

Health

3.1 Health is undoubtedly seen as the sector that will benefit most from the NBN. This was evident throughout the course of the inquiry – health was discussed in more than two thirds of submissions and at all of the hearings.

3.2 The Broadband Commission for Digital Development’s recent report argued that:

E-health is one of the most compelling applications to take advantage of high-speed broadband networks. In countries with a clear policy for an advanced broadband infrastructure, e-health allows citizens to enjoy advances in medical technology and services, at more affordable costs.¹

3.3 The terms e-health and tele-health are often used interchangeably. The correct use of the terms was clarified in the submission of the Australasian Telehealth Society:

The term Tele-health refers to healthcare delivery, or closely-related processes (such as education), when some of the participants are separated by distance and information and communications technologies are used to overcome that distance ...

Tele-health is usually considered to be a subset of e-health, which refers to the use of Information and Communications Technologies (ICT) in healthcare. A primary focus of e-health is the implementation and use of Electronic Medical Records.²

1 Broadband Commission for Digital Development, *Broadband: A Platform for Progress*, June 2011, p. 100.

2 Australasian Telehealth Society, *Submission 101*, p. 4.

- 3.4 This chapter looks at the development of e-health in Australia, particularly tele-health services, and examines the likely impact of the NBN.

Why is e-health important?

- 3.5 As has been widely publicised over recent years, health care costs are expected to increase dramatically in the future. The situation was summarised in the Department of Broadband, Communications and the Digital Economy's (DBCDE) submission:

An ageing population, increasing rates of chronic disease and a shortage of health and care professionals is expected to put significant pressure on Australia's health care systems and budgets in coming years. The percentage of the Australian population over the age of 65 is predicted to grow from 13.5 per cent in 2010 to 22.6 per cent in 2050. Over the same period real health spending on those aged over 65 is expected to increase seven fold. Against this background there is a need to find new ways of delivering health care services efficiently and effectively, that also meet patient expectations.³

- 3.6 A similar point was made by NSW Health:

With the rise of chronic disease expected to account for almost three quarters of all deaths by the year 2020, and chronic disease already accounting for more than 80 per cent of the burden of disease and injury in Australia, establishment of a national telecommunications network which would support delivery of services via tele-health is critical to minimise the influence that chronic health has on health budgets.⁴

- 3.7 The widespread implementation e-health, facilitated by the NBN, will improve the efficiency of the health sector and generate significant financial savings for government, as well as savings and quality of life improvements for citizens. This point was made in the submission of the Institute for a Broadband Enabled Society (IBES):

Ubiquitous and high-speed broadband has the potential to dramatically transform the health care sector. The application of video-conferencing, sensor networks and enhanced information

3 DBCDE, *Submission 215*, p. 9.

4 NSW Health, *Submission 117*, p. 1.

management systems can drive productivity growth in hospitals, general practice and support patients in their home.⁵

- 3.8 The Broadband Commission for Digital Development has suggested that ‘cost savings through the use of e-health are expected to be between 10 per cent and 20 per cent of total healthcare costs, while maintaining a good quality of service.’⁶ An Access Economics Study from 2010 found that the benefits to Australia from extensive implementation of tele-health may be in the order of \$2–4 billion per annum.⁷ The Australian Information Industry Association cited a Booz & Co study that:

... estimated that rollout and adoption of core e-health capabilities in Australia is expected to be worth an estimated \$7.6 billion annually by 2020, with the primary benefits stemming from reduced errors, enhanced adherence to best practice, and enhanced workforce productivity.⁸

- 3.9 The Australasian Telehealth Society described some of the ways that savings can be realised in practice:

- Early intervention for patients in rural and remote areas can help to avoid costly hospital stays and more expensive treatment if the condition is left untreated.
- Trauma patients admitted to emergency departments of rural, remote and regional hospitals can receive appropriate intervention in the ‘golden hour’ following their injury, reducing further costs.
- Ageing in place delays the commencement of full-time residential care and the high personal and community costs of that care.
- Self management of chronic disease helps avoid costly interventions and residential care.
- Better targeted evacuations of patients needing care in major hospitals reduces the costs of caring for those patients, especially if they require special care during evacuations (e.g. ICU patients).
- The cost of visiting major centres for outpatients and their families can be reduced or avoided completely.

5 IBES, *Submission 84*, p. 6.

6 Broadband Commission for Digital Development, *Broadband: A Platform for Progress*, June 2011, p. 98.

7 Access Economics, *Financial and externality impacts of high-speed broadband for tele-health*, July 2010, p. i.

8 AIIA, *Submission 184*, p. 12.

- Medical errors and the costs of dealing with their consequences can be reduced.⁹

3.10 The submission also described how e-health applications could help improve the utilisation of an already stretched health workforce:

While tele-health cannot create new health professionals, it can play a role in ensuring that the existing workforce is used efficiently and to its full capacity. For example, a specialist located in one hospital can deliver some services across a number of centres, helping to maintain facilities such as intensive care units in centres which might not be large enough to make use of such a specialist on a full time basis.¹⁰

3.11 Implementation of e-health initiatives is currently constrained by the inconsistent nature of broadband across the country, particularly in rural areas. CSIRO gave an example where broadband access has restricted the widespread implementation of a worthwhile e-health initiative:

The Virtual Critical Care Unit (ViCCU) ... was successfully trialled between Katoomba and Lithgow hospitals. The ViCCU system was an outstanding success, however, it was not rolled out across the state, due to the lack of a broadband communications network. A national high-speed network will reduce network connectivity costs and will stimulate the use of such tele-health technologies.¹¹

3.12 While many of the e-health applications discussed in the remainder of this chapter do not require high-speed broadband, the Committee notes that there are many that do, and as tele-health develops in the next decade, high-bandwidth applications are likely to become commonplace. Successful e-health implementation also relies on other factors such as ubiquity and reliability of service, as explained by the AIIA:

While not all [e-health] activities necessarily require high speed broadband, the health system is exactly that – a system. An online health system requires uniform capability to enable all parts. Ubiquity is essential to ensure all Australians can benefit from all these (and more) services.¹²

3.13 Many hospitals and other health facilities, particularly in metropolitan areas, are already connected to high-speed fibre broadband and can take advantage of a range of e-health applications. There are, however, many

9 Australasian Telehealth Society, *Submission 101*, p. 14.

10 Australasian Telehealth Society, *Submission 101*, p. 6.

11 CSIRO, *Submission 171*, p. 9.

12 AIIA, *Submission 184*, p. 12.

more premises, including homes and doctors' surgeries, which do not have access to the symmetric and reliable broadband connections necessary for many e-health applications.

