most practical and innovative method for providing outcome data for the Project. Whilst the first step of the longitudinal tracking has proceeded with the implementation of the 2009 PGY1 Questionnaire, MSOD intends to work with the relevant bodies over the next 12 months to manage linkages with the national registration databases for longitudinal tracking. However, in the likely absence of fully operating data collections through NRAS and HWA, the Project will develop and administer the first PGY3 Questionnaire and begin work on the development of the concluding tracking process, PGY5 as its participants advance through the prevocational stages, if needed.

5. Database – The establishment of the Project’s national database did not progress during the Stage 2 funding period as quickly as desired due to a number of difficulties, which were largely unforeseen at the time of entering the Stage 2 contract. As the Project developed during Stage 2, some of the initial requirements and deliverables for the national database identified at the end of Stage 1 had changed to address strategic developments. In addition, the Medical Schools Dataset format was still being developed and the collection at the schools was progressing more slowly than expected due to inadequate resources.

Monash TSG also required additional time to become familiar with the comprehensive requirements of the Project. Database software was delivered by Monash TSG at the end of the contract period. At that time the Board determined it appropriate for an independent analysis of the current and future data management needs of the MSOD to be considered. This analysis undertaken by DMAC made a number of recommendations in relation to data collection and storage; ability to clean and link datasets and the need for a functioning relational database for the Project. In this context, the package delivered by Monash TSG was not deemed sufficient to meet the current and future needs of the Project. IT Magnet was then contracted to further develop the database so that it will be relational and better enable automated systems for cleaning and linking datasets.
SECTION THREE: RECOMMENDATIONS

The MSOD Board recommends the following strategies for the next phase of the MSOD project:

1. **Ongoing Long Term Funding**: It is recommended that the MSOD Project is financially supported for the ongoing collection of data at the medical school level and at PGY1 level and to conduct relevant analyses on the data. As the Department is aware, it has taken considerable time and effort to develop the commitment and enthusiasm for the Project within each medical school and stakeholder organisation. This goodwill and co-operation augurs well for the continued success of this project and the invaluable resource the Project’s collection has become to medical workforce planning in Australia. The momentum garnered and the corporate knowledge developed must be preserved and nurtured. A 12 month proposal⁹ was recently submitted to the Department for consideration and approval.

Medical Deans also wishes to discuss and establish a longer term commitment with the Department to deal with the challenges described in point 1 of Section 4. It is Medical Deans’s understanding that the Department will continue to support the collection of data at the primary medical degree level. Hence, on this basis, the commitment to funding the core collection can be made a longer term one.

2. **Continuation of the PGY1 Questionnaire** – In late 2009, the first PGY1 Questionnaire was administered to the medical students from three medical schools - Griffith, Flinders and Sydney, one year after their graduation. The 2009 PGY1 Q was available online and response rates have been lower than expected. In an attempt to increase response rates, CPMEC and the state based PMCs were engaged to promote the PGY1 Q to interns. The response from the interns has been positive and the response rates have risen. Further strategies are being employed to follow up on those who have not yet completed a questionnaire. One such strategy is to contact the participants individually via mobile phone and/or email to complete the questionnaire.

The 2009 PGY1 Questionnaire process has been a valuable learning experience. The 2010 PGY1 Questionnaire process will continue to engage with the PMCs to administer the questionnaire but will attempt a new strategy of administering a paper based version of the questionnaire as early as possible to allow time for follow-up and reminders. Paper-based questionnaires elicit better response rates. Specific events held for PGY1s, will also be identified to provide an opportunity for the PGY1 Questionnaire to be administered face to face.

The MSOD PGY1 Questionnaire is the only national data collection currently that has the capability to track each Australian and New Zealand student longitudinally to assess their career paths including where they practise medicine and their readiness for practice. The Board recommends that the administration of this questionnaire is maintained until a more robust system or process is in place to track interns. Given that there is a national curriculum for internship training (PGY years) and that there is considerable movement of interns during the prevocational years, there are advantages in implementing a national database that could monitor movement of interns; evaluate the training received in PGY 1 to 3 and provide MSOD an opportunity for linkage and to follow up on the participants.

⁹ MSOD Board (March 2010) MSOD Workplan 2010-12 including Funding Proposal for 2010-11
3. **Longitudinal Tracking** – It is recommended that the Project continues to plan for the tracking of medical graduates as they progress through the postgraduate training years (PGY 3 and 5). The package of demographic, undergraduate and intern experience is unique in providing a complete set of variables that may influence workforce outcomes. Medical Deans is cognisant of the significant Commonwealth initiatives in health workforce that will be operationalised over the next two year period, including the National Registration and Accreditation Scheme and HWA’s Clinical Placements Management System. Refer to Appendix E. Acknowledging that there is a significant time lag with the full operation of these national data collection initiatives, the Board recommends that the MSOD project is maintained in its entirety until those systems are firmly established and appropriate linkages are defined. In the longer term the Medical Deans envisages significant collaboration and linkage with the data collections developed through these initiatives.

4. **Collaboration between Health Workforce Australia and MSOD** – The Board proposes to work with HWA to streamline the collection of clinical placements data on medical students, to minimise workload for medical schools and to increase efficiency and accuracy of data collection. From 2010 onwards, the HWA’s Clinical Placements Application Project will require education providers to supply data on clinical placement activity for every student enrolled in the medical, nursing, dental and allied health disciplines which will be validated by placement providers in order to release clinical placement funding. This process will involve identification and agreement of a minimum dataset; standardisation of data definitions and the development of a central IT system to store records of clinical placement activity. Whilst the guiding principle behind the HWA collection is to simplify and to reduce administrative burden, there are lessons to be learnt from the MSOD Medical Schools Data collection process, which has been developed over the last five years. The timelines and necessary resources required to embed these data collection processes must not be underestimated. Funding provided to the medical schools for the MSOD process has been crucial for the establishment of staff, processes, information technology resources and the maintenance of the quality assurance process built into the Project. Medical Deans recommends that these issues are seriously considered and addressed as a priority by HWA.

