the difficulty in comparing students from different universities, each with completely different examinations and marking systems. A national examination could provide a sound basis for comparing all graduates against each other nationally. From an administrative point of view, this would line up well with the advent of compulsory registration with the Medical Board of Australia, which began on the 1st of July 2010. However, whether a competitive allocation system is of itself desirable is another issue. Certainly, it would render the final year of medical school much more stressful for many, and may create stark disparities between hospitals, as the students with the poorest performances would inevitably end up at the least popular hospitals. On the other hand, nothing drives quality more than competition.

One must also keep in mind that a higher degree of standardisation does not necessarily equate with higher standards. There is no use in having a national curriculum or examination if the bar is set too low. The stakes involved in devising a system and ensuring its rigour would be enormous, with the danger that such a project may be hijacked by politics and vested interests. There would also need to be measures to ensure that a national system did not become overly cumbersome and resistant to change. Effective avenues for ongoing feedback and adaptation to changing healthcare needs would be critical.

Neither a national curriculum nor national examination should be rushed into. The intention of the authors is simply to stimulate a rigorous student discussion about this issue, and we hope to see the Australian Medical Student Journal facilitate this going into the future. Wheels are beginning to turn in this area, and it is important that we as students are not shut out of the debate, or potentially, the design.

Acknowledgement

References

[1] Australian Medical Council. Assessment and Accreditation of Medical Schools: Standards and Procedures, 2009 [Online]. 2009 [cited 2011 Feb 14]; Available from: URL:http://www.amc.org.au/images/Medschool/standards.pdf
[2] Craig S, Tait N, Boers D, McAndrew D. Review of anatomy education in Australian and New Zealand medical schools. ANZ J Surg 2010;80(4):212-6.

[3] Chapuis P, Fahrer M, Eizenberg N, Fahrer C, Bokey L. Should there be a national core curriculum for anatomy? ANZ J Surg 2010;80(7-8):475-7.
[4] Creswell A. Call for national medical curriculum. The Australian 2010 Feb 2.
[5] Kirchner S. Using this 'Internet' Thing to Create a National Curriculum. Panacea 2010;44(1):36-7.
[6] Australian Medical Students' Association. Policy

Document: National Barrier Exam [Online]. 2010 Feb [cited 2011 Feb 14]; Available from: URL:http://www.amsa.org.au/sites/default/files/Policy-National%20Barrier%20Exam.pdf
[7] Australian Medical Council. International Medical Graduates [Online]. 2011 Feb 11 [cited 2011 Feb 14]; Available from: URL:http://www.amc.org.au/index.php/img

Telemedicine: The possibilities, practicalities and pitfalls

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The internet has woven itself into the fabric of society, by offering a plethora of services which have evolved from luxuries to necessities. Telemedicine - the use of the internet to transmit information for diagnosis and management - has garnered recent attention because of the Federal Government's promise to provide AU$392million for its development, and the proposed national broadband network which may increase the efficiency of telemedical services. [1,2] Telemedicine, endorsed by the Australian Medical Association, [3] has a number of applications; however, the most highly publicised of these is the concept of online interactive consultations with a specialist practitioner in real-time, potentially using a Skype™-like platform.

In the coming years, telemedicine will likely play a significant role in our careers and as such, we must have an understanding of both its benefits and limitations. Despite the obvious potential of telemedicine, several questions remain in the minds of the public, doctors and also medical students. The first is: do we really require telemedicine? The costs are significant, but so is the need for the 12% of Australia's population inhabiting outer regional and remote locales - data travels significantly faster over hundreds of kilometres than patients and their families. For example,

geriatric patients even in the relatively large Queensland town of Rockhampton may need to travel over 600 kilometres to their nearest geriatrician. [4] For frail elderly patients, this is hardly practical. To help address this, the University of Queensland's Centre for Online Health currently provides approximately 2,200 inpatient and outpatient consultations annually, primarily for geriatric and paediatric patients. A designated outpatient clinic exists at the Royal Children's Hospital, Brisbane, and the transmission of video, radiological images, laboratory data and medical records allow distant consultants to conduct 'video ward rounds' for their inpatients. [4,5]

Nonetheless, even if there is a need for telemedicine, is it effective? Can doctors really diagnose and treat patients they are not in the physical presence of? Although telemedicine has been studied in several ways, two particular studies investigated these questions. A Canadian randomised controlled trial found that telepsychiatry and face-to-face psychiatry produced equivalent clinical outcomes [n = 495]. Further, when comparing the travel and accommodation costs of patients versus the cost of videoconferencing technology, the authors found the costs of the latter to be 10% cheaper. [6] Similarly, a Scottish study which compared 44 outpatient diagnoses and management plans made by a neurologist in a face-to-face consultation and

one in a video consultation found there was complete agreement. [7] These data suggest telemedicine can be just as effective, and less costly, as conventional face-to-face medicine in specialist outpatient scenarios.