Tele-health applications

- 3.14 The inquiry received a significant amount of evidence about the various tele-health applications that exist already or that become feasible with the advent of ubiquitous, high-speed broadband. This section discusses some of those applications.

Remote consultations, diagnostics and treatment

- 3.15 The NBN will enhance the capacity for people to undergo a medical consultation without travelling, as explained in the submission of DBCDE:

Pervasive high-speed broadband is a key enabler for the widespread use of high quality video consultations. In combination with work underway to provide Medicare Benefits Schedule rebates for tele-health services, this can support tele-health to become a mainstream complementary option for health service delivery in Australia.¹³

- 3.16 The Medicare changes mentioned above commenced recently – from 1 July 2011 participating medical practitioners will receive Medicare rebates for undertaking tele-consultations (further discussed below in the section on the role for government).¹⁴
- 3.17 The submission of the Royal Australasian College of Physicians (RACP) described how remote consultations can either be a direct patient to doctor exchange, or can involve the assistance of another health professional. The submission provided some examples where the different types of remote consultation might be appropriate:
- A patient with epilepsy who requires six monthly or annual consultations to monitor his/her response to anti-epileptic medication: in this case, the patient may consult the neurologist without an accompanying health care professional present.
 - A patient recovering from a stroke at home who requires a review of her/ his progress: in this case, the patient may consult

13 DBCDE, *Submission 215*, p. 30.

14 The Hon. Julia Gillard MP, Prime Minister, and the Hon. Nicola Roxon MP, Minister of Health and Ageing, 'Tele-health Transforming Health Care', *Media Release*, 29 June 2011.

the neurologist together with the local GP, where the GP or health care professional can carry out physical examination as directed by the neurologist (this would also be appropriate for review by rehabilitation specialists and others).

- A patient suffering an acute stroke who may benefit from thrombolysis: in this case, the emergency care physicians may consult with the neurologist on whether to administer thrombolytic therapy and to assist in monitoring the patient's condition after such therapy.¹⁵

3.18 The RACP submission also outlined the specialties that are currently involved in remote consultations or that may be appropriate for remote consultations in the future:

Consultation and cognitive specialties are more likely to adopt tele-health consultation, whereas examination based, investigative or procedural specialties require direct consultation. For example in Queensland, specialties involved include:

- Paediatrics;
- Endocrinology (Diabetes);
- Cardiology (Heart Failure);
- Geriatrics;
- Clinical Pharmacology;
- Rehabilitation;
- Nephrology (Renal Services); and
- Oncology.

Other specialties are currently involved in providing services by means of tele-health, include dermatology, palliative care and neurology. Many other scenarios are yet to be explored in Australia, although developments overseas indicate that tele-health is capable of effectively delivering a far greater range of services across a greater range of specialties.¹⁶

3.19 The inquiry heard about a number of specific examples where remote consultations are already being used or are being investigated. CSIRO told the Committee about the development of its Remote Immersive Diagnostic Examination System (RIDES), as discussed in Box 3.1.

15 RACP, *Submission 58*, p. 4.

16 RACP, *Submission 58*, p. 4.

Box 3.1 RIDES

CSIRO has been active in the development of broadband tele-presence systems for healthcare for the past ten years. The Remote Immersive Diagnostic Examination System (RIDES) is one example of a broadband application it has developed for tele-health.

The RIDES system provides an immersive, high-definition specialist consultation overcoming the need for travel by a specialist or the need to pre-emptively transport patients long distances. Apart from high quality video and audio, the system allows high quality image exchange, data exchange and three-dimensional (3D) viewing of the patient. The system also allows the specialist to project their presence by remote use of laser pointing and marking devices.

CSIRO advised that RIDES requires a symmetric connection of 30 to 50 Mbit/s to and from the patient, which is not possible with current ADSL or HFC networks. Costs for the equipment required for this type of system are falling and it is possible that, in future, this type of technology will either run on home entertainment systems or be a module that healthcare providers can deliver to a patient's home and connect to a high speed broadband network.

Such a development also has the potential to reduce the demand on aged care services. For example, the use of remote health monitoring and 'always on' high definition video, audio and data communication available in the patient's home may delay their need to move to full-service residential aged care.

Source: CSIRO, *Submission 171*, pp. 8-9.

- 3.20 IBES told the Committee about its 'telestroke' project, which allows stroke sufferers in rural areas to be administered with a potentially life-saving drug. The drug can only be prescribed by a specialist because of its serious side effects:

The National Stroke Foundation estimates that seventy two percent of Australian hospitals are unable to provide acute stroke treatment. The Telestroke pilot study is demonstrating the feasibility and effectiveness of a remote consultation system between a comprehensive stroke centre at the Royal Melbourne Hospital and a rural hospital in Wangaratta. To date, 93 patients have been enrolled in the study. Of these patients, 20 were assessed with the telestroke system and nine of these were

administered the ‘clot busting’ medications with an average treatment time of 82 minutes.¹⁷

- 3.21 At its site visit to the IBES laboratory in Melbourne, the Committee was shown a demonstration of a remote dentistry project which aims to improve the quality of dental care received by residents in aged-care facilities using high-definition video technology. IBES informed the Committee that this type of technology could help dentists to better plan their workloads before visiting such facilities in person. The IBES submission explained:

Face-to-face patient examinations are regarded as the most accurate method for correct oral health diagnosis. However, only 11 per cent of aged care residents have seen a dentist in the past 12 months. Few dentists provide dental care for residents of aged care facilities ...

The project ... is investigating whether improvements in accessibility and appropriateness of oral health services can be achieved by using broadband technologies to screen for oral disease in older people living in residential aged care facilities.¹⁸

- 3.22 The Committee notes that at the site inspection the presenters at IBES indicated that the applications it demonstrated required bandwidth of no more than 20 Mbit/s.

- 3.23 The DBCDE submission outlined the operations of the Victorian Virtual Trauma and Critical Care Unit (ViTCCU), which has demonstrated the capability of high-speed broadband to improve critical and emergency care in regional communities:

ViTCCU provides support for regional doctors in smaller towns, dealing with trauma or specialist cases, by linking them (via video-conferencing supported by high-speed broadband) with trauma and critical care specialists at major Melbourne hospitals. This allows quicker decisions on the right treatment for the patient, and also helps to determine if they can stay in their local hospital or need to be sent on to a larger hospital.¹⁹

- 3.24 The CSIRO submission explained how remote eye screening could contribute to disease prevention:

17 IBES, *Submission 84*, p. 7.

18 IBES, *Submission 84*, p. 8.

19 DBCDE, *Submission 215*, p. 31

... a national broadband communications network will support the delivery of telemedicine-based eye screening programs for sight threatening diseases such as diabetic retinopathy (DR) and Age Related Macular Degeneration (AMD).