In August 2009, the MSOD Board and NHWT met to consider strategies to minimise overlap and duplication of collection of data at the national level. The proposed NHWT dataset on the demand and capacity for clinical training was matched with the MSOD Medical Schools Dataset and some areas of overlap were identified. It was acknowledged that the MSOD Medical Schools Data collection with its robust collection of placement and electives data over the last five years can inform and guide the NHWT’s proposed clinical training dataset and collection process. It was agreed that the MSOD needed to maintain this data collection role at least until the NHWT’s Clinical Training Database Management System architecture is bedded down at the national level, which would be at least another two years and the differences in the variables measured were clarified.

5. **Further streamlining of ethics approval with HoMER** – Whilst the NEAF has streamlined the MSOD ethics process, the practice of seeking an ethical review from each institution participating in this multi-site project has meant that multiple ethical reviews are still being carried out for the one research proposal. This ‘multiple ethical review’ is often a time-consuming process for the collaborating investigators. Responses from each of the reviewing HRECs must be coordinated and communicated with multiple HREC administrators. HoMER (as described in Section 4.4) provides an opportunity to further streamline the ethics process with a single ethics process. A single ethical review removes unnecessary duplication in the ethical review of a given research proposal. Single ethical review separates the roles of the Coordinating Investigator (CI) and the Principal Investigators (PI) in relation to the ethical review process, and the institutions’ research governance processes. The CI then provides the outcome of the single ethical review to the PI at each participating institution, thus creating more efficiency. The Board proposes that the HoMER process is undertaken for the MSOD in late 2010 when the HoMER tools are available. This will remove the need to monitor varying length of time for which each medical school has received approval and the regularity of reporting requirements which differ between HRECs.
SECTION FOUR: FINANCIAL MANAGEMENT

The MSOD Board and Medical Deans express their thanks for the project funding provided by the Commonwealth. The investment has ensured that the role of the central team guiding this multi-site project was maintained in order to fulfil all its objectives and to enable progress through its developmental stages.

Regular financial statements have been provided to the Department with the Progress Reports.

At the end of the Project period 30th June 2010, an audit will be conducted and a report will be submitted to the Department in accordance with the Funding Agreement.

The Board has submitted a 12 month funding proposal to the Department for consideration. The new Agreement will be contracted with Medical Deans, now an incorporated body, instead of the University of Sydney.
SECTION FIVE: CONCLUSION

It is difficult in a report of this format to do justice to the significance of the exciting outcomes achieved over the last five years of this project.

A number of milestones have been achieved during the Project’s developmental stages including the establishment of a national data set and collection process. As well as continuing core data collection of future cohorts, it now enters a new phase of implementation. The Project has focussed on outputs from the data through analysis of the longitudinal data. Linking the internal MSOD longitudinal datasets will be a priority over the next twelve months as the complete dataset on the second cohort that participated in the CMSQ becomes available. There will be a complete dataset on students from eight medical schools who completed a CMSQ from 2005 to 2006. The dataset will include data from the CMSQ, Medical Schools Data, EQ and PGY1 Questionnaire. This longitudinal data from a now committed cohort of participants, far superior to any snapshot from cross-sectional analyses, is unique and irreplaceable and provides excellent value for the investment already made. Analyses will be able to answer pertinent questions on career intentions, the effect of clinical placements on career choices and the demand on internships places.

A project like this is the cumulative effort of many minds. The MSOD Board would like to express its grateful thanks to the following people for their contributions to development of this Project:

- The individual members of the Board (previous Management Committee and Steering Committee) and the Research & Scientific Advisory Committee, both past and present, have given of their time, wisdom, expertise and advice in developing, steering and overseeing the project. Their excellent contributions should be applauded. Refer to Appendix F for the governance structure for the Project and members of the committees.

- The consistent and ongoing support of the Deans, staff and students of Australia’s medical schools has guaranteed the success of the project so far. Many staff and students have been an enormously important source of valuable insight and advice over the years. In particular, the Board wishes to thank the medical school Deans for continuing to support, encourage and believe in the importance of this project both for their own institutions and for medical education more broadly. The collegial and collaborative approach of the Deans to this groundbreaking project is to be highly commended.

- Dr Deborah Loxton and Dr Anne Young from the Australian Longitudinal Study of Women’s Health in Australia (Women’s Health Australia) who have been an invaluable source of advice and practical support in conducting longitudinal studies. The WHA’s established protocols and requirements on data usage and studies have served as a valuable model for the Project.

- The nine stakeholder organisations of the Project that have contributed to the development of the Project through the Stakeholder Advisory Committee, R&SAC and participation at the national workshops. In particular, AMSA has been instrumental in ensuring that the MSOD Project is promoted with commencing medical students through their annual national tours.

