Chapter 15
A connected Australia — now and in the future

Judith Walker, Dawn E DeWitt, Jonathan Newbury and Ann Larson

Learning objectives

- Describe how connectivity and connectedness might improve the quality of day-to-day rural health care delivery.
- Describe the variety of face-to-face and virtual connections that enable rural and remote practice in Australia.
- Describe how research opportunities may stem from electronic medical records and other forms of connectivity and connectedness.
- Explain specific electronic or collegial resources that will facilitate rural health providers' professional development.

Introduction

Brian, a 40-year old farmer suffered a total body crunch when his tractor overturned, falling on him. Called to deal with the acute situation, the connected GP and paramedic transmits video images of the patient, enabling consultation with the connected Crash Team, using nomadic computers (web-enabled palm devices with built-in wireless telephony, messaging, text and data display, multipoint conferencing and global positioning systems). The Crash Team, now physically assembled at the regional hospital, is ready to operate the minute Brian is evacuated into the hospital.

The GP, updated continuously through the online shared Electronic Health Records (EHR), keeps the family informed throughout the acute phase. The post-acute and rehabilitative care is managed by the GP and health team, including carer, with the online shared EHR and integrated decision support tools.

The Community Health Information Network (CHIN) of clinical teachers and learners, researchers, administrators and consumers, formed as part of continuous quality improvement of health care in the region, continues to connect policy makers, providers

and consumers, sharing information and resources, leading to shared decision making and common best practice.

The above scenario, futuristic as it may seem, demonstrates the natural progression of the electronic connectivity that has changed the world and the way we work and think as health professionals. Broadband cable, ADSL Internet connections, bluetooth and Wi-Fi-enabled communications and multimedia capture devices are becoming more affordable, as are powerful smartphones. Personal portals are gaining widespread popularity. Hospital wards and emergency departments are being wireless-enabled. With the increasing emphasis on shorter hospital stays and home care, this connectivity will spread out into the community via the Wi-Fi network. Software can be distributed via the public wireless networks, enabling the monitoring of clinical and other devices via secure and authenticated mobile phones.

The case studies that follow in this chapter illustrate the benefits of eConnectivity and connectedness to support personal lifestyle, professional care and development, improved access to services, challenges such as the technological and other barriers to eConnectivity and a horizon scan of possibilities in the short and medium term.

Case study 15.1 Connecting health professionals in rural Western Australia

When you join rural practice, you join a dispersed community of professionals. Opportunities come up that would never have arisen in the city, and you see the immediate effects of your innovation. You achieve this not in isolation, but by connecting with your peers, who frequently also become your teachers, mentors, students and best friends.

A WA regional health service prided itself on its telehealth program to support people caring for chronically unwell family members in isolated rural towns. However, they lacked formal evidence of its success. An experienced nurse and telehealth coordinator based at a regional centre took advantage of a six-week research fellowship and the support of the Combined Universities Centre for Rural Health (Western Australia's UDRH) and worked to increase rural health professionals' capacity to conduct evaluations. She loved the experience so much that she now regularly gives workshops with the local UDRH, has co-authored a paper, and is mentoring a young nurse. She is using her skills to increase the use of videoconferencing in the region. Most important to her, the project was helpful in gaining continuing funding for the telehealth program.

Telehealth is now standard in some remote areas, having been used successfully in psychiatry and dermatology. Many rural practitioners are using satellite broadband and many local hospitals have ISDN lines, enabling them to use videoconferencing, send X-rays or pictures of skin lesions for remote reporting, and exchange encrypted pathology and radiology reports. Much of the radiology is using DiCom tele-radiology infrastructure, but there is increasing use of the Picture Archive and Communications System (PACS) within the region.

Another way of looking at connectivity is the role of rural professional associations. Mainstream professional associations are notorious for finding it too difficult to meet the needs of their rural and remote peers. Seminars, conferences and annual general meetings are invariably held in capital cities and address the concerns of urban life and tertiary hospitals. In contrast, organisations such as the Council of Remote Area Nurses of Australia (CRANA) and the Australian College of Rural and Remote Medicine (ACRRM) are pioneers in connecting their membership. ACRRM is planning to run its candidate exams remotely via video assessment in a structured clinical setting. The Bush Crisis Line (a 24/7 counselling service for rural and remote health professionals) and RRMEO (a web-based professional education site for ACRRM members) are exemplars of providing practical services for a unique professional group.

Discussion

Rural health care providers speak of the joys of cradle-to-grave practice. Health service managers, educators and researchers also have the opportunity to take a wisp of an idea and nurture it until it is a fully fledged program that is making a difference and setting standards nationally and internationally. The lack of technical and semantic standardisation is a significant issue. Firewalls that provide security, especially for clinical services, are significant barriers to educational communication that links academic/educational issues, research opportunities, and clinical services. Imagine a student presenting a case with an interesting radiological finding in a classroom across the street from a rural hospital. The hospital has digital radiology, but the hospital and educational facility use separate Internet services with firewalls. Ideally, the students

would be able to bring up the X-ray, but the firewalls currently often make this impossible.

As rural health professionals become more connected to information sources, specialist advice from capital city practitioners, and peers working in remote communities in another state, we risk losing the intimacy that attracted us to the country. Fortunately, that does not need to be the case. For the professional moving to a rural town or remote community, the rewards of making new friendships, enjoying beautiful surroundings and practising excellent general care will be as great 30 years from now as they were 30 years ago. Research has shown that, despite initial concerns, greater electronic connections do not mean sacrificing local networks. In addition, new forms of connectedness in education and service delivery vastly expand the opportunities for lifelong rural and remote residents to gain health qualifications, find rewarding employment and develop professionally.

On the downside, patient use of email is low. Rural Australians do not appear to use the Internet as much as their metropolitan counterparts. However, there is much to hope for, and every reason to think, that Australia can solve the problems associated with a system of 'connected' rural health and make it come alive. As the new generation of health care students, you are the people who need to understand the challenges, refine the visions, and make it all happen.

Challenges for the learner and teacher

1. Look up the website of one of the professional clinical organisations that is not rural (eg a doctors or nurses group, such as a college). Does the organisation address rural issues specifically? What are the issues? Contrast these with the websites of specifically rural organisations, such as ACRRM and CRANA. What do they do? How are they different?
2. How are people recruited into rural and remote health practice? How can a metropolitan student or health care professional find out whether rural practice is for them?

Case study 15.2 A day in the eConnected life of a rural clinical educator and clinician

My typical day starts with a teleconference or videoconference. Through wireless and mobile phone eConnectivity, I can teleconference from home, in the car, from work, or away from home (for example at conferences) and receive my emails as well! During the teleconference, emails pile up in my inbox from all over Australia, and from colleagues and students around the world.

As I scan my email, I see notification of a new article in the *Rural and Remote Health (online)*. This journal allows authors from all over the world to submit papers online and follow their progress — unthinkable 10 years ago! eReviewing assists the international panel of reviewers and allows articles to be edited and published much more quickly than print publications.

Finally, there is an encrypted secure email, through my clinical email account, from a patient asking if I can write a repeat prescription for him, to be picked up at the clinic desk.

On my morning ward rounds, I use my handheld pocket PC to search UpToDate© or pharmaceutical databases and to log cases and procedures at the bedside, usually in conjunction with students or postgraduates. I also use the computer in my consulting room to search the web using databases such as MEDLINE, the Cochrane database, UpToDate©, and MIMS (Australian pharmaceutical database) for answers to clinical questions that arise during ward rounds or during clinics. During my clinic, a research question arises about the prevalence of obesity in the clinic population and a search of the clinic's electronic medical record/database yields the number of clients with a diagnosis of obesity in the practice. I can cross-reference this by searching Body Mass Index (BMI). The clinic hopes to use this information to argue for rural patient access to new obesity therapies that are currently only available at metropolitan hospitals; the clinical team hopes to have students do health checks and update their database; and the research team hopes to write a research grant to study the effect of availability of these therapies to the rural community when they don't have to travel to the city to access such therapies.

A patient comes in asking about shark cartilage as a treatment for his brain tumour. We search the 'Natural Medicines' database and decide that the therapy probably won't help and might have some risks based on his other medical problems. Instead, I ring another colleague to ask where I could get a second opinion about the patient's cancer treatment.