A tele-ophthalmology service is currently being developed by CSIRO using leading edge, computer-aided ophthalmic diagnostic image analysis technologies as well as commercially available retinal scanner devices. The system will allow healthcare professionals (nurses in the first instance) to perform screenings for eye disease in Port Hedland, Western Australia, and then seek specialist consultation as needed from an ophthalmologist in Perth who decides on the course of action. In addition to providing the remote ophthalmologist in Perth with a 'real-life experience' through an immersive video-conferencing environment using 3D images and patient interactivity, the system will enable the upload of images, videos and medical history using a web-based diagnostic system (with Electronic Health Records) that can be read by other ophthalmologists.²⁰

- 3.25 At the Committee's Sydney hearing, Dr Dean Economou, a Technology Strategist at National ICT Australia (NICTA), detailed a tele-health application for skin cancer:

A company called MoleMap has a team of dermatologists that specialise in skin cancer. It turns out skin cancer is a subspecialty. If you go to your average GP he or she may not really know about whether something is a skin cancer and they might send you to a dermatologist. The average dermatologist is barely better, at skin cancer, than that. So, there are people who specialise in this. But the efficiency of getting a person into a doctor's office, making a booking and taking the map makes it a very slow process. They have this team and you go to some sort of clinic where they take the appropriate pictures, upload those pictures and then they have their team of dermatologists basically doing one patient per minute.²¹

- 3.26 Dr Economou expanded on the efficiencies gained and improvements in the quality of service delivered:

The stats that came out from this MoleMap company were that they did 20 000 more patient consults with the same sized team.

20 CSIRO, *Submission 171*, pp. 7–8.

21 *Committee Hansard*, Sydney, 29 April 2011, p. 55.

The thing that is really marvellous is that you have taken this very specialised set of patients with specialised needs and you have matched them exactly to the right people. Rather than everyone getting some sort of average service, those specialists are getting the patients that are most relevant and those patients are getting the best service. That is 20 000 extra patients covered by the same team. If you extrapolate that kind of thing to the wider medical system you can see there are some real efficiencies. They think they probably saved 250 lives because those people are so specialised they would have caught things that others would not. You hear a number like that, and that is just because the digital economy allows you to organise things and match the work to the people.²²

- 3.27 The NICTA submission described an example of remote surgery from Ontario, Canada. The ability to undertake the surgery is reliant upon a 15 Mbit/s symmetric connection with very low latency:

To date, 21 telerobotic laparoscopic surgeries have taken place between North Bay and Hamilton ...

Telerobotic remote surgery is now in routine use, providing high-quality laparoscopic surgical services to patients in a rural community and providing a superior degree of collaboration between surgeons in teaching hospitals and rural hospitals. Further refinement of the robotic and telecommunication technology should ensure its wider application in the near future.²³

Electronic storage and transmission of medical data

- 3.28 The ability to store and forward medical data has become a crucial element of modern health services, and the NBN will improve the ability of health providers to undertake these activities. The Australian Medical Association (AMA)'s submission identifies the importance of timely access to information:

[Broadband] minimises slow download times, thereby both enabling medical practitioners to make time-critical treatment decisions, and preventing busy medical practitioners wasting time waiting for data to arrive electronically.²⁴

22 *Committee Hansard*, Sydney, 29 April 2011, p. 55.

23 NICTA, *Submission 198*, p. 12.

24 AMA, *Submission 75*, p. [1].

3.29 The AIIA made a similar point in its submission:

Healthcare decisions and service delivery depends on the ability to access the right information when and where it is needed. Access to information reduces over servicing, informs healthcare decision making, reduces the incidence of medical misadventure, enables preventative healthcare strategies and ensures citizens are empowered in the healthcare delivery process.²⁵

3.30 The Medical Technology Association of Australia's (MTAA) submission commented on how the NBN will improve the transmission and usability of medical imagery:

High speed broadband will enhance image quality and increase the speed of data transfer. This will benefit radiology specialties where large files must be transferred and disciplines that use medical photography (e.g. for wound care). Large data intense files such as magnetic resonance image (MRI) and computer aided tomography (CAT) scans will be able to be downloaded and transferred more easily.²⁶

3.31 There are a range of data-intensive medical activities that will be enhanced by the bandwidth capacity of the NBN, as identified by the Australasian Telehealth Society:

- Ability to rapidly transfer and interact in real time with large data sets, as generated by some 3D imaging modalities such as CT or MRI.
- High-definition interaction with camera- or computer-generated images.
- Simultaneous transmission of several video and/or data channels, which can support team interaction in complex critical care applications.
- Broadcast-quality (or better) video-conferencing to create a high sense of presence and trust, without latency-induced time delays.
- Real time guidance or even robotic control of some procedures.
- High-quality, interactive teaching, accessible by medical trainees or practitioners seeking continuing medical education, wherever they happen to be located.²⁷

25 AIIA, *Submission 184*, p. 11.

26 MTAA, *Submission 76*, p. 4.

27 Australasian Telehealth Society, *Submission 101*, p. 8

- 3.32 Mr David Ryan, Chief Information Officer of the Grampians Rural Health Alliance, told the Committee about the limitations of the current network infrastructure in his area when dealing with high volumes of data:

... you can have a video-conference and throw up an image of an X-ray, but that might then mean that your video-conference drops out or that one will be of a lesser quality than the other, if you are limited by bandwidth. So, on a 100-megabit link, you should be able to get video, data, voice and high-quality X-rays projected all at the same time. But you would not be able to do that on a four-megabit link ...²⁸

- 3.33 The Committee heard that dial-up and ADSL services are inadequate to upload medical data in a timely fashion. This point was illustrated in the National Rural Health Alliance's supplementary submission:

A chest x-ray image would be about 10 MB – there are usually two per session. Thus if connections are optimal, one chest x-ray image (10 MB) would take approximately:

- 24 minutes on a 56 kbit/s dial-up connection;
- 2.6 minutes on 512 kbit/s ADSL; and
- 1 second on the 1 Gbit/s internal hospital network.

A breast screen image is a similar size, 10–15 MB, but there are usually 10 per exam so 100–150 MB in total; the time for downloading the full set would be multiplied.