The main suggested purpose of telemedicine is to manage chronic conditions, which comprise the majority of the burden of disease in Australia. Telemedicine, however, is a far more versatile and powerful tool, and will likely play a role in our careers, no matter which medical or surgical fields we choose to enter. The reach of telemedicine even extends into the domain of the Emergency Department (ED). For example, the Victorian Stroke Telemedicine project allows neurologists in

Melbourne to be consulted by ED at Bendigo hospital, over 150 kilometres away. This is important because, when administered within three hours of the onset of ischaemic stroke, tissue plasminogen activator (tPA) is associated with higher rates of recovery. [8] Due to a lack of practitioners experienced in its use and the risk of intracerebral haemorrhage, tPA is not widely used, particularly in regional areas. Transferring stroke patients to an urban hospital for tPA will be futile if the three hour window closes whilst the patient is in transit. Videoconferencing allows for a discussion of the clinical features and the transmission of the requisite CT scan and laboratory results by ED staff in Bendigo to a neurologist in Melbourne, who will determine whether tPA is appropriate. A German study investigating this clinical situation showed a reduction in poor stroke outcomes as defined by low Barthel or Rankin scores, where a poor outcome was defined as a Barthel index <60 and/or a modified Rankin scale score >3 [44% versus 54% in control group, p < 0.0001]. [9]

There are several other applications of emergency telemedicine, which have not yet been trialled in Australia, but may become crucial in years to come. In severe trauma, patient outcomes significantly decline after 'the golden hour.' Critically injured trauma patients in rural hospitals may need air or ground transport to a distant referral hospital, during which time they may die. A retrospective analysis of trauma presentations in rural Arizona found that the use of telemedicine was deemed lifesaving in five out of 35 cases. [10] An American multi-centre study evaluated the utility of telemedicine in the assessment and treatment of burns. Among its findings were that burn centre physicians' ability to estimate burn severity was not impaired by video broadcast, and unnecessary air transport due to over-triage was reduced. [11] These findings were echoed by a study analysing 51 cases of trauma in Mississippi with total costs being reduced sevenfold, as only the most serious

cases required subsequent transfer. In this study, however, mortality was not influenced by the implementation of telemedicine. [12]

The benefits of telemedicine include novel educational techniques. One particularly exciting application is in surgical mentoring. [13] A recent study describes the intra-operative instruction of eight general surgeons by experienced off-site specialist surgeons via videoconferencing. [14] The study concluded that surgical 'telementoring' improved both the outcomes for patients and the confidence and knowledge of less experienced surgeons, particularly when laparoscopic images can be transmitted directly to the off-site surgeon. Surgical telementoring may prove to be invaluable for those who choose to pursue a career in surgery, particularly in rural locations.

Telemedicine is needed in Australia, and it can be of benefit in both outpatient and critical care situations. Nevertheless, before launching hastily into a national system, there are barriers which need careful consideration. The most obvious limitation of telemedicine is that the distant specialist cannot physically examine the patient. In some circumstances such as dermatology, psychiatry and dementia syndromes, adequate examination can be performed via videoconference. In general, the onus is on the local General Practitioner (GP) to have elicited the relevant signs and to relay this information. In these situations, however, the issue of liability becomes clouded. If a GP misses or does not report an examination sign, and a specialist acts on this incomplete information, who is liable for potential mismanagement of the patient? Will medical insurance companies cover online consultations? When available, however, the transmission of high resolution medical images may often bypass the need for a detailed clinical examination.