After clinic, I lead a student tutorial with a slide show using digital photos I have taken of dermatological problems. When I get home, I quickly check my email and find an email and photograph from a post-graduate trainee, who I have been assigned to as a 'distance mentor' for the last year, telling me that she is getting married and moving to the UK to do a year of training there.

I reflect on the wonders of being able to write a paper with colleagues from across the world in days rather than months. I also despair about keeping up with email, how to get rid of spam, and the email–mobile phone dilemma of being expected to respond immediately to all communications (because I must be connected, right?). I think there must be a research study in there about mental health and demands of connectedness in this way; but then I remember the studies showing that one of the best predictors of health and decreased mortality is being socially connected (through marriage or partnership, volunteering, and/or religious and social groups). So, the challenges and perils of being connected come back full circle, as I smile at the email from a former mentee, thanking me for being her 'distance mentor.' The attached pictures show her winning a 'best paper' award at a conference and her engagement party — it's all about being connected!

Discussion

As a rurally-based clinician and medical educator, being 'connected' is essential to collect, process and disseminate information with students, clients and colleagues. The Australian Government Department of Health and Ageing (DoHA) funding for the UDRH and RCS programs has enabled the establishment of infrastructure networks to support videoconferencing and interactive eLearning across rural Australia. The rural satellite network regularly broadcasts educational programs. Interactive websites offer students cases, incorporating radiology, histology, microbiology, quizzes and feedback.

In the future, these formats will be embedded into training and, hopefully, teachers will be trained on how best to teach inclusively and interactively via videoconference.

Distance mentoring, and even remote clinical examinations currently being piloted by the Australian College of Rural and Remote Medicine (ACRRM), will be common, reducing the burden of travel for learners and examiners. However, research has shown that students still need face-to-face teaching and that it is hard to impart clinical and teamwork skills remotely. Bedside teaching will always be needed and computers will probably never replace a mentor.

Challenges for the learner and teacher

1. Consider the use of email between health care providers. What are the benefits and disadvantages for clients and providers? What are the privacy and appropriateness issues?
2. Discuss when and how 'distance mentors' could be useful for you. What are the barriers? Are there times when distance mentoring just cannot work?

Case study 15.3 A shared electronic health record for eHealth and eResearch

The Explorer Clinic in Port Abraham, a small coastal town in South Australia, is a large group general practice where the GPs and nursing staff access the same electronic health record (EHR). All appointment and billing information is managed by administrative staff who have separate security levels to access that part of the EHR system. Patient demographic details and clinical information are recorded in discrete fields (eg presenting symptoms, examination findings, management and diagnoses) and coded using the International Classification of Primary Care. Nursing staff perform and record all immunisations according to the childhood schedule (updated from the Internet) or opportunistic adult immunisations. Immunisations that are overdue generate a reminder at the start of a consultation.

In addition, following training and support, the clinicians in the Explorer Clinic are able to examine the EHR data for information about their clients and their professional practice. Clinical questions are generated from the database. These data mining activities are particularly useful because, unlike urban practices, rural practices serve the entire spectrum of their community over many generations.

Port Abraham is also part of a number of regional clinical networks defining ways to streamline care for particular groups of clients. An example is iCCnet SA, the Integrated Cardiovascular Clinical Network South Australia, which links rural GPs and hospitals with Adelaide-based cardiologists for interpretation of urgent ECGs, retrieval of urgent results and interventional managements of acute coronary events.

The Port Abraham Aboriginal Health Service (PAAHS) is located within the same building as the Explorer Clinic, but is separately managed by the local Indigenous community council. Several visiting GPs provide health services to Indigenous clients through the PAAHS; they keep hand-written patient records in manila folders. Indigenous clients use the other mainstream

health services in town for inpatient services, mental health services, after-hours care and secondary and tertiary care.

There is an ongoing debate as to whether Indigenous Australians should continue to have access to specific Indigenous health services or whether mainstream services should continue to adapt and improve their cultural security for Indigenous clients and staff.

A centralised or shared electronic record would enable all these services to access and contribute to a complete health record for each person, which should produce more effective coordinated care. Confidentiality of information in small towns is always important, but is a particularly sensitive issue for marginalised minority groups, such as the Indigenous community. While efficiency directs us to centralise health records for all services, community preferences might argue that privacy and security is more important for particular services or particular population groups.

Discussion

EHR, with security and confidentiality measures in place, can benefit health care and provide endless opportunities for eResearch. A shared EHR should let us consistently and accurately describe, document, share and use the information about people's journeys through the health care system, and about health outcomes at relevant points. The CONDUIT (Collaborative Network and Data Using IT, www.conduit.unimelb.edu.au) program in the Goulburn Murray Valley in Victoria uses record-linkage techniques and Internet-based technologies to link the health records of GPs and specialist health services, many of whom use different computer systems. This information network enables the sharing of information across the continuum of primary and secondary care to support clinical care, audit and research. The network of linked GP and health services information systems can improve safety and quality of care, quality of research, health planning and policy.

While information and communication technology, particularly the Internet, is being used as the vehicle for information sharing, the health card with a magnetic strip or computer chip (smartcard) is also being promoted. In this situation, the patient is the controller of information sharing. The proposed Health Access Card is an example, although it plans only to record uses of health services.

National health cards or information networks should and can improve health care and overcome access issues. Consensus on privacy, security and research protocols should facilitate research using linked and integrated databases from primary and secondary care. This should also allow us to provide state-of-the-art services for clients by allowing health care professionals full access to patient information, thus saving repeated investigations into, or morbidity from, adverse drug-drug interactions, and saving the health care system millions of dollars. The eResearch made possible would enable researchers to answer crucial questions, such as the national immunisation rate for influenza, or patient access to cardiac services.

However, despite much rhetoric in the past two decades, there is still a significant shortfall in the systems and resources needed to support the adoption of eHealth and a shared EHR (see also Table 14.1).

Many of the eChallenges for Australia relate to the vast distances; and thus the costs of physically installing the hardware for high-speed Internet and videoconferencing services. However, the benefits for Australia are huge, as we face critical shortages not only in health care providers, but also in educators for health care professionals. The relative smallness of the Australian population makes it feasible for us to be world leaders in these areas; but, the current structure within which funding of health services operates, particularly in terms of the division between federal, state and territory responsibilities makes it difficult to run collaborative projects across health services, or to provide education that is funded by different sectors.

Challenges for the learner and teacher

1. Consider whether you would change the current paper-based system at PAAHS. Why or why not?
2. Are there electronic medical record systems available that might provide privacy for Indigenous (and non-Indigenous) Australians?
3. Consider the national debate on 'health smart cards' that clients might carry with them. What advantages or problems might such a system create?

Scanning the horizon

At the beginning of this chapter we were presented with a scenario about Brian and the response to his serious tractor accident by connected health care professionals and teams. We learnt about CHIN supporting 'communities of interest and practice', providing access to shared decision making and common best practice. The scenario demonstrated the natural progression of electronic connectivity. The world is changing. This scenario is technically possible and such scenarios are becoming reality. Likewise, in the case studies in this section, we have seen examples of the benefits and challenges of current rural eHealth innovations.

There is a significant amount of eConnectivity and eConnectedness, mainly through the broadband programs and communication carriers. However, we are nowhere near to achieving the potential of eConnectivity to support and enhance eHealth, eLearning and eResearch. Examples through case studies are described as 'innovation', 'advance' or 'project' and are not being implemented as part of mainstream activities.

Will eHealth be an accepted routine part of rural health business in two, five or even ten years' time when you may be a rural eHealth practitioner? Or will individual eHealth projects continue to be examples of the suboptimal implementation and use of eHealth tools, described as the rural eHealth paradox (Liaw and Humphreys 2006)? Will the digital divide of information haves and have-nots, knowers and know-nots, doers and do-nots continue to be a feature of rural health care?

Sir John Daniel, President of the Commonwealth of Learning asked: 'What will it take to replace the digital divide with a digital dividend?' (Daniel et al 2005). Is eHealth the solution to providing quality and cost-effective health services to the six million people in rural and remote Australia dispersed across 7.5 million square kilometres? Or is it just another over-hyped but underperforming attempt to connect technology to health care? Can we organise ourselves effectively to take advantage of technological opportunities?