- Finally, we sincerely thank the Department of Health & Ageing and its staff for the high quality advice, feedback and efficient support we have received during the implementation and development of this Project. In particular, Mr David Meredith, Mr Tony Podpera and more recently Ms Suzy Saw. The commitment of these staff is deeply appreciated and valued. We look forward to working together to further the achievements of this remarkable Project in future.
LIST OF APPENDICES

A. MJA Article- From medical school to medical practice: a national tracking system to underpin planning for a sustainable medical workforce in Australasia

B. Medical Education Article - Predicting medical students’ intentions to take up rural practice after graduation

C. Australian Journal of Primary Health Article - Driving change in rural workforce planning: the Medical Schools Outcomes Database

D. The Australian Newspaper Article – World's First Mapping of Medicos

E. MSOD and Interrelationship with other National Medical Data Collections

F. 2010 MSOD Project Governance Arrangement
Editorials

From medical school to medical practice: a national tracking system to underpin planning for a sustainable medical workforce in Australasia

John S Humphreys, David Frideres, Justin J Bellby and Nicholas J Glasgow

To provide the ongoing robust evidence needed for workforce planning, a national longitudinal study will itself need to be sustained into the future.

Globally, medical workforce shortages and maldistribution are major impediments to providing accessible, sustainable and safe health care. Strategic medical workforce planning is essential for resolving this problem. This requires up-to-date, robust data to predict future trends and, most importantly, give sound insights into the underlying determinants of workforce patterns and choices in workforce participation. Many countries have sought to develop appropriate medical workforce data collection mechanisms for tracking practitioners from graduation through employment, with varying degrees of success. Rural medical workforce shortages have been the impetus for several of these collections. Experience from these highlights the importance of comprehensive, systematic and ongoing quantitative data collection, and the value of establishing a minimum data collection system from the outset of a medical education program.

In Australia and New Zealand, a small number of cross-sectional workforce studies have been undertaken in the past. A major limitation in using the disparate research outcomes of these is the lack of connection between studies of students, current practitioners and past practitioners. Evaluations of government health workforce initiatives in Australia and New Zealand further emphasise the need for a uniform data collection methodology as the basis for tracking the progress of students throughout their training program and beyond.

All of these approaches highlight the fundamental problem—a series of cross-sectional studies and evaluations “stitched together” to answer workforce questions will always provide less robust evidence than a well conducted, purpose-built, ongoing study. Sound medical workforce planning requires longitudinal data. Responding to this need, the Medical Deans Australia and New Zealand (MDANZ) established the Medical Schools Outcomes Database (MSOD) and Longitudinal Tracking Project in 2005. This project collects reliable demographic and educational data about medical students across all Australian and New Zealand medical schools.

To date, data have been collected on at least 11,200 medical students in Australia over 5 years of their training. Using an agreed national minimum dataset based on consistent definitions, the project targets critical times of medical career decision making—at the commencement of, and exit from, medical school; during the intern year; and during postgraduate training. Demographic information and data on vocational and practice location intentions are collected from surveys of students commencing medical school. Data obtained directly from the medical schools provide information on the nature of the students’ education and clinical experiences; for example, the length and nature of rural exposure, or membership of rural health clubs. Exit surveys of students again collect demographic data, vocational and practice location intentions, data on factors influencing career choices, and future contact details.

Initial results from the MSOD show that length of residence in a rural area, specialist practice intention, and financially supported study (but not a bonded arrangement) are the strongest predictors of intention to take up rural medical practice. In addition, changing trends towards intended take-up of specialties are apparent—for example, a steadily increasing proportion of students intending to take up general practice was apparent between 2005 and 2008. In short, excellent data now exist to benchmark the impact of medical education and training activities. Success for this project requires more than a strong interest in evaluative medical education research. Other important catalysts have included champions (leading medical education researchers and medical school deans), resources (national funding provided by the Australian Government), a mandate (national suspending by MDANZ to ensure comprehensive collection of relevant data), and timing (eg, to assess the impact and effectiveness of specific Rural Undergraduate Support and Coordination program funding designed to increase the numbers of students taking up rural practice). Importantly, the process for establishing the MSOD drew on international expertise to identify possible pitfalls and to help realise its potential. Professor Howard Rabowicz, a rural workforce expert in the United States who played a leading role in a medical school longitudinal study in Pennsylvania, was engaged in an advisory capacity at the outset and continues to have an ongoing role.

The MSOD will allow both short- and long-term monitoring and reporting on outcomes of medical education programs, and will inform national workforce policy implementation. It can contribute to evaluating the effectiveness of federally funded medical education initiatives in achieving improved medical workforce recruitment and retention. It complements activities of bodies such as the National Health Workforce Taskforce (NHWT), state and territory medical boards in Australia, and the Medical Council of New Zealand. It has the potential to link with data collected by the NHWT and other similar groups to track graduates after they leave medical school. This will allow further exploration of factors influencing career choice and destination, and continued data collection on the location and types of their clinical experience. Linking the MSOD with the forthcoming national medical registration system has the potential to identify specialty, practice location and changes in pattern of medical practice. In addition, the MSOD project offers a facility for conducting targeted substudies of specific policy or research questions, not unlike other well known longitudinal studies such as the 45 and Up study. The project has access to 100% of the relevant student doctor population, and to date has achieved a student participation rate of...
around 95%, providing a high-quality sampling frame on which to base any empirical study.

MIDANZ considers MSOD an essential resource and is fully committed to its success — but is this sufficient to ensure its sustainability? Given the tyranny of distance, the process of bringing diverse groups together has required fostering trust and collegiality among all players around a shared project goal, in order to minimise competition and apprehension. Moreover, longitudinal studies have a long lead time before results become apparent, and convincing funders that outputs will justify the time and resources needed requires good ongoing communication and strong partnership arrangements. The Australian Government Department of Health and Ageing has provided crucial financial support that has produced a solid foundation without which the MSOD project would not have progressed.

Several factors have been built into the project with a view to ensuring its sustainability. The database has not been produced by any one individual, university or workforce organisation. Instead, a collective approach that reflects all parties as equal partners is led by the MIDANZ steering and management group. The process is underpinned by project officers who liaise with stakeholders. Project objectives, processes and desired outcomes are shared by all parties, and stakeholders are regularly engaged in full and open discussion of any likely sticking points, including ethics, ownership of data, roles and responsibilities. Agreed principles (such as simplicity, necessity, consistency, objectivity, sufficiency and relevance) guide the data collection process and support the intended outcomes. While all medical schools share a belief that the tool is more valuable than the sum of the parts, there is ample opportunity within the MSOD and Longitudinal Training Project to conduct rigorous subsudies, either by individual medical schools or in partnership with others.

Sound workforce policy decisions and reforms cannot be made in the absence of quality longitudinal data. The MSOD project is unique, well established and running effectively. With the continued and sustained support of MIDANZ and the Department of Health and Ageing, the full potential of this resource, as a valuable platform for informing a more coordinated approach to medical workforce planning will be realised.

Competing interests

David Pridaux is a member of the Management Committee of MIDANZ and has received travel assistance to attend meetings. Nicholas Glasgow is employed by the Australian National University as Dean of Medicine and Health Sciences and Dean of the Medical School.

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Predicting medical students’ intentions to take up rural practice after graduation

Michael Jones,1 John Humphreys2 & David Friddle3

OBJECTIVES Using a novel longitudinal tracking project, this study develops and evaluates the performance of a predictive model and index of rural medical practice intention based on the characteristics of incoming medical students.

METHODS Medical school entry survey data were obtained from the Medical Schools Outcome Database (MSOD) project implemented in all Australian and New Zealand medical schools and coordinated through Medical Deans Australia and New Zealand, the representative body for the Deans of 18 Australian and two New Zealand medical schools and faculties. The medical school commencement survey collects data on students’ education and family background, including rural upbringing, personal circumstances and scholarships, and on their practice intentions in terms of location and specialty. The MSOD will also allow tracking of medical graduates after graduation. Logistic regression modeling was used to develop a predictive model of rural practice intention. Split-sample validation was used to gain some insight into the stability of performance of the model.

RESULTS Response rates to the MSOD survey exceeded 99% on average. The model findings confirm and extend previous research examining the association of medical student characteristics with intention to take up rural medical practice. The statistically significant independent factors in the model included students’ rural backgrounds, financial arrangements and intentions regarding specialist versus generalist practice upon graduation. Model performance was good, with an area under the receiver-operator characteristics curve of 0.86, and reproducible, with an area in a validation sample of 0.88.

CONCLUSIONS The model and related index provide important insights into individual factors associated with rural practice intention among students commencing medical studies. The model can also provide a means for optimising the use of scarce medical programme resources, thereby helping to improve the supply of rural medical practitioners. This study illustrates the power and potential of a robust, consistent, systematic longitudinal tracking project.

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INTRODUCTION

Australia has a shortage of rural and regional medical practitioners.1–5 This shortage has manifested as a significant social and political issue for several decades in Australia,6,7 as it has in other Western countries, such as the USA.2 Considerable research has been undertaken on the recruitment and retention of rural general practitioners,8,9 but less has been undertaken around allied health professionals.10–12 However, despite more than 30 years of such research and many millions of dollars of government expenditure,13 the problem of how to attract and retain health care professionals to posts outside urban areas persists.1,14

The Australian government has implemented several expensive national schemes designed to encourage medical student exposure to rural medical practice during medical training.12 These schemes include the Rural Undergraduate Support and Coordination (RUSC) programme, initiated under the broader Rural and Remote General Practice Programme (RRGPP).13 A key element of the RUSC programme is the belief that exposing a student to rural medical practice very early in his or her career increases the likelihood that the student will take up a rural career once qualified. However, such schemes as the RUSC focus on only one aspect of the individual and his or her medical training. In reality medical students experience a broad range of both internal and external influences during their training. The former might relate to their upbringing and personality, whereas the latter might include family obligations and positive or negative life events.

The association of rural exposure during medical training with increased likelihood of rural practice has only been partially demonstrated in Australian16 and international research,17,18 for allied health workers as well as for medical practitioners.19 Because many studies fail to control for confounding variables, Rammunthugala et al.20 questioned the individual contribution of rural exposure to intention to take up rural practice, and the implications for resource utilisation.

These observations illustrate that, until very recently, rural medical workforce policy and rural medical education training in Australia were largely guided by a somewhat eclectic body of knowledge that emerged from diverse existing international studies and several disparate empirical studies affirming the roles and contribution of various factors to rural workforce outcomes. Hence the concept of selecting rural origin students who already have some affinity with rural areas and encouraging positive rural attachments to change stereotypical preconceptions of rural life have been shown to influence the take-up of rural practice. Specific affirmative workforce funding in Australia to support devolved rural medical education programmes has been predicated on these beliefs.21 The unique strength of this study is that its findings emanate from a methodologically rigorous analysis of comprehensive national data from all medical schools in Australia.

A proper evaluation of the effectiveness of national programmes requires long-term longitudinal studies of a cohort or cohorts from medical training through graduation and until well into their medical practice careers, based on up-to-date, robust data. In Australia, a few cross-sectional workforce studies have been undertaken.16 However, a major limitation in utilising such disparate research studies to inform current and future policy is the lack of connection between medical students, current rural practitioners and past rural practitioners. Approximating a true longitudinal study via a series of cross-sectional studies makes strong assumptions that, if not met, might be misleading rather than helpful.

Although some universities engage in local monitoring of the progress of both education and funding initiatives on workforce supply, recent government reviews highlighted the need for a uniform data collection methodology as the basis for tracking the progress of students throughout their training programme and beyond.22,23 To date, the absence of consistent definitions, agreed protocols and mechanisms for collecting and reporting data precludes comparable outcome analysis over time on a national basis. Moreover, the recent growth in medical schools has increased the interstate movement of medical students to both undergraduate and graduate schools and subsequently into postgraduate training. These factors make a national minimum database essential for future planning. The Medical Schools Outcomes Database (MSOD) and Longitudinal Tracking Project seek to fill this gap.

The MSOD project was established in 2005 under the auspices of the Medical Deans of Australia and New Zealand to design and implement a national process for collecting reliable demographic and education data on medical students in all Australian medical schools, and to establish a national minimum database based on nationally consistent definitions as the
basis for tracking students into take-up of practice. Ethics approval for participation in the project was obtained from the human research ethics committee of each university and student participation is voluntary. Access to MSOD data is regulated by a Scientific Advisory Committee and a Management Committee. This national database allows short- and long-term monitoring of outcomes of medical education programmes, and contributes to evaluating the effectiveness of Commonwealth-funded medical education initiatives designed to achieve improved medical workforce recruitment and retention.

Figure 1 shows how the MSOD and longitudinal data collection target critical areas of medical career decision making (at entry to and exit from medical school, during the inter year and during postgraduate training) and simultaneously record sentinel aspects of training and clinical exposure likely to influence decision making.

Data collection for the MSOD commences on entry to medical school with a questionnaire that elicits a standard set of items on medical students’ family background, education and upbringing, current circumstances, medical school and career intentions. Further data are collected from each medical school during the course of training, and an exit questionnaire is administered at the end of university training to collect more information on student experiences and on where students have applied for internship in the first year after graduation from medical school. This information provides important input to medical workforce planning and is designed to link with National Health Workforce Taskforce (NHWT; http://www.nhwt.gov.au/) data to allow long-term follow-up of medical graduates.

This paper seeks to develop and validate a predictive model of medical student intention to practise in rural areas and, in doing so, to provide the first demonstration of the value of the MSOD in a policy-setting environment. Evidence obtained from this study may inform the optimal use of scarce resources relating to current rural placement schemes. Using available data, student intentions are used as the outcome variable in the absence of actual student behaviour. Although it would be optimal to use observed behaviour data, the value to both education and workforce planning of understanding how individual student characteristics relate to student attitudes to rural practice should not be underestimated.

METHODS

The present study utilises the entry questionnaire administered to the first three annual cohorts of incoming medical students to all medical schools in Australia and New Zealand. A copy of the 2007 questionnaire can be accessed online Appendix S1. Earlier questionnaires differ only in minor respects from the 2007 version and are available from the corresponding author.

Completed questionnaires were sent to the secretariat of Medical Deans of Australia and New Zealand for data entry and cleaning. Each medical school received funding to implement the questionnaire dissemination and collection.

As the aim of the study was to determine the extent to which rural practice intention could be predicted from information about individuals at the time of their entry into medical schools, unconditional logistic regression was used with probability of rural practice intention as the outcome and both numeric and qualitative individual characteristics as predictors. Logistic regression relates the probability of an event occurring, such as intending to practise in a rural area, to one or more predictive factors. This model is used extensively in epidemiological research.

Figure 1 Concept plan. PGY = postgraduate year
to discriminate important outcomes based on easily obtainable information. The current application of the model can be compared with a diagnostic test. Student information obtained from the entry questionnaire can be viewed as the test and the students’ reported intentions are the standard against which the test is compared.24,25 Statistical analyses were undertaken using Stata software (StataCorp LP, College Station, TX, USA). The effects of predictive factors on probability of rural intention are reported in terms of odds ratios (ORs). An OR < 1.0 indicates negative effect (i.e. reduced probability), whereas an OR > 1.0 indicates a positive effect (i.e. higher probability). One potential structural determinant of student intention was the fee basis under which the student entered medical school. These can be classified as ‘HECS’ (a government-supported Higher Education Contribution Scheme in which the student makes a relatively modest co-payment for tuition), ‘bonded’ (the student may pay no fees and may receive a stipend during his/her study, but in return agrees to work in areas of need for an agreed period) and ‘fee-paying’ (the student pays the full cost of his/her tuition). The fee basis of entry may be regarded as a control variable as it may have an effect on graduate destination that is external to the individual. Rural practice intention was gauged from students’ preferred practice locations (Question 16.2). Possible responses range from ‘capital city’ to ‘small town (<10 000)’. Responses of ‘regional city’ to ‘small town’ were considered to indicate ‘rural’, whereas those of ‘capital city’ or ‘major urban centre’ were considered ‘urban’. Given the well-known phenomenon of over-optimism where the apparent performance of predictive models in the sample on which they were developed exceeds that in future application, the sample was randomly split into approximately equal sized ‘training’ (n = 2037) and ‘validation’ (n = 2075) sub-samples.26 The predictive model was developed on the training sample and then applied independently to the validation sample. Comparing predictive performance across these two samples yields insight into the stability of the model’s performance in the face of natural sample variation. Model performance was assessed through receiver-operator characteristic (ROC) curves and by calculating the area under the ROC curve. An area of 1.0 would indicate perfect sensitivity and specificity in prediction, whereas an area of 0.5 would indicate sensitivity and specificity no better than would be expected from a coin toss. (Martin and Jolly27 give a description in a medical education context.)

Because one application of the model is to derive an index by which new students can be ranked for likelihood of rural practice via the linear predictor of the logistic model

\[ I_i = \sum_{j=0}^{2} \beta_j X_{ij} \]

has been evaluated for each student and its practical discriminatory value illustrated graphically. Such an index would not be an independent measure of student propensity to enter rural practice; rather, it derives directly from the logistic model and provides an alternative operationalisation of the model that has the feel of entry schemes using multiple criteria, such as are typically applied in Australian and New Zealand medical schools. An index score of 0 corresponds to a probability of 0.5, whereas scores < 0.0 indicate lesser probabilities and scores > 0.0 indicate higher probabilities. An index derived this way is a weighted summation of each predictive factor such that the correlation between index and observed outcome is maximised. This approach contrasts with that of Rabinowitz et al.,28 whose index has the advantage of simplicity, but will not optimise the relative weights of contributions of individual predictors.

Given the large sample size (> 4000) involved in interpreting quantitative results, particularly in Table 1, a distinction needs to be made between statistical significance (Pvalue) and practical significance (magnitude of difference) because statistical power is high for even quite subtle and possibly random differences between those intending ‘rural’ and those intending ‘urban’ practice.

RESULTS

Sample characteristics

A total of 6292 students responded to this commencement questionnaire. Response rates among medical students increased from 85% in the 2006 cohort to 91% in 2007. Missing data rates per question are generally very low, although the rural intention question was not answered by 1442 students. Taken together with other missing data exclusions, the study has an effective sample size of 4112. The sample was 55% (n = 2296) female. Although the majority of students commenced medical studies shortly after high school, 6% were aged ≥ 30 years, which suggests they had embarked on another career choice before taking up study in graduate medical schools.
Table 1 Descriptive comparison of students intending to enter 'rural' and 'urban' practice after graduation

<table>
<thead>
<tr>
<th>Factor</th>
<th>Intended location</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Urban, %</td>
<td>Rural, %</td>
</tr>
<tr>
<td>Gender, % female</td>
<td>54</td>
<td>60</td>
</tr>
<tr>
<td>Year of birth</td>
<td></td>
<td></td>
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<tr>
<td>1953–1961</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1962–1975</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>1976–1991</td>
<td>95</td>
<td>90</td>
</tr>
<tr>
<td>Admission scheme*</td>
<td></td>
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<tr>
<td>HECS</td>
<td>62</td>
<td>53</td>
</tr>
<tr>
<td>Bonded</td>
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<tr>
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<td>7</td>
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<tr>
<td>Holding scholarship</td>
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<td>26</td>
</tr>
<tr>
<td>Citizenship</td>
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<td></td>
</tr>
<tr>
<td>Australian</td>
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<td>95</td>
</tr>
<tr>
<td>New Zealand</td>
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<td>1</td>
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<tr>
<td>Permanent resident</td>
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<td>1</td>
</tr>
<tr>
<td>Temporary resident</td>
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<td>3</td>
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<tr>
<td>Years resided in rural area</td>
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<td></td>
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<tr>
<td>None</td>
<td>83</td>
<td>33</td>
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<tr>
<td>1–5 years</td>
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<td>12</td>
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<tr>
<td>&gt; 5 years</td>
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<td>55</td>
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<tr>
<td>Years educated in rural area</td>
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<td></td>
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<tr>
<td>None</td>
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<td>44</td>
</tr>
<tr>
<td>1–5 years</td>
<td>8</td>
<td>24</td>
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<tr>
<td>&gt; 5 years</td>
<td>5</td>
<td>32</td>
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<tr>
<td>Area of longest residence</td>
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<td>Major urban centre</td>
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<tr>
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<td>11</td>
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<tr>
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<td>60</td>
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<tr>
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<td>Specialist</td>
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<td>44</td>
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<tr>
<td>Non-specialist</td>
<td>9</td>
<td>29</td>
</tr>
<tr>
<td>Undecided</td>
<td>32</td>
<td>27</td>
</tr>
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</table>

* HECS indicates Higher Education Contribution Scheme in which most of the cost of education is borne by the government but the student makes a co-payment; bonded indicates a scholarship arrangement in which the recipient has some obligation to work where directed after graduation; fee-paying indicates that the student pays the full cost of his or her own education.
Descriptive discrimination of ‘rural’ from ‘urban’ intention

Table 1 contrasts students indicating ‘rural’ versus those indicating ‘urban’ practice intentions in terms of all potential predictors considered for the predictive model. A number of the individual characteristics reported in Table 1 are expected to be inter-related and therefore it cannot be said, on the basis of Table 1 alone, that all those characteristics are independently discriminatory of ‘rural’ versus ‘urban’ practice intention.

Predictive model and its performance

Figure 2 provides a graphic representation of the predictive model developed using the training sample, sorted from most negative to most positive effects. The vertical axis shows the OR, which is a measure of the effect that a given predictor has on the probability of rural practice intention. All factors listed on the horizontal axis of Fig. 2 have statistically significant and independent effects on the probability of intending to practise in rural areas. The negative factors are ‘being supported by parents’ and ‘not having previous rural exposure’ or ‘not self-identifying as a rural person’. The positive factors appear to be around ‘previous exposure to rural life’, either ‘being undecided about specialty’ or ‘having decided to be a generalist’, and ‘being on a scholarship’ or ‘being bonded’. In case the model was over influenced by bonded students it was refitted excluding such students, but otherwise remains essentially unchanged.

![Figure 2: Graphic depiction of predictive model based on the training sample](image)

![Figure 3: Model performance in the (a) training sample and (b) validation sample. ROC = receiver-operator characteristic](image)

Figure 3(a) suggests the model has useful discriminatory power, with an area under the ROC curve of 0.86 (95% confidence interval [CI] 0.84–0.88). Further, Fig. 3(b) suggests this performance is reproducible because the model developed on the training sample when applied to the validation sample yields an area only slightly lower, at 0.85 (95% CI 0.83–0.87).

Derivation of an index from the model

As noted in the methods, the linear predictor component of the model can be used to form an index of
Predicting medical students' rural practice intentions

**DISCUSSION**

Despite considerable investment by both federal and state governments in Australia to make rural medical practice more attractive to prospective rural doctors, evidence suggests that at best we are maintaining the status quo and arguably are losing ground in terms of ensuring medical coverage outside capital cities and major urban centres. Medical schools themselves also encourage the take-up of rural practice through the provision of rural placement experience and preferential treatment for rural origin students in entry scores. Two universities offer their medical programme entirely at rural locations.

Rural bonding aside, however, none of these schemes are guaranteed to produce medical practitioners who choose to work in rural areas because students experience many other influences during their training that may predispose them towards more positive, or negative, attitudes towards rural practice upon graduation. This paper has outlined the development and initial validation of a predictive model for rural practice intention that might assist in determining which students are more likely to intend to work in rural areas.

The model incorporates a number of statistically independent predictors of rural intention that centre around the students' rural backgrounds, financial arrangements during studies, and intentions regarding specialist versus generalist practice upon graduation. The strongest predictors of rural practice intention were generalist intentions, length of rural residence and holding a scholarship (but not a bonded arrangement). Although the finding of rural background (living or education) as a positive predictor of rural intention confirms previous research, this paper also adds intentions towards generalist practice and financially supported studies as predictors. By contrast, intentions towards specialist practice or the status of being supported by parents were negative indicators for rural practice intention.

The work reported here refines the approach taken by Rabinowitz et al in a similar study in which the authors calculated a crude index of rural practice intention based on adding up individual 'factors' positively associated with rural practice. In this earlier study, the authors constructed a simple index of likelihood to enter rural medical practice based on summing the number of predictor variable conditions present within any individual. This is effectively equivalent to an unweighted version of the index.
derived in our study. The advantage of the weighted index proposed here is that it optimises the index score specifically in relation to rural practice intentions. A potential drawback of such optimisation is over-optimism in index performance. However, the split-sample validation reported for our data suggests that this potential is not realised.

The model provides useful and reproducible prediction of rural practice intention although, not surprisingly, imperfect prediction. The area under the ROC curve was found to be 0.86 in the training sample and 0.85 in the validation sample.

As indicated above, one limitation of this study is the use of intention to take up rural practice rather than actual behaviour as the outcome variable. Until data on actual behaviour become available, however, this is the best available surrogate. This limitation can be overcome in the future because the longitudinal nature of the MSOD project will enable us to monitor the relationship between early stated intentions, medical education experiences, and actual behaviour.

Medical practice has long embraced the theory and application of evidence-based practice, a concept that extends readily to medical education. Some previous studies illustrate this point. Understanding how individual student characteristics and elements of the medical school programme influence medical graduates' decisions to work or not work in rural areas represents a critical link between academic research and policy outcome. Increasingly, academic researchers are under pressure to strengthen the link between research and policy. This is all the more important when policies target considerable public resources to facilitating outcomes deemed to be in the public interest, such as encouraging the recruitment of more doctors to work in areas of workforce shortage such as those in rural and remote Australia. Given that effective knowledge transfer is a continuous process in which knowledge accumulates and influences thinking over time, rather than a one-off event, research such as this has important implications for appropriate and effective policy implementation and the expenditure of scarce resources within medical school education and training. The MSOD and Longitudinal Tracking Project, which form the basis for this study, provide a unique opportunity to collect data from across the medical education—training—practice continuum. Although the MSOD database is important for medical education evaluation activities in its own right, data collected during medical school can play a critical role in identifying the relative roles of specific factors and influences within the totality of incentives and interventions designed to contribute towards an increased orientation to take up rural practice. In addition, it will become an invaluable platform from which to inform a more coordinated approach to medical workforce planning between universities and Commonwealth and state government.

Contributors: MJ contributed to the study design, and data analysis and interpretation, gave important intellectual input and took lead responsibility for the writing of the manuscript. JH and DP contributed to the study conception and design, and data interpretation, gave important intellectual input, and contributed to the writing of the manuscript. All authors approved the final manuscript for publication.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article.

Appendix S1. 2007 commencing medical student questionnaire.

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

Jonathan P. Gerber and Louis L. Landau

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, whilst those who intended to practice rural 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% for 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, 390 MSOD participants were due to graduate from three of the pilot schools. This allowed the linkage of entry questionnaire, exit questionnaire and school 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 had steadily risen to 65% for the 2008 entry questionnaire sample.

Very little attrition (n = 3) occurred due to missing school 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 2006 cohort was expected to complete the exit questionnaire in 2008 due to different lengths of medical courses and for delays in progression through the...
course. Only 200 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 data 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 ID, then use 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=306) 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 a 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 in nature 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 = 33), 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 key new educational variable of rural placements during their medical course.

**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, $F_{3,98} = 2.72, P = 0.048$). 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 = 2.60, 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 findings of Jones et al. (2008). 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 (Opun and Gabriel 2005) with stronger methodology.

The current analysis using four groups also revealed an interesting age effect. Those staying rural were likely to be older, while the going rural group was the same age as the city group. This suggests that age is a good entry criterion if the applicant already intends to practice rural. 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/rural 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 (Grether 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

<table>
<thead>
<tr>
<th></th>
<th>Stay city</th>
<th>Stay rural</th>
<th>Going city</th>
<th>Going rural</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>No GP Intention</td>
<td>62</td>
<td>93.9</td>
<td>57.4</td>
<td>77</td>
</tr>
<tr>
<td>Initial GP int</td>
<td>4</td>
<td>61.1</td>
<td>4</td>
<td>42.9</td>
</tr>
</tbody>
</table>

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 sub-study 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.

Acknowledgements
The research on which this paper is based was conducted as part of the MSOD project, Medical Dean Australia and New Zealand. We are grateful to the Australian Government Department of Health and Ageing for funding the project from 2004 to 2009 and to the medical students who participated.

References
APPENDIX D: The Australian Higher Education Article

World-first mapping of medicos

Tenure tensions

The NZ experiment

P28

Higher Education

Treasures of the Lost World

P34
AUSTRALIAN medical schools are joining forces to create a national tracking system for all medical students in a venture they hope will reduce politicking and guesswork in medical work-force planning.

After four years of pilot work the government-backed project was launched this month with a survey of all the 2330-plus first-year medical students across the nation’s 15 medical schools.

The move came amid heightened debate about medical student numbers and whether these can stem the critical doctor shortages in some areas.

The federal Government decided earlier this month to raise the cap on the number of full-fee paying Australian medical students a university can enrol from 10 per cent to 25 per cent. Although no details have emerged about how this step will affect enrolments, it is based on the assumption that there is a strong market for students willing to pay up to $200,000 for a medical degree.

Project convener Professor Andrew Coats, dean of medicine at the University of Sydney, said there had been enormous political pressures in relation to planning for numbers.

He said the federal Government intervened more in deciding on places for medical courses than for most other university courses. It "micromanages the number of medical students down to individual places".

"So it is ... under the control of politicians ... and yet they're under pressure to make sure we have enough doctors in the future and enough doctors in the right places," he said.

"And to do that without detailed information of career intentions is impossible."

Data from the medical student survey will be stored in a vast database and used to inform government policy, directions in medical education and research into work-force trends. It will be used to track the students’ careers and demographic trends over the next 25 to 50 years.

The Committee of Deans of Australian Medical Schools is steering the study, which came about after the committee was approached by the federal Department of Health and Ageing about five years ago.

Initially the department wanted to survey the effects of rural clinical schools on getting doctors into country practice.

But the deans proposed a much broader study, which the Government later backed with $250,000 in seed funding. It recently committed almost $1 million more to continue the next stage of the project.

Medical education has undergone significant change in the past decade as the number of Australian medical schools mushroomed and many degrees switched from undergraduate to graduate entry.

But the deans say there has been little evaluation of these changes and not much research into graduates' careers.

"This has never been done anywhere in the world," Professor Coats said of the project. "No one has ever prospectively got every single medical school, [with] every single student being invited to participate, and tracked [them] on this scale."

He cited a government decision more than a decade ago to reduce medical student numbers, a move that led to the present doctor shortage, as evidence of the need for an accurate tracking system. "The information then was obviously not accurate enough or there were some other political considerations that led to a reduction," he said.
The data could also help to eliminate some of the politics from the area of health policy.

The two-pronged CDAMS project is called the Medical Schools Outcomes Database and Longitudinal Tracking Project.

Professor Coats said the data could be used to make decisions about the size and location of medical schools, whether graduate entry worked, the effectiveness of support schemes for rural doctors, career intentions, the impact of age and background on student performance, and so on. He said the information would be collected and stored to the same standards of privacy as modern clinical trials.

The project is a joint effort by 10 groups, including the Australian Medical Workforce Advisory Committee, the Australian Medical Students Association, the Federation of Rural Australian Medical Educators and the Australian Indigenous Doctors Association.
APPENDIX E: MSOD and Interrelationship with other National Medical Data Collections
APPENDIX F: 2010 MSOD Project Governance Arrangement

2010 MSOD Project Governance Arrangement

Funding Body
Department of Health and Ageing

MSOD Project Host
Medical Deans Aust & NZ

Legal Contractor
The University of Sydney

MSOD Project Team
Director: Lou Landau
Project Manager: Bal Kaur
Postdoc Research Fellow: Jonathan Gerber
Data Manager: Nick Kominos
Project Assistant: Karla Mahe

MSOD Board
Justin Bellby (Chair),
Nick Glasgow (Co-Chair),
Don Robertson (NZ Rep), Lou Landau
(MSOD Director), Bal Kaur (Committee Administrator) Mary Solomon (EC, MOANZ)
(3 – face to face meetings)

MSOD Executive
Justin Bellby,
Nick Glasgow, Lou Landau, Bal Kaur

Administration/Project/Data Management Group
Chair: Lou Landau, Jonathan Gerber, Nick Kominos, Bal Kaur, Deb Loxton
– other experts identified
(Bi-monthly – face to face)

Research & Scientific Advisory Committee
Chair: Lou Landau
Administrator: Jonathan Gerber
Members: David Prideaux, John Humphreys, Deb Loxton, Richard Hays, Allison Jones, John Bushnell, Rob Olver (AMSA), Marlene Kong (AIDA), Suzy Saw (DoHA), Michelle Warwick (DoHA), Michael Bonning (AMACDT)

Stakeholder Advisory Committee
Chair of MSOD Board, Committee Administrator: Bal Kaur
Members: DOHA, AMSA, FRAME, AIDA, CFMEC, CFMC, NRHSN, NHWT, ARHEN
+ MSOD Board

Working Groups
With short timelines
Members co-opted accordingly

Version 5: Jan 2010