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The Social Mission of Medical Schools in a Time of Expansion: Australia

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The Dean of a well-established medical school in Australia, when asked about the school's social mission, replied: "To ensure a quality health service for the State; that's what we were established for"; the sentiment of many schools has been similar. The subject of the paper will be considered under 3 headings: first, expansion in the Australian context; second, the responses of schools to the question of mission; third, two national imperatives – improving rural health and raising the standards of health of Indigenous Peoples.[III] We will conclude with the opinion that medical schools are striving sensibly to meet social expectations.

A Time of Expansion

The population of Australia is growing at 2% a year and was 22.1 million at the start of 2010, a doubling in 50 years.[1] The ratio of doctors in the labour force to population was 1:445 in 1991, 1:358 in 2001, and 1:305 in 2007,[2,3] the last year for which figures are available. The number of medical school entrants showed little increase in the period 1980-2000, during which time there was a persuasive view that the nation was oversupplied with doctors.[4] Government applied a cap on medical student places of about 1,500 from 1996, when there were 10 medical schools.[5] By 2004 there was evidence of a medical workforce shortage despite continuing immigration of overseas qualified doctors. In 2006 the Australian Government funded 8 new medical schools and student intake has increased from 1,470 in 2002, to a predicted 3,074 in 2010, an extraordinary expansion of 109%.[6]

The growth was unplanned in the view of many and problems were foreseen. Buildings and other infrastructure have been provided but staffing the schools was likely to be difficult and the availability of clinical placements and experience would prove an ongoing problem. With the progress of classes in new schools, the pending demand for additional intern places is exercising minds of hospital management and governments; the spectre of unemployed graduates has been raised. The problem already exists for international students who make up to 25% of classes in some medical schools. These full-fee-paying students make important financial contributions to schools but are generally ineligible for intern places. Up to 60% of them are said to wish to stay in Australia and many have questioned this impediment to training, when large numbers of doctors not trained in Australia are admitted to practice.

The Medical Deans of Australia and New Zealand considered options for clinical placements of students in a report of 2008[7] and listed rural and community settings, the private sector, general (family) practice and Indigenous health settings. Possible community settings included health centres, aged care facilities, women's health centres, children's health centres, the Aboriginal health service, drug & alcohol services and ambulance services. As described below, medical students are gaining clinical experience in rural clinical schools all over Australia, learning in Aboriginal health services, and gaining instruction in aged care facilities.

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The Australian Government is establishing *GP* (General Practice) *Super Clinics* - community health centres with medical, dental and allied health professional services, and it is hoped clinical experience will be available there for students as well as interns and postgraduate trainees (residents).

There has thus been rapid expansion in medical education in Australia. Older medical schools have expanded and formed new clinical schools at a distance, some with universities that have not previously supported medical courses. Newer medical schools, established in the growing capital cities or in non-metropolitan areas, are thriving. There are many parts of cities that need more doctors, and rural and remote areas are longing for the new graduates.

Social Mission: the Schools' Perspectives

Australian medical schools have a variety of programs. About half have *graduate* programs, taking students who have completed a 3-year Bachelor's degree at a university. Others take students from secondary school into a *School-leaver* course of 5 or 6 years duration. One school has offered both options. Social missions might differ accordingly. It was important to ask the schools for their visions and their social commitments. Australians may recognise the schools but the visions and priorities are more important than the identities. A general question on social mission was put to 10 of the deans, followed by questions about general practice and rural health training and encouragement of Indigenous students. Since governments are promoting team working in health and see advantage in interprofessional learning, we asked about this.

(1) The Dean of a long established medical school said that while newer schools were founded with currently popular missions such as rural medicine and general practice, older schools like his saw their task as producing clinical researchers and top flight clinicians. One was reminded of the output of Cambridge, Oxford and Harvard schools. A second mission was to produce graduates with an international perspective, and to this end agreements had been completed with medical schools in Vietnam; clinicians come to Australia for 3 months with Australian Government funding, and in return, 25 students are offered electives in Vietnam each year. Another 25 electives, funded by the Dean, are to Cambodia, East Timor and Papua New Guinea. Agreements entered into with North American medical schools allow students to exchange electives without payment of fees at either end.

A third mission was support of graduate training through course-work Master's programs. The Master of Surgery course, with 100 students, gives preparation for Fellowship exams of the Royal Australasian College of Surgeons. The school teaches ophthalmology to students of another medical school in its city and has a joint rural health facility with two other schools. The school recognised areas of unmet need and was striving to build enthusiasm for Chairs in adolescent medicine and intellectual disability. It had joint teaching of medical and nursing students but abandoned this because of scheduling problems.

(2) A new medical school, associated with a renowned research institute, saw its mission first as a producer of clinician researchers, academics and educators. At a time of rapid expansion of medical education it was troubled by the demand for academics and educators. It planned to pursue this by recruiting outstanding school-leavers into a Bachelor of Philosophy program in a wide range of subjects, leading, for the best, straight into the medical course. Combined courses in Science and Medicine, Economics and Medicine, even Music and Medicine are on offer elsewhere in Australia. The school has a distributed rural clinical school with 25% of its students spending a year of clinical training outside the main campus.

Interprofessional learning takes place in its rural clinical school but also with pharmacy and nursing students at a nearby university. A new program will have its students learning with allied health profession students in another state.

(3) A senior and long-established medical school, literally surrounded by world-ranking research institutions, saw research familiarity as a large part of its educational role. Another principal focus of the school was preparing its students for practice in areas of workforce need, while preparing them for leadership in research and practice. It has rural clinical schools in several parts of the state and was a strong supporter of Indigenous students and their advancement. One of its missions was preparing students to be teachers and a program was described in which senior students learned by teaching reproductive health to education trainees in the university. Subjects covered were physiology, contraception, abortion and sexually transmitted diseases, including HIV/AIDS, in 20-30 lectures per year. Volunteers for the program, women and men in a ratio of 3:1, received feedback on their teaching from both trainees and the supervising professor.
The school is concerned about the costs of health care and the dean quoted the adage that the doctor's most expensive technology is his pen. He referred to *The New Yorker* article of 2009: *The Cost Conundrum: What a Texas town can teach us about health care,*[8] and saw a mission for medical schools to instil cost-consciousness in their students.

(4) Two medical schools in Melbourne have established a joint program, *the Extended Rural Cohort* (ERC) in which students will undertake most of their clinical training, i.e. 5 semesters for one school and 3 years for the other, in hospitals and community practices in northern Victoria. Preference for entry to the ERC course, by both school-leavers and graduates, is given to students from rural areas. There are 60 places per year. Final examinations are the same as those for students at the city campuses.

(5) The western-most state medical school has a mission to encourage and support students from groups previously under-represented in medicine. A quota of places is reserved for Indigenous students and medical school staff visit high schools to promote the course. A summer school in the capital city offers potential entrants an introduction to medicine and the most able are recommended for the reserved places; scholarships are provided for the successful. There are 21 Indigenous students in classes at present and the aim is 10% of the entry, currently 210 school-leavers. Recruitment efforts have lifted rural student representation from about 4% to a present 25% of admissions and this also followed country visits and spread of information by medical school staff. Review of entering classes showed 100 secondary schools in outer urban districts of the capital that had never provided a medical student. After a pilot with 3 schools the *Aspire* program will involve 17 schools and up to 12 reserved places for students from these schools. The medical school is keen to develop interdisciplinary learning programs and medical students learn with those in dentistry and podiatry, with nursing and psychology trainees at another city university and with students of several allied health professions at the rural clinical schools. Building accessibility for medical training and inter-professional learning are demanding but part of the vision of the school.

(6) The Island medical school in Australia is small, with 120 students entering each year. It sees its main social mission, indeed its reason for existence, as ensuring a quality health service for the state, a large part of which is rural. The education program is shared between 2 city-based clinical schools and a dispersed rural school in the north-west. There is combined instruction with nursing students in aged care. After early difficulties with time-tabling, the program has been modified and now runs successfully in years 2 and 3 of a 5-year course.

(7) The Dean of the largest medical school told of the school's responsibility to graduate doctors and other health workers who will mainly work within its own state, delivering care to its people. The school expresses this as a mission: to embrace engagement with society and the health professions, producing doctors and other health workers of the highest quality.
Part of its mission is development of world class research and scholarship that ultimately contributes to human health. Commitment to the community is evident in its distributed rural clinical schools. but it also sees itself as a global medical school, having clinical schools in 3 continents. The school gives great importance to a performance framework that assesses module results, student satisfaction, research activities and publications. The school aims for operational excellence.

(8) Australia's most northern medical school has a vision statement:

> *To pursue excellence and provide leadership in medical education and research. In particular, programs will be responsive to the health needs of the communities of northern Australia and the School will be a leader in the focus areas of rural and remote health, Indigenous health and tropical medicine for Australia and the wider Asia-Pacific region.*

The school was begun 10 years ago with a mission to develop training for rural and remote health and it impresses by having data on the careers of the graduates of its first 4 years. Seventy percent are in non-metropolitan practice and half remain in the school's area. A second mission of the school is that its students should be advocates of social responsibility and to this end it strongly supports a 6-year school-leaver course. The Dean sees the six years as necessary for students to attain clinical and social maturity, and a sense of responsibility. Additionally, Indigenous students would be lost to medicine if required to do another course before medical entry. Rural attachments are widely dispersed; towns where students learn and work have seen their hospitals and medical services resuscitated. This is a school working effectively to achieve its clearly articulated social mission.

(9) This school has tried from its beginning to restore what it sees as missing from Australian medical education: real clinical preparedness and confident communication with patients, staff and colleagues. It believes its principal social mission is to serve its community. An ongoing commitment is to Indigenous medical students and its record in this field is outstanding. A major task is the development of a joint course with a distant rural university and the Dean sees much promise in this initiative in what has been an underserved area. The rapid expansion of medical schools and students is seen as presenting a crisis in clinical placement. The school has supported interprofessional learning but timetabling problems led to demise of early programs. There is little drive for its revival.

(10) This new school admits 130 students into its graduate, regional and rural based program. Its principal mission is the training of doctors for work in a rural environment and it aims to promote vertical integration, with training through to intern and vocational (resident) years. Its second mission is delivery of equity in health care delivery, through taking its students to underserved places. There's an interest in teaching mental health in a poorly served area with few specialists. The school is participating in interprofessional training with practice nurses, and year 2 students learn with nurses, occupational and dietician trainees.

Summation. These schools have a range of social missions, but service to a school's community is prominent. There's a common commitment to rural teaching and support for increasing numbers of Indigenous students. Both subjects are considered in depth below. The connection with leading research institutions makes research a priority in some schools. Interprofessional learning seems to have a marginal place. Our thanks are extended to the deans with whom we spoke.

A Social Mission: To improve medical participation in, and standards of, rural health

The provision of health care in rural and remote parts of Australia presents a serious problem to communities and governments. There are shortages of doctors and other health workers and availability of care is worsened by great distances and the unattractiveness to many of a professional career in the country. Remoteness in Australia is defined in terms of the accessibility to goods, services and opportunities for social interaction.[9] Remoteness areas are given an Index score from 0 to 15 and major categories are: Major Cities; Inner Regional; Outer Regional; Remote and Very Remote. In the last of these there is very little accessibility. The remoteness of much of Australia is shown on Figure 1.

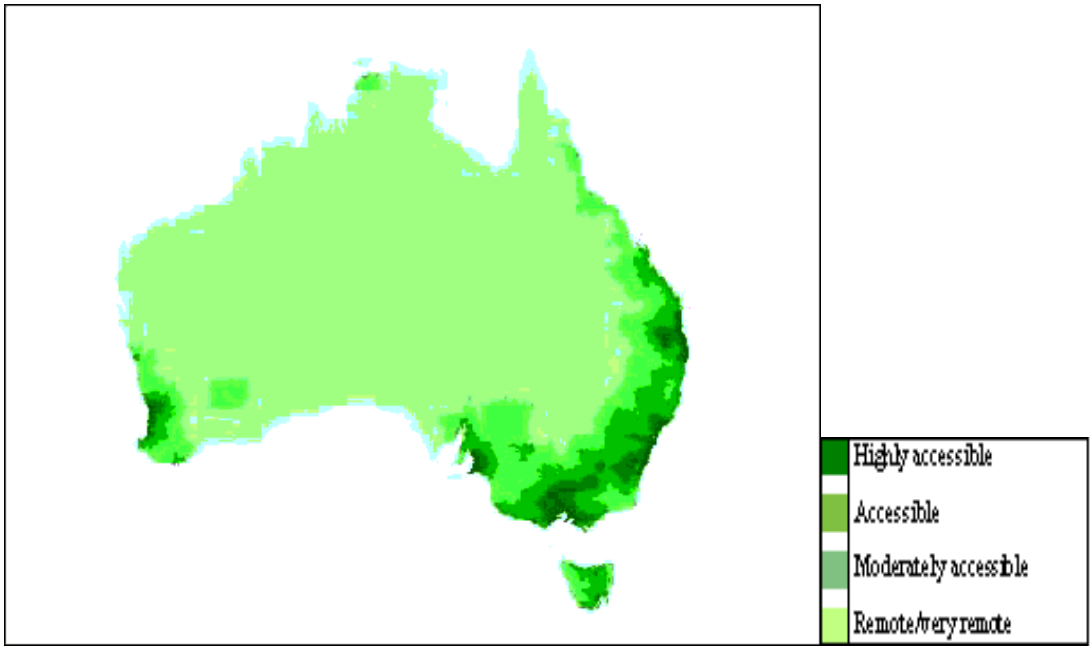

Figure 1 Remoteness areas of Australia, Australian Bureau of Statistics

Thirty-four percent of Australians live outside major cities, but these areas have only 27% of its general practitioners and only 23% of its medical specialists.[10] Problems flow from the shortage of health staff, of doctors but also of nurses and allied health professionals, and this is shown in regional assessments of clinical conditions.

Since 2000, the Australian government has provided scholarships for rural students entering medical school, based on the success of the *rural pipeline* by which students with a pronounced rural upbringing, who study and train in a rural area, are more likely to settle and work in such an environment.[10] Rural Australia Medical Undergraduate Scheme (RAMUS) Scholarships providing $10,000 a year throughout the medical course are offered to students who have lived in a rural area for a minimum of 5 consecutive or 8 cumulative years. [11]
A rural general practitioner acts as a mentor for each scholar. There is no commitment to postgraduate service attached to the awards. There were initially 400 scholarships; 100 new scholarships are offered each year, maintaining a current total of 550 holders.

Quite separate is the Medical Rural Bonded Scholarship Scheme that offers 100 scholarships a year for medical students. [12] The scheme offers the handsome sum of $23,686 a year throughout the course and holders are bound for 6 years of practice in rural or remote areas of Australia after completing general practice or specialist qualifications. The aim of both schemes is to bring doctors to rural areas.

The social mission of medical schools in their training of students in rural areas has been encouraged and supported by other Government initiatives. From 1997 the Australian Government funded the establishment of University Departments of Rural Health.[13]
The first two were opened at Broken Hill by the University of Sydney and at Mt Isa by the University of Queensland. Each site is almost as far as possible from the capital city of the state, respectively 1081 km (672 miles) and 1,822 km (1132 miles). The aim of the departments was to promote rural access to professional support, education and training, to link with local health services and provide a base for rural health research and support of local clinicians. The provision of medical student placements in rural areas was a further objective but this has largely been taken over by a more recent development that also aims to raise the status of rural health and employment: the rural clinical schools.

The Rural Clinical Schools program was launched in 2000 with the aim of providing extended clinical training in regional areas that conformed to the approved curricula of the parent medical school.[13] The rural schools were expected to encourage students and clinicians to settle and work in such areas, strengthen the local health workforce and raise the standard of local healthcare. Fourteen rural clinical schools have been established and their prospects have been enlarged by a government decision in 2006, tied to continued funding of medical schools, that 25% of all Commonwealth-funded students spend at least a whole year of their clinical training in rural and regional communities. The rural schools form a network across Australia (Figure 2).

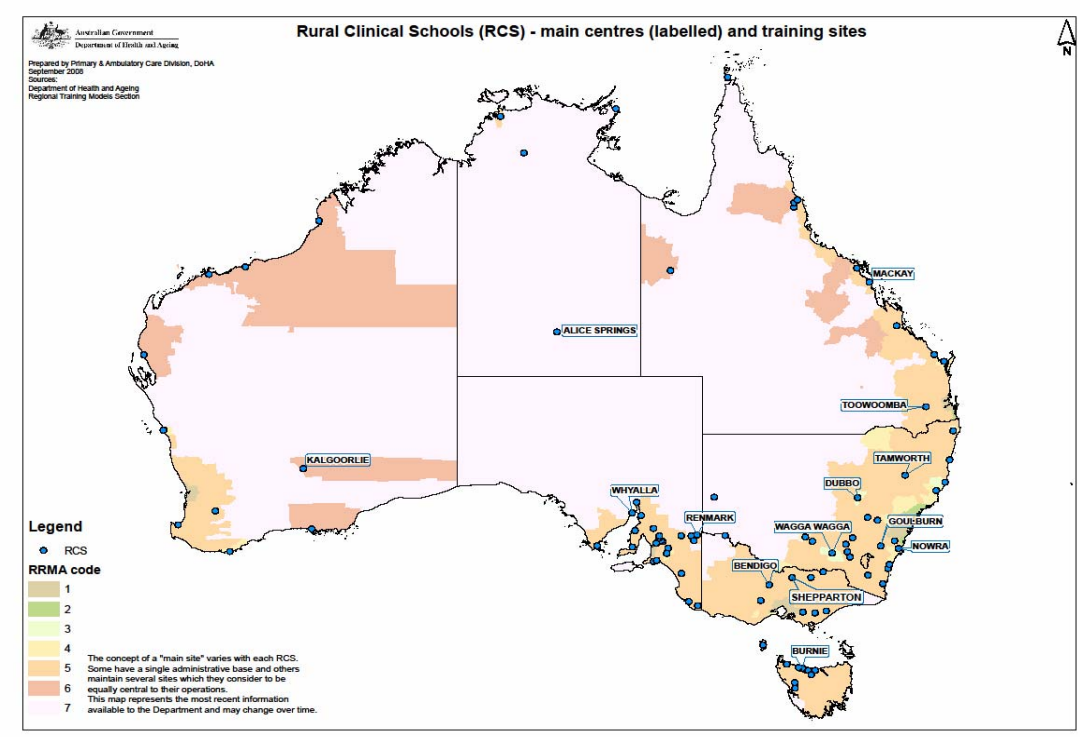

Figure 2. Rural clinical schools in Australia,
Australian Government Department of Health and Ageing

Students at the schools attend the regional hospital and other health initiatives and have regular attendance at one or more associated general practices. There are sessions of instruction at the school, often by video link with the main campus. An illustration of a program at Flinders University rural clinical school comes from the 2008 evaluation of the schools[13]:

"Through the year the students must learn all of their medicine, surgery, paediatrics, obstetrics and gynaecology, general practice and psychiatry in exactly the same way a students based at Flinders Medical Centre [in Adelaide] *However instead of rotating through a sequence of discrete terms (medicine, surgery, etc) as their city-based peers do, the PRCC* [Parallel Rural Community Curriculum] *students learn disciplines in an integrated way throughout the year. Although the students are allocated to a specific general practice and have a GP Supervisor, the year itself is NOT only a general practice experience.*

"Students are expected to attend clinical activities related to all medical domains. They will encounter patients in the general practices to which they are attached and then follow them through primary care and the hospital system.

At the end of the year the PRCC students sit exactly the same exams as their FMC-based colleagues in all other clinical domains."

The potential impact of rural experience on future medical careers has been well studied in Australia,[10,14,15] and short-term positive outcomes are described,[16,17,18] as well as longer term ones.[19,20] The subject was reviewed by Dunbabin & Levett in 2003[21] and by the Australian Department of Health and Ageing in 2008.[12] A particularly instructive paper from Flinders Medical School tells how students in a 4-year graduate entry program who undertook the clinical studies in year 3 in a rural remote setting performed significantly better in end of year exams than those who remained in Adelaide.[22]

The social mission of expanding rural health care is thus being pursued energetically in Australia, prompted and supported by government, and providing new resources for rural regions and new and eagerly accepted training for medical students.

Social Mission: to improve the health care of Indigenous Peoples

The health of Indigenous Peoples in Australia is a reproach to the country's response to its peoples' needs. The 2008 Health and Welfare Report on Indigenous Peoples, by the Australian Institute of Health and Welfare (AIHW) shows the deficiencies in their welfare, which compound their deficiencies in health.[23] In June 2006 there were 517,200 Indigenous people, 2.5% of the Australian population. They were younger than the non-indigenous (NI) population with a median age of 21 years, compared with 36 years. Most lived in regional areas (43%), with 32% in cities and 25% in remote areas. The retention rates for students to Year 10 and beyond was 91%, an increase of 8% since 1998. Year 12 completion rates were 23%, an increase of 3% from 2001. The unemployment rate for those aged 15-64 years was 16%, well above the NI rate of 5%. The median household income was $362 per week, just above half the NI figure of $642. One in every two Indigenous households was receiving some form of government housing assistance.

But what of health? The life expectancy at birth was 67.2 years for Indigenous males and 72.9 years for females, deficits of about 10 years from the NI figures of 78.7 and 82.6 years. Causes of serious long-term health problems for Indigenous people were cardiovascular disease, diabetes, respiratory diseases, musculoskeletal conditions, kidney disease, and eye and ear disorders. Half of all Indigenous people over the age of 15 smoked. Indigenous people were admitted to hospital for renal dialysis at 14 times the rate of the NI; general practitioners saw Indigenous people with diabetes at 3 times the rate of the NI, but at similar rates for other illnesses. Indigenous adults were twice as likely as NI to report high or very high levels of psychological distress.

There have been energetic steps to overcome these problems.

In 2009 the Australian Government Department of Health and Ageing established an Office of Aboriginal and Torres Strait Health, and with agreement of the Council of Australian Governments, set out a series of targets.[24] Attainment of these will lead to solving problems such as the disparity in life expectancy, the high mortality of children under 5, the low attainment of Year 12, and high unemployment. Meanwhile there is a growing role of medical schools in addressing health needs of Indigenous Peoples, first by encouraging entry of increasing numbers of Indigenous students into the medical course, second by building instruction in Indigenous life and health into the medical curriculum, thirdly by establishing and/or supporting institutions devoted to Indigenous health and advancement.

Indigenous medical students. Efforts to bring Indigenous students into Australian medical schools began in the 1980s with spreading of information to schools, reservation of places, and identification of tutors and mentors. A lead was taken by the University of Newcastle, NSW medical school, with particular emphasis upon encouragement and a support network. By 2007 it had produced 51 Indigenous doctors, more than half of all such graduates in Australia.[25] The University of Western Australia had similar enthusiasm and in 1996 established the Centre for Aboriginal Health, to improve recruitment and retention of Indigenous students. A graduate of the school in 1983, said to be the first Aboriginal doctor in Australia, is now Professor of Psychiatry.[26] The University of Queensland followed a similar path and a graduate of 1990 has told of his work at the Inala Indigenous Health Service in Brisbane. On his arrival in 1994 there were only 12 patients on the books. Fifteen years later there were three thousand, and he sees the Service developing as a centre of excellence for Indigenous primary care.[26] At James Cook University medical school in North Queensland a team of Indigenous students tours high schools with a road show for Years 10-12; similar exercises are run by most Australian medical schools.

The programs are seen as providing Indigenous doctors who it is hoped will wish to work in Indigenous health, either in urban or rural settings. A booklet from the Australian Indigenous Doctors' Association (AIDA) gives photos and life stories of 20 graduates, including those above, who demonstrate this desire.[26] A senior medical dean said there were now 150 Indigenous students in training; he believes there is a need for 450.[27]

The Indigenous medical curriculum. A curriculum framework for Indigenous Health was developed and accepted by the Committee of Deans of Australian Medical Schools in 2004.[28] A collaboration agreement was reached by the Deans and AIDA[29] and the curriculum was subsequently adopted by the Australian Medical Council (AMC), an independent national body that assesses medical schools, postgraduate colleges and international medical graduates. It now forms part of the standards required to be met by Schools.[30] Accordingly, students learn about Aboriginal and Torres Strait history, culture and medicines, population health, health service delivery, clinical presentations common in Indigenous people and communication skills. They learn about working with Indigenous people.

The significance of this requirement is seen in the 2002 AMC Accreditation Report of James Cook University Medical School.[31] Under the heading *Indigenous People's health* it states:

> *The ability to train a skilled workforce of doctors to work in Aboriginal and Torres Strait Islander health is a major claim for justification of the JCU School of Medicine. The comprehensive approach to Indigenous Peoples health in the curriculum reflects this focus.*
> *JCU is to be commended for developing a curriculum that provides early exposure to the problems facing delivery of health care to remote communities and for Indigenous people.* (continues)

It has developed a curriculum that is sensitive to the particular needs of Indigenous Australians, and which provides an introduction to anthropology and training in cultural awareness.

Institutions related to Indigenous Health. Nearly all medical schools in Australia have an institute devoted to promoting Indigenous health and research, and supporting Aboriginal and Torres Strait Islander students. Some have simple titles – the UQ Centre for Indigenous Health; the Centre for Aboriginal Medical and Dental Health at the University of Western Australia. Others have Aboriginal names – Yaitya Purruna Indigenous Health Unit at the University of Adelaide; Nura Gili at the University of New South Wales.
Melbourne University has the Murrup Barak Institute for Indigenous Development and the Onemda Koori Health Unit. Most institutions have Indigenous medical and other staff. Medical schools are thus deeply involved in encouraging Aboriginal and Torres Strait students and providing knowledge of Indigenous health and welfare to all students. The growth in number of Indigenous graduates and the work of those described in the AIDA booklet bode well for this Social Mission.

Conclusion

The development of medical education in Australia in the last 20 years has been closely linked to health and social policy through specific Australian Government programs and University initiatives. The increasing student experience of general practice and rural health and the growth of Indigenous student involvement in medical courses and practices are evidence that the medical schools are striving sensibly and effectively to meet the social expectations of society.

References

1. Population Clock. Australian Bureau of Statistics 2010. http://abs.gov.au/ausstats/abs

2. Labour Force, Medical 2007. Australian Institute of Health and Welfare. http://www.aihw.gov.au/labourforce/medical.cfm

3. Australian Historical Population Statistics, 2008. Australian Bureau of Statistics. http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/ED3777A70ACA4E0DCA25749B00176970/$File/3105065001ds0001_2008.xls#'Table 1.2'!A1

4. Self Sufficiency and International Medical Graduates – Australia. National Health Workforce Taskforce 2008. http://www.nhwt.gov.au/documents/NHWT/

5. The Supply of Physician Services in OECD Countries. Organisation for Economic Co-operation and Development 2006. http://www.oecd.org/dataoecd/27/22/35987490.pdf

6. Clinical Placements across Australia: capturing data and understanding demand and capacity. National Health Workforce Taskforce 2008. http://www.nhwt.gov.au/documents/Education%20and%20Training/Clinical%20placements%20across%20Australia%20-%20Capturing%20data%20and%20understanding%20demand%20and%20capacity.pdf

7. National Clinical Training Review: Report to the Medical Training Review Panel. Medical Deans of Australia and New Zealand 2008. http://www.medicaldeans.org.au/pdf/Medical%20Deans%20National%20Clinical%20Training%20Review%20March.pdf

8. The Cost Conundrum: What a Texas town can teach us about health care. *The New Yorker 2009; June 1.*

9. Accessibility/Remoteness Index of Australia, 2009. Queensland Office of Economic and Statistical Research. http://www.oesr.qld.gov.au/about-statistics/statistical-standards/national/aria.shtml

10. Murray RB, Wronski I. When the tide goes out: health workforce in rural, remote and Indigenous communities. *MJA* 2006; **185;** 37-38.

11. Rural Australia Medical Undergraduate Scholarship (RAMUS) Scheme. Department of Health and Ageing 2010. http://nrha.ruralhealth.org.au/scholarships/?IntCatId=7

12. Medical Rural Bonded Scholarship (MRBS) Scheme. Department of Health and Ageing. 2010. http://www.health.gov.au/internet/main/publishing.nsf/Content.work-st-mr . .

13. Evaluation of the University Departments of Rural Health Program and the Rural Clinical Schools Program. Department of Health and Ageing 2008. http://www.health.gov.au/internet/main/publishing.nsf/Content/work-pubs-eval-udrh

14. Ranmuthugala G, Humphreys J, Solarsh B, Wakerman J, Dunbar JA, Solarsh G. Identifying the aspects of rural exposure that influence medical students to take up rural practice. *Med Educ* 2007; **41:**718-719**.**

15. Jones ML, Humphreys J, Prideaux D. Predicting medical students' intentions to take up rural practice after graduation. *Med Educ* 2009; **43**;1001-1009.

16. Worley P, Martin A, Prideaux D et alii. Vocational career paths of graduate entry medical students at Flinders University : a comparison of rural, remote and tertiary tracks. *MJA* 2008; **188:** 177-178

17**.** Veitch C, Underhill A, Hays RB. The career aspirations and location intentions of James Cook University's first cohort of medical students: a longitudinal study at course entry and graduation. *Rural Remote Health (on line)* 2006**; 6**: Article No 537.

18. Wilkinson DW, Beilby JJ, Thompson DJ et alii. Associations between rural background and where South Australian general practitioners work. *MJA* 2000; **173:** 137-140**.**

19. Worley P, Prideaux D, Strasser R et alii. Empirical evidence for symbiotic medical education: a comparative analysis of community and tertiary-based programmes. *Med Educ* 2006. **40:**109-116.

20. Waters B, Hughes, Forbes K, Wilkinson D. Comparative academic performance of medical students in rural and urban clinical settings. *Med Educ* 2006.**40:**117-120.

21. Dunbarbin J, Levitt L. rural origin and rural medical exposure: their impact on the rural and emote medical workforce in Australia. *Rural and Remote Health (online)* 2003**; 3:** Article No 212.

22. Worley P, Esterman A, Prideaux D. Cohort study of examination performance of undergraduate medical students learning in community settings. *BMJ* **328;** 207-209.

23. Pink B, Allbon P. The health and welfare of Australia's Aboriginal and Torres Strait Islander Peoples 2008. Australian Bureau of Statistics. http://www.aihw.gov.au/publications/ihw/hwaatsip08/hwaatsip08.pdf

24. National Partnership agreement on Closing the Gap in Indigenous Health Outcomes: Implementation Plan 2008. Australian Department of Health and Ageing. http://www.coag.gov.au/intergov_agreements/federal_financial_relations/docs/national_partnership/NP_closing_the_Gap_indigenous_health_outcomes.rtf

25. Lawson KA, Armstrong RM, Van der Weydon MB. Training indigenous doctors for Australia: Shooting the goal. *MJA* 2007; **186:**547-550**.**

26. Journeys into Medicine 2009. Australian Indigenous Doctors' Association, Canberra ACT. http://www.aida.org.au/pdf/Journeys.pdf

27. Professor James Angus. Personal communication 2010.

28. Indigenous Health Curriculum Framework 2004. Deans of Australian Medical Schools. http://www.medicaldeans.org.au/pdf/CDAMS%20Indigenous%20Health%20Curriculum%20Framework.pdf

29. Medical Deans of Australia and New Zealand and The Australian Indigenous Doctors' Association: Collaboration Agreement 2008-2011.

30. Assessment and Accreditation of Medical Schools: Standards and Procedures 2009. Australian Medical Council Limited, Fyshwick ACT 2609.

31. Accreditation of the School of Medicine, James Cook University 2002. Australian Medical Council, Fyshwick ACT 2609.

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