D'Antoni (2002) outlined four questions about the usefulness of eLearning that are equally applicable to eHealth and eResearch:

- Is it accessible? For eHealth to have universal impact, practitioners and clients must be able to access it.
- Is it appropriate? Does it respond to rural health needs and suit cultural contexts?
- Is it quality-assured? Does eHealth promote trust and confidence?
- Is it affordable? If it is not affordable locally, digital dividend will not replace digital divide.

So, what does it take to make eHealth an integral part of the rural health landscape? Who must do what?

Governments can facilitate the context in which rural eHealth can flourish. They can surmount the barriers that limit the availability of bandwidth and address telecommunication affordability and legislation, and telecom company monopolies. They should specify national, state and territory policy and support an implementation plan for rural eHealth. Governments can legislate for benchmarks for adequate bandwidth and standards to enable cost-efficient and effective sharing of information in rural Australia.

Health care organisations, public and private, can provide infrastructure, skills training and professional support to rural health practitioners. They must also face important, sensitive, non-technical issues in developing eHealth:

- Institutional development and organisation — replacing existing policies and procedures conceived for a different health care environment and implementing change management structures that encompass cultural, organisational, operational and behavioural issues of introducing eHealth.
- Service issues — the choice of appropriate services for eHealth.
- Intrastate, interstate and national environment — partnerships and cooperation between public and private sectors to reduce the costs of eHealth resources.
- Management — overcoming the reluctance of managers to challenge their ICT specialists and engage in problematic issues in a systematic way.
- Decision making — taking decisions with a long-term perspective, looking beyond the present opportunity or budget cycle.

- Interprofessional teamwork — working with universities and other health education and training providers to prepare practitioners for inter-professional teamwork and facilitating a culture of eConnectvity.
- The concept of knowledge management (the creation, protection, development and sharing of knowledge assets) must be embraced as part of the paradigm shift in education from content only to content, process and meta-learning.
- Cultural safety and security issues must be addressed through improved connectivity and connectedness with patients and clients.

As current and future eHealth practitioners, we should harness our energies to the challenge of transforming the digital divide into a digital dividend for rural eHealth. Our aim must be to combine connectivity with health care resources so as to create an eHealth commons accessible to all rural and remote Australians.

Key points

- eConnectivity and eConnectedness is reducing the professional isolation of rural practitioners.
- New technological and academic support for practitioners is improving the range and quality of services to rural communities.
- A paradigm shift from baby boomer thinking to Generation Y thinking is required to bridge the digital divide and achieve a digital dividend.
- The digital dividend includes a shared electronic health record and decision-support systems that are routinely used by competent eHealth practitioners.

Recommended readings and resources

- Liaw S and Humphreys J (2006). The rural eHealth paradox — it's not just geography! *Australian Journal of Rural Health* 14:95–98.
- Gaster B, Knight CL, DeWitt DE, Sheffield JV, Assefi NP and Buchwald D (2003). Physicians' use of and attitudes toward electronic mail for patient communication. *Journal of General Internal Medicine* 18:385–389.
- Gates P and Urquhart J (2007). The electronic, 'paperless' medical office; has it arrived? *Internal Medicine Journal* 37(2):108–111.
- Hoffman DM (2007). The new era: going paperless with clinical software for physicians. *Internal Medicine Journal* 37(2):71–72.

These references discuss digital health practice and eHealth further. The paperless office is possible, but requires commitment and training of all staff; it is preferable, but not

absolutely essential, that at least one member of the practice has an interest and some expertise in computers.

Learning activities

1. Identify three databases on the web that would help you in your clinical field. How would they help you stay connected if you were in the rural workforce?
2. Research how patient access to web information about medical treatments helps or harms clients.
3. If you participate in a clinical placement opportunity, investigate what clinical information is available electronically at the site.
4. Write a paragraph sketch of a new initiative based on a problem you have seen in rural health. Who would be the major stakeholders (eg government, citizens, health services, etc)?