The major barrier to telemedicine expansion for many years was the lack of financial incentives for practitioners. The Federal

Government has addressed this barrier by proposing to remunerate GPs $100 for each consultation they establish and specialists $180 per consultation. [2] This is, on average, $34 more than what each would receive for standard face-to-face consultations. [15]

Is the internet fast enough for widespread telemedicine? While current internet speed is often sufficient, the national broadband network, when completed, is predicted to elevate speeds sufficiently to allow the transmission of complex data such as MRI scans. It remains to be seen whether connections can be sustained without frustrating drop outs or slow downs.

Since the protection of confidentiality in all aspects of medicine is paramount, concerns have been raised over the security of online videoconferencing. Currently, to protect eavesdropping, most telemedicine services use a 256-bit random digit key generated jointly by both conversing parties. It is infeasible that an outsider could crack a code with this many permutations, and hence the security of a videoconference far exceeds that of telephone calls and emails. [16] Security concerns, however, do not end there. Should consultations be recorded and stored? If so, what security measures must be taken to protect them from unauthorised use?

Widespread use of telemedicine may have a significant impact on healthcare in Australia's regional and rural areas. Evidence exists to support videoconferencing as a safe and effective alternative to traditional face-to-face consultations, as well as in emergency situations and in the training of rural surgeons. Telemedicine can be an important, effective and lucrative aspect of our own future medical practices, but concerns over security and liability must first be investigated and addressed before its implementation on a wider basis. Yes, it can work, and yes we do need it, because for rural Australians, specialist medical care must evolve from a luxury to a necessity.

References

[1] Gillard J. Let's move Australia forward [Speech transcript]. Brisbane; 2010 [updated 2010; cited 2010 October 4]. Available from:URL: http://www.alp.org.au/federal-government/news/speech--julia-gillard,-alp-campaign-launch,-brisba/

[2] Australian Medical Association. Telemedicine an important component of a modern health system [Internet]. 2010 [updated 2010; cited 2010 October 4]. Available from:URL: http://ama.com.au/node/5976

[3] Australian Labor Party. Connecting health services with the future. Canberra: ALP; 2010.

[4] Smith A, Gray L. Telemedicine across the ages. Med J Aust 2009;190(1):15-9.

[5] University of Queensland. Centre for Online Health: Service [Internet]. 2007 [updated 2007; cited 2010 October 4]. Available from:URL: http://www.uq.edu.au/coh/

[6] O'Reilly R, Bishop J, Maddox K, Hutchinson L, Fisman M, Takhar J. Is telepsychiatry equivalent to face-to-

face psychiatry? Results from a randomized controlled equivalence trial. Psych Serv 2007;58:836-43.

[7] Duncan C, Dorrian C, Crowley P, Coleman R, Patterson V. Safety and effectiveness of telemedicine for neurology outpatients. Scott Med J 2010;55(1):3-5.

[8] The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group. Tissue plasminogen activator for acute ischemic stroke. N Engl J Med 1995;333(24):1581-7.

[9] Audebert H, Schenkel J, Heuschmann P. Effects of the implementation of a telemedical stroke network: The Telemedic Pilot Project for Integrative Stroke Care [TEMPiS] in Bavaria, Germany. Lancet Neurol 2006;5(9):742-8.

[10] Latifi R, Hadeed G, Rhee P, O'Keeffe T, Friese R, Wynne J, et al. Initial experiences and outcomes of telepresence in the management of trauma and emergency surgical patients. Am J Surg 2009;198(6):905-10.

[11] Saffle J, Edelman L, Theurer L, Morris S, Cochran A.

Telemedicine evaluation of acute burns is accurate and cost-effective. J Trauma 2009;67(2):358-65.

[12] Duchesne J, Kyle A, Simmons J, Islam S, Schmieg R, Olivier J, et al. Impact of telemedicine upon rural trauma care. J Trauma 2008;64(1):92-8.

[13] Augestad K, Lindsetmo R. Overcoming distance: Video-conferencing as a clinical and educational tool among surgeons. World J Surg 2009;33(7):1356-65.

[14] Ereso A, Garcia P, Tseng E, Gauger G, Kim H, Dua M, et al. Live transference of surgical subspecialty skills using telerobotic proctoring to remote general surgeons. J Am Coll Surg 2010;211(3):400-11.

[15] Australian Government. Medical Service Rates. n.d. [cited 2010 October 4]. Available from:URL: http://www.comcare.gov.au/claims/benefits__and__entitlements/medical_expenses/medical_service_rates

[16] Berson T. Skype Security Evaluation; 2005 Document Number ALR-2005-031.

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