... transmission of high resolution images from [a] clinic setting with [an] ADSL connection would be a slow process and the specialist would not be able to receive it during the consultation, especially if another practitioner in [the] clinic was using the internet connection at the same time.²⁹

- 3.34 The ability to transmit large data files also has wider benefits in allowing Australian businesses to export medical services (more general export opportunities are discussed in Chapter 6). At the Committee's first Perth hearing, Richard Bone, President of the Western Australian Internet Association, explained how the availability of fast broadband has enabled new business opportunities in medical imaging:

In the area of health, we have a customer ... providing a medical analysis service out of Western Australia, but their service is supplied around the world. Effectively, MRI images taken from

28 *Committee Hansard*, Ballarat, 17 March 2011, p. 32.

29 National Rural Health Alliance, *Submission 143.2*, p. 2.

locations around the world are transferred through a secure protocol to Perth. Perth basically processes them overnight and sends the results back overnight.³⁰

In-home monitoring

- 3.35 The availability of ubiquitous broadband enables the widespread use of in-home health monitoring applications. Many of the current devices in this area are more dependent on the availability of a reliable broadband service than high speed. However, this is likely to change over time as two-way video is incorporated into the applications.
- 3.36 The MTAA's submission provided a comprehensive list of monitoring applications that are becoming available:
- Implantable cardiac devices are able to wirelessly transmit cardiac data or information regarding the performance of a device, which can be assessed by a specialist without the need for a face-to-face routine check up.
 - Vital signs monitoring uses equipment and medical devices installed in the patient's home to identify trends and send alerts when necessary, in order to detect symptom exacerbations and intervene early.
 - Online health alerts and medication reminders can be delivered to patients online to enhance medication compliance and remind patients to take the right medication at the right time.
 - Incontinence assessment does not have to take place in a hospital or nursing home setting. A device with enuresis sensors can record incontinence events over a 72 hour period while the patient is at home.
 - Diabetic patients can have insulin levels and other vital signs monitored using automated data upload and online services.
 - There are a number of wireless devices that combine satellite global positioning systems and can be used to track dementia patients who wander.
 - Cognitive assessments can be performed in a patient's home using a personal computer and data automatically scored and sent to a specialist in a different location.
 - Patient safety can be monitored in the home using a range of alarms, alert systems and sensors.
 - Health education can be delivered online to a patient at home.
 - There are a range of Therapeutic Goods Administration (TGA) approved home monitoring systems that record and transmit

30 Committee Hansard, Perth, 5 May 2011, p. 29.

daily vital signs. Peripheral devices can be used to monitor pulse, weight, blood pressure, temperature, epilepsy and subjective symptoms associated with a range of chronic diseases.³¹

3.37 The submission went on to detail the benefits that have been measured from a range of worldwide trials of remote monitoring applications:

- Significant improvement in glycemic control in diabetics who transmitted blood glucose and blood pressure data to a nurse.
- A 71 per cent reduction in emergency room admissions in respiratory patients who had oxygen saturation measured by pulse oximetry and monitored daily.
- A 25 per cent reduction in numbers of bed days of care and a 19 per cent reduction in hospital admissions in 17 025 veterans with chronic disease who were enrolled in a home tele-health program.
- A 43 per cent reduction in hospitalisations and a 68 per cent reduction in bed days of care in cardiac patients who transmitted daily electrocardiogram (ECG) and blood pressure data.
- A reduction in office visits and earlier detection of anomalies in patients with implantable cardiac devices who were monitored using automated, wireless technology.
- A significant decrease (45 per cent) in the need for in-patient hospital evaluation in 1339 patients with implanted cardiac defibrillators who were remotely monitored.
- Detection of a far greater number of clinical or device related events than during scheduled office visits in patients with implantable cardiac devices.
- A 50 per cent reduction in mortality in a large sample (69 556) of patients with implantable cardiac devices, including cardiac defibrillators.
- A decrease in blood pressure and a reduction in the number of medications needed to treat high blood pressure in an analysis of 37 clinical trials, including 9446 individuals using home blood pressure monitors.³²

3.38 The IBES submission provided the Committee with information about the development of a device to monitor knee osteoarthritis:

The project is developing a prototype device that will be integrated with a mobile phone to enable remote monitoring of patients as they undertake typical daily activities. It is expected

31 MTAA, *Submission 76*, p. 5.

32 MTAA, *Submission 76*, p. 5.

that real time monitoring over extended periods will enable more accurate assessment of knee joint usage patterns, natural disease progression, and development of more effective interventions.³³

3.39 Neuroscience Research Australia outlined how remote monitoring applications will become important in managing neurological disorders:

Successful and continued independent living in older people or those with neurological damage or disease depends on a number of key physical, cognitive and social markers of health. Monitoring these markers of health over time, and comparing them to clinical models, enables us to draw conclusions about the current physical, cognitive and social health of the individual. However, this necessitates labour intensive assessment by clinical professionals that requires the individual to travel to a central clinic or hospital facility. In remote and rural communities, especially in a country like Australia, the distance, inconvenience and expense of travel often make routine assessment of function very difficult. There is therefore a pressing need to develop data on routine or semiroutine measures that can be gathered from peoples' home environments.

Daily, weekly or monthly home-based monitoring of health also improves our ability to detect and act upon changes in these markers should they deviate significantly from an individual's history or accepted clinical models of good health. Tele-health technology, which combines digital data acquisition and broadband communication technologies to monitor health status in the home, is gaining attention as a promising strategy for acquiring accurate, reliable and time critical health marker data.³⁴

3.40 The ACT Government's submission described its program that enables families to monitor babies in the special care nursery from home:

An example of the kind of bandwidth intensive application being developed is NICUCAM at the Centre for Newborn Care at the Canberra Hospital. NICUCAM offers remote viewing of individual babies via a secure website, so that parents who are unable to be by their newborn's bedside can view them via live video.

3.41 The submission further described how many ACT residents cannot access the service because of poor broadband coverage:

33 IBES, *Submission 84*, p. 8.

34 Neuroscience Research Australia, *Submission 74*, p. [2].

While this service is technically available to everyone, some families are restricted to access by where they live and the broadband services they currently receive. For example, many areas of the ACT are still unable to access the internet speeds required for such applications.³⁵

- 3.42 At the Committee's Hobart hearing, Professor Paddy Nixon outlined that technology could be utilised to remotely monitor if people have taken their medication, but also noted that there remains a human element:

Many [applications] simply spot whether you have taken the tablet out of the cupboard and not whether you have actually taken it. So there are always technological solutions to those particular things. There is still a human-technology interface that you have to work with and that is always the single most challenging part. As a technologist myself I can devise anything you want, but whether it works for you as an individual is the key question.³⁶

Rehabilitation and preventative health

- 3.43 The NBN will improve rehabilitation outcomes by providing patients with regular and real-time feedback. One project in this area was outlined in the IBES submission and demonstrated to the Committee on its visit to the IBES laboratory:

IBES researchers are investigating the use of *Haptic tele-rehabilitation* for stroke recovery. Haptic devices provide sensory feedback between two people in different locations, enabling them to share the sense of touch. Through the application of broadband technologies, haptic devices can provide alternative rehabilitation methods for stroke survivors. This project is developing a low-cost in-home tele-rehabilitation system to assist stroke patients in the rehabilitation process. The prototype system consists of a robotic platform on which the patient places his or her arm, and a simple rehabilitation software program that provides exercises with various degrees of difficulty. Clinicians can interact with a patient via the Internet, which allows them to monitor and change computer-based movement tasks according to the patient's performance and needs.³⁷

35 ACT Government, *Submission 227*, p. 6.

36 *Committee Hansard*, Hobart, 11 March 2011, p. 6.

37 IBES, *Submission 84*, p. 8.

- 3.44 Another example of remote rehabilitation was outlined by Neuroscience Research Australia and involves using conventional modern gaming systems such as the Nintendo Wii:

... by using engaging video game therapy, patients can significantly improve their movement and the range of tasks they can perform using their stroke-affected hand and arm. More importantly, patients no longer consider rehabilitation therapy a chore. This form of therapy is highly effective after only two weeks of therapy.³⁸

- 3.45 Another way in which home-based rehabilitation can be improved is through the use of technology to give reminders to patients and maintain motivation through interactivity. This is the aim of a CSIRO program being developed to improve the rehabilitation of heart attack sufferers:

[The] Cardiac Rehabilitation Program ... is delivered by mobile phones and through a web portal. The aim of offering the program in this way is to double the number of patients completing a rehabilitation program after a heart attack. This system has the potential to save \$50 million per year in readmission costs alone in Australia. The range of possible applications, similar to the Cardiac Rehabilitation Program, is huge.

This mode of health service provision could readily be extended to treat chronic illness, diabetes and support aged care. The key to the development of such applications is that they are interactive; this will require ubiquitous broadband communications connectivity to all homes.³⁹

- 3.46 For some ailments an important component of rehabilitation is group therapy. However, as identified by Dr George Margelis, the Australian General Manager of Intel-GE Care Innovations, in-person therapy sessions can be inconvenient and costly, and broadband-enabled technologies can offer a better solution:

The classic example is that cardiac rehab is done normally in group clinics at a hospital. We are doing a project in Melbourne at the moment with a hospital where they have a cardiac rehab program. Their biggest limitation is getting eight patients with congestive heart failure to their hospital for that one-hour session, because it requires eight taxis to pick up eight people from around Victoria, get them to the hospital, do the session and take them

38 Neuroscience Research Australia, *Submission 74*, p. [2].

39 CSIRO, *Submission 171*, p. 10.

back home. It is important because they need to have that community effect. One-on-one does not have the same effect. If they are in the room with their peers who have similar issues they can relate to it, but there is no reason why that cannot be done virtually with the advent of video conferencing capabilities and multiuser video conferencing capabilities.⁴⁰

- 3.47 Dr Steve Hambleton, then Vice-President of the AMA, told the Committee that broadband video-conferencing technology can enable doctors to remotely demonstrate to patients how to perform ‘Epley maneuver’ exercises, which are used to help patients with dizziness and inner ear problems. He explained that the exercises can enable patients who otherwise may need to spend seven to ten days in bed to be ‘completely cured from their dizziness very quickly’. Mr Hambleton suggested that greater broadband capacity would enable these type of demonstrations to be more effective:

In my surgery, with my bandwidth, sometimes I cannot get the video to show. When I do get it, it is two inches by two inches, so it is very difficult. If you could have the whole screen and proper vision to show the patient, it would be even better ... it would be great if I could actually say, ‘Here are the videos and here is the download site where you can do them and I will show you how to do them. If you are doing them at home then I could watch you.’⁴¹

- 3.48 The Committee notes that there is significant potential for broadband-enabled technologies in the area of preventative health. For example, Mr Ian Fry, Executive Officer of Ballarat ICT, told the Committee that a company in Ballarat has started online fitness courses using a fibre connection at the University of Ballarat’s technology park. Mr Fry suggested that these courses could have the capacity for people who cannot make it to gyms, such as young mothers, to take part in video-based guided exercise regimes from their homes.⁴²

Aged Care

- 3.49 Ageing populations are an important consideration in the likely uptake of tele-health services around the world, as recently identified by the Broadband Commission for Digital Development:

40 *Committee Hansard*, Sydney, 29 April 2011, p. 46.

41 *Committee Hansard*, Canberra, 4 March 2011, p. 16.

42 *Committee Hansard*, Ballarat, 17 March 2011, p. 25.

Aged care services are at the forefront of developments for in-home technologies using broadband. It is estimated that there are currently around 550 million senior citizens worldwide. The elderly outnumber children in countries such as Japan, Bulgaria, Germany, Greece, Italy, and Spain.⁴³

- 3.50 In this context, the capacity of the NBN to be a conduit for home-based aged care services is of fundamental importance:

A key component of solutions will be homecare services. Video-based broadband connections allow people to stay at home and still have access to medical staff at monitoring hubs that provide services ranging from automated analysis of data from personal health systems, to advice from qualified nurses on call throughout the day.

These layered response systems can alleviate demand for expensive clinical staff and significantly ease the anxiety levels experienced by family carers. The nurses maintain contact with people who need medical assistance and other medical specialists can be brought in as required via video link.⁴⁴

- 3.51 While one important advantage of widespread home-based service is the financial savings and efficiencies, an equally important advantage is the improvements to quality of life. This was identified by Dr George Margelis of Intel-GE Care Innovations:

If we can deliver services that enable people to delay or if possible totally remove the need for them to spend their last years in a nursing home, we can improve that person's quality of life and also improve the quality of life of their family. The major issue we face in nursing homes [is] that family and friends cannot come and visit when the nursing home is 20 kilometres away from work and they need to go and spend the day. So, how we use these technologies in the home is critical.⁴⁵

- 3.52 The Australasian Telehealth Society's submission recognised that technology has been important in aged care for many years, and this will increase as broadband coverage and speeds improve. The submission went on to describe the features of modern technologies in this field:

43 Broadband Commission for Digital Development, *Broadband: A Platform for Progress*, June 2011, p. 101.

44 Broadband Commission for Digital Development, *Broadband: A Platform for Progress*, June 2011, p. 101.

45 *Committee Hansard*, Sydney, 29 April 2011, p. 44.

Recent systems can provide various forms of interaction for the subjects (such as high quality video-conferencing with a carer), as well as automated systems for monitoring vital signs and other measures of well-being.⁴⁶

- 3.53 A recent trial of aged care technology in the Hunter region has demonstrated the practical benefits that can be delivered. This project was detailed to the Committee by Dr Margelis of Intel-GE Care Innovations:

... we delivered technology into the homes of about 50 patients who were at that stage receiving regular care by a home nursing service. Hunter Nursing is a nursing service and it has about 400 nurses. They basically go and visit people in their home and deliver healthcare services. What we did is pick 50 of those patients who had the highest needs. These were patients whose average age was about 83. We delivered a little white box into their home, which for all intents and purposes was a small computer but was designed to be used by someone who did not know anything about computers. So, the classic patient had never used a computer before in their life and had never had to worry about those sorts of things. This device spoke to them, gave them very large onscreen prompts, took them through a process of healthcare delivery and enabled them to also communicate with their healthcare provider remotely. So, the nurse sitting at her desk at Hunter Nursing could video-conference to this patient and discuss their health concerns. They could get information about their blood pressure, weight, blood oxygen, general wellbeing and actually ask the patients questions about how they felt, and it did all that quite simply. Ninety-nine per cent of the patients were satisfied with the way it was used. It was very easy to use. We had no issues around the technology.⁴⁷

- 3.54 Dr Margelis identified that the biggest challenge for the project was getting a reliable broadband connection:

I had the resources of the world's largest microprocessor company running around trying to get those network connections, and the engineers spent more of their time finding a network connection ... We really came to the understanding that, if we had access to ubiquitous connectivity in these people's homes, our job would have been a lot easier. I would not have had my guys running around the

46 Australasian Telehealth Society, *Submission 101*, p. 5.

47 *Committee Hansard*, Sydney, 29 April 2011, pp. 44–45.

streets literally with antennas trying to find the best spot to find a 3G connection and run a cable out of people's homes.⁴⁸

3.55 As mentioned above in relation to in-home monitoring, many current applications are more dependent on reliable broadband than fast broadband. But as identified in the Hunter trial, the ability to have two way video interactions is vital for the most effective delivery of home-based aged care services. Dr Dean Economou of NICTA told the Committee about an example in Korea where high-definition video conferencing capability is used to supplement sensor alerts. The video quality allows experts to make informed decisions about the type of care required in emergency situations.⁴⁹

3.56 The DBCDE submission highlighted that the NBN will also enable improved support for carers:

Comprehensive, rich online training content and environments and ongoing real-time interactive support for carers of people with dementia could assist not only in providing best practice care for those with dementia living in the community, but also in reducing uncertainty and pressure on the more than 100 000 carers.⁵⁰

Mental health

3.57 The Committee heard evidence about the benefits of the NBN in the delivery of mental health services. The Department of Health and Ageing claimed that the reach of these services will be improved. The department further noted:

Low bandwidth internet connections can be a deterrent to seeking treatment, particularly when consumers are already suffering a degree of stress or anxiety. A slow response by web based systems can create significant barriers to seeking help online, which is designed to provide consumers with choice and an anonymous avenue for seeking help.⁵¹

3.58 The inquiry heard on a number of occasions that while mental health issues are becoming more prevalent in society, young people, in particular, are reluctant to see mental health services in person. This point

48 *Committee Hansard*, Sydney, 29 April 2011, pp. 45.

49 *Committee Hansard*, Sydney, 29 April 2011, p. 60.

50 DBCDE, *Submission 215*, p. 35

51 Department of Health and Ageing, *Submission 212*, p. 6.

was made in the submission of the Inspire Foundation, who also commented on the damage caused by mental illness:

The research shows that whilst one in four young people aged 16 to 24 experiences a mental disorder, 70 per cent of those same young people are unable or unwilling to receive clinical care – a problem that is compounded in the case of young men and those living in rural and remote areas of Australia. Left untreated, mental health problems worsen, impacting significantly on the quality of a young person's life including their relationships with family and friends, and their eventual educational and vocational achievement. In 2009 mental illness cost Australia \$10.6 billion in lost productivity, underemployment, absenteeism, welfare payments, health care expenditure and carer costs.⁵²

- 3.59 The submission of the National Rural Health Alliance further outlined the case for online service delivery and the plight of those in regional areas:

Mental health services are increasingly being provided via the internet and have been found to be effective, particularly for young people. In Australia, suicide rates have consistently been found to be higher in rural than in metropolitan areas. Adolescent and young adult males, especially those in rural or remote areas, have particularly high suicide rates. The availability of the NBN will enable people living in rural and remote areas to have the same access to online mental health support as people in metropolitan areas.⁵³

- 3.60 The Committee heard valuable evidence from Helen Pepper, a Youth Ambassador for the Inspire Foundation, and a recent beneficiary of online mental health service delivery. Ms Pepper provided her perspective on the NBN and its capacity to improve mental health services:

To be honest, when I first heard about the government's plan for the National Broadband Network, I did not entirely support it. I wondered how it could be of higher priority than investing in Australia's health system. I thought, 'How can it be more important for young people to be able to view web pages and complete downloads faster when mental health disorders and suicide account for approximately 14 per cent of Australians' total health burden'. I got so caught up in the stereotypical view of

52 Inspire Foundation, *Submission 194*, p. 3.

53 National Rural Health Alliance, *Submission 143.1*, p. 5.

young people and the internet that I looked over my experience of how they can work so fantastically together.

ReachOut already connects young people from all over the country through their forums, but text based discussions can only go so far and offer so much. So online interactive media would complement ReachOut's youth involvement strategy amazingly by bringing young people together without the financial and time costs associated with face-to-face interactions.⁵⁴

- 3.61 Emma Stace, Deputy CEO of the Inspire Foundation, described how online services might evolve over time:

My philosophy is that the internet is a displacer, not a replacer, meaning that it will complement and enhance what people are doing already but it does not stop what people are doing already. I certainly see – not now but in the future – that the ability to deliver a highly interactive multimedia-rich interaction could potentially, one day, begin to replace face-to-face engagement with a health provider. But that is probably quite a long way off.⁵⁵

- 3.62 Aram Hosie, also of the Inspire Foundation, explained how current broadband coverage has restricted the organisation's ability to deliver mental health training to teachers:

The consistent feedback we get from teachers is that the reliability of the video streaming and the quality of the interaction are really poor. In all the evaluations we do of our program they say that the content was great and the ability to access a webinar was great but the frustration was that the link kept dropping, the video kept dropping and the quality was poor – and there is nothing we can do about that at the moment. As speeds and bandwidth go up, that will get better.⁵⁶

Improved service in regional areas

- 3.63 The tele-health applications outlined above clearly provide the most benefit in the areas where there are difficulties in accessing quality health services. The inquiry received substantial evidence about the capacity of the NBN to improve health services in regional areas. Dr Jenny May of the

54 *Committee Hansard*, Canberra, 27 May 2011, pp. 10–11.

55 *Committee Hansard*, Canberra, 27 May 2011, pp. 14–15.

56 *Committee Hansard*, Canberra, 27 May 2011, pp. 11–12.

National Rural Health Alliance summarised this proposition at the Committee's first hearing in Canberra:

The alliance believes the NBN provides a real opportunity to improve the health outcomes of those in rural Australia, as well as the wellness and liveability of rural communities. It has the capacity to improve the lot of those who live in rural, regional and remote areas by enhancing access to health information, education for our children and jobs for our spouses. Not only do Australians who live outside metropolitan centres have higher risk factors for many ailments, they also, as we know, have poorer access to health care and health personnel. With the support of a high-speed broadband system, improvement in health outcomes can be achieved through the development of healthy communities.⁵⁷

- 3.64 The submission of the Telehealth Society also observed that while equal access to healthcare is considered a fundamental right by most people, 'Australia's large distances and widely distributed demographics create challenges in providing this equity of access'. The Society cited a recent Australian Institute of Health and Welfare study which found that 'life expectancy for non-indigenous males living outside major cities was three years less than the life expectancy for their metropolitan counterparts'.⁵⁸
- 3.65 Dr May of the National Rural Health Alliance explained that the availability of broadband is currently the missing link in the provision of e-health services to regional areas:

Many valuable applications for tele-health and e-health more broadly are already technically feasible but available only where there is high-speed connectivity. Real-time video-conferencing for specialist consultation, the transfer of digital images such as X-rays and CAT scans and the transfer of other information is already here and making a difference where it can occur. Highspeed broadband will provide the platform for making these proven modalities – as well as those yet to be developed – available everywhere. In emergency care, for example in a place like Marble Bar, it will enable the linking of a remote outpost to a major burns unit so that a remote specialist can visualise a burn, assess the condition of a patient and advise local staff.⁵⁹

57 *Committee Hansard*, Canberra, 29 March 2011, p. 2.

58 *Australasian Telehealth Society, Submission 101*, p. 5.

59 *Committee Hansard*, Canberra, 29 March 2011, p. 3.

- 3.66 The Grampians Rural Health Alliance is one regional healthcare provider that is already demonstrating the types of benefits that can be delivered in regional areas with broadband. See Box 3.2 for details. Mr David Ryan, CIO of the Alliance, outlined that his service is spread across multiple campuses and the use of video-conferencing has been significant, both for meetings and for seeing patients. Mr Ryan also commented that:

It is a significant reduction on travel and in fact it has almost eliminated travel for some people, which is therefore an accrual of savings back to the health service directly. That also means that the clinician has a much more productive day. There are also the safety issues with jumping in a car and travelling long distances on country roads. That is also a major problem.⁶⁰

- 3.67 The McKinlay Shire Council outlined how the NBN might impact those people living in the most remote areas:

The Julia Creek Hospital is staffed by a full time GP position. Members of the community are required to travel 250km to Mount Isa or 650km to Townsville to receive medical services from specialists. The NBN could enhance medical services through the virtual appointment of specialist services at the Julia Creek.⁶¹

- 3.68 Regional Development Australia (RDA) Townsville and Northwest Queensland also highlighted that the NBN will enable easier access to specialists:

Regional Australians are at a disadvantage when it comes to access to health services. High speed broadband will enable greater and more efficient interaction between specialists in regional and metropolitan centres and their patients and local GP.⁶²

- 3.69 It is likely that the NBN can contribute to improving health outcomes in very remote Indigenous communities. The Telehealth Society's submission presented the example of Numbulwar, located on the north-east coast of the Northern Territory, with a population of 672 people—just over half the population is under 25 and 95 per cent are Indigenous. The community does not have a resident medical practitioner. Darwin is accessible only by poor quality roads that are impassable in the wet season. The Society further described:

60 Committee Hansard, Ballarat, 17 March 2011, p. 30.

61 McKinlay Shire Council, *Submission 31*, pp. 1-2

62 RDA Townsville and Northwest Queensland, *Submission 202*, p. 2.

Presently, tele-health services are delivered via the only internet connection available, a 512 kbit/s Telstra link shared by all services. The satellite link planned as part of the NBN may make a substantial difference to healthcare available in this isolated community.⁶³

Box 3.2 Grampians Rural Health Alliance

The Grampians Rural Health Alliance is a not-for-profit joint venture established to represent all the public health services in the Grampians region of Victoria, including community health, acute health, sub-acute health and aged care. There are approximately 40 sites with about 160 network connections across the region, for which the Alliance provides the ICT support and telecommunications services.

Video-conferencing is now being used in many different ways throughout the region covered by the Alliance, including for professional development and training, for specialist to GP issues, and increasingly for clinical engagement.

The mobile high-definition video-conferencing units used by the health service in rural areas are currently working on 2 Mbit/s symmetrical links, shared between voice and data. However, whereas it is possible to have one video-conference using this infrastructure, the bandwidth is not sufficient for two or more high quality conferences at once.

The Alliance said that the bandwidth capacity provided by the NBN will bring equity of health services across the region, particularly for specialist services in more remote rural areas for which video-conferencing is increasingly relied upon.

Source: Mr David Ryan, Executive Officer and Chief Information Officer, Grampians Rural Health Alliance, *Committee Hansard*, Ballarat, 17 March 2011, p. 34.

Health professional in regional areas

- 3.70 The submission of the National Rural Health Alliance highlighted the ongoing difficulties in attracting medical practitioners to rural areas, and explained how the NBN might improve this situation:

There is a continuing struggle to secure more health professionals for rural and remote areas: doctors, nurses, allied health

63 Australasian Telehealth Society, *Submission 101*, pp. 6.

professionals, dentists and other oral health workers, paramedics as well as aged care workers. Major change is needed to the models of education and training for students of health professions. Every effort should be made to provide this training close to where students live and the NBN is critical to this.

In addition, rural and remote placements and other programs to consolidate and expand the rural health workforce rely on the support of the NBN to keep students and new health professionals in touch with their peers, able to access professional advice and continuing professional development, and to work with current technology. And good telecommunications are not just vital for professional work and support; they also enable people to maintain their social networks and links with their families.⁶⁴

- 3.71 The issue of networking and mentoring is a particular issue for regionally located health professionals. The Telehealth Society described how improved access to professional support may reduce costly mistakes:

Despite the high quality of health care in Australia, ‘adverse events’ in the hospital system have been estimated to cost the nation between \$1 billion and \$2 billion annually, with a large proportion of such events seen to be preventable. In a number of recent, well-publicised cases, medical practitioners in regional areas were found to have been practising beyond their level of training, and without adequate supervision or contact with their peers. There is likely to be a role for tele-health in creating such contacts, and providing facilities for mentoring and monitoring the performance of isolated practitioners.⁶⁵

- 3.72 The inquiry heard there is demand from students who want undertake their medical education in regional areas. Ms Meredith Feist, Manager of Operations and Community Engagement at Flinders University Rural Clinical School, explained that:

[The courses] are oversubscribed. People actually want to do the course – they want to come to the country – and part of the reason for that is that often the academic marks are better. They come away from their third year with a high level of clinical exposure and skills because they have had the continuity of patient care and they have had lots of things that they do not get elsewhere. I guess our drive is to get them out here, convert them, tell them that the

64 National Rural Health Alliance, *Submission 143.1*, p. 9.

65 Australasian Telehealth Society, *Submission 101*, pp. 5–6.

country is a wonderful place and immerse them in that community for one year so that we increase that chance.⁶⁶

- 3.73 Ms Feist also told the Committee that improved access to broadband would help attract and keep doctors and nurses in regional areas:

The benefits [of the NBN] to this community, as I see them, will be in helping to get health professionals to stay in the area or return to the area. Our current research indicates that about 65 or 67 per cent of students who go through a [Parallel Rural Community Curriculum]-type program do return at some point to rural and remote areas, and we just want to keep growing that.⁶⁷

E-health records

- 3.74 An important component of e-health is the development of e-health records. The Committee heard that the NBN will be a catalyst for the continued development e-health records. This point was highlighted in the Broadband Commission for Digital Development's recent report: 'A national broadband network offers the unique opportunity for transformation of isolated and inefficient systems'.⁶⁸

- 3.75 The Department of Health and Ageing's submission explained the problems and inefficiencies with current systems used to manage health information:

Patients currently have limited access to and control over their own health information. Their health information is largely fragmented and held in paper based record systems across each health care provider they have seen. Each health care provider usually only has an incomplete record of a patient's medical history and care needs. This means a patient's critical health information may not be available when and where they are being treated, especially in emergencies or when seeing multiple doctors ...

As well as being frustrating for patients and their health care providers, deficiencies in the availability of a patient's health information can have damaging effects on patients' health and the

66 *Committee Hansard*, Victor Harbor, 5 April 2011, p. 23.

67 *Committee Hansard*, Victor Harbor, 5 April 2011, p. 19.

68 Broadband Commission for Digital Development, *Broadband: A Platform for Progress*, June 2011, p. 100.

quality of care they receive. Many adverse drug events and poor transitions from one health care setting to another could be avoided with better access to patients' health information across care settings.⁶⁹

3.76 The IBES submission explained how the NBN will improve information flows in the health system:

The health sector is an information rich environment, in which the medical profession has traditionally controlled both access to and the form of information. Health data is currently stored in multiple places, often 'siloes', and has the challenge of privacy, data accessibility, comparability and initial collection. The advent of ubiquitous and high-speed broadband will allow sharing of patient information rapidly between sites, and allowing clinicians to access real time data during a patient consultation.⁷⁰

3.77 The Government is currently working toward the provision of a 'Personally Controlled Electronic Health Record' for all Australians, as part of a \$466.7 million commitment in the 2010-11 Budget.⁷¹ The DBCDE submission outlined how the NBN is likely to assist this process over time:

By providing a high capacity, ubiquitous and reliable network, the NBN will enable the benefits of system-wide electronic health records to be fully realised ... Doctors and specialist medical practitioners in various health settings and locations across Australia will be able to have fast and reliable access to patient health records, including data intensive, high resolution medical images and videos.⁷²

3.78 The DBCDE submission also outlined the benefits of e-health records for Australians with chronic conditions (for example, diabetes, chronic obstructive pulmonary disease, cystic fibrosis). Such individuals are often high users of health services, requiring ongoing and integrated care. Benefits would also be felt by older Australians who may have complex medical needs, and may at times have difficulties in remembering details of their health history. The DBCDE submission further suggested that:

Ensuring all relevant information is able to be provided to key health personnel can support swifter and more effective diagnosis

69 Department of Health and Ageing, *Submission 212*, p. 1.

70 IBES, *Submission 84*, p. 7.

71 Department of Health and Ageing, *Personally Controlled Health Records for All Australians*, Media Release, 11 May 2010.

72 DBCDE, *Submission 215*, p. 36.

and treatment, informed by knowledge of existing medications and past health events.⁷³

Medical education

3.79 As outlined in the following chapter, the NBN is expected to have a significant impact on the provision of education services and the availability of educational resources. The inquiry received specific evidence about how the NBN will impact medical education. The DBCDE submission provided an overview of the range of opportunities which may enhance support services for GPs and other health professionals, resulting in improvements to skills and capabilities ‘without having to waste time in traffic or long distance travel’. The opportunities may include ‘content rich online real-time interactive continuing professional development courses (including, for example, 3D virtual environments), or mentoring by senior practitioners facilitated through video-conference.’⁷⁴

3.80 Professor Don Iverson, Pro Vice-Chancellor of Health at the University of Wollongong, told the Committee about the expectations of his medical students:

Each successive group that has come in has greater expectations on technology. They have grown up with technology and most of us in this room did not ... These young people who are coming through medical school now are absolutely comfortable with and rely on technology for virtually every aspect of their life ... When they go out to rural areas, they expect to be able to get their cases online and to be able to go online to check a physician reference with regard to medication. They are finding it frustrating right now doing that.

3.81 Professor Iverson also spoke about the significant role that the NBN can play in developing ‘communities of doctors and nurses that support one another’. He noted the importance of social connectivity, not just professional connectivity, for medical students who move to regional areas.⁷⁵

73 DBCDE, *Submission 215*, p. 37.

74 DBCDE, *Submission 215*, p. 32.

75 *Committee Hansard*, Wollongong, 28 April 2011, pp. 3–4.

- 3.82 Professor Iverson went on to explain the increasing importance of broadband in modern teaching methods:

The key to making the model [of locating students remotely] work is connectivity; it just cannot work without it. We cannot travel those distances; we cannot do it. The connectivity is important for a number of functions. The first one right now is teaching. For example, a third of our class of medical students are actually housed down in Nowra, and they only come to Wollongong one day a week. All the lectures and that are delivered via video link, which sometimes works and sometimes, unfortunately, does not work if the weather turns bad. We actually now have another hub we are developing up in the Southern Highlands area, and ultimately, if you look down the road 10 years, there is no reason why a lot of medical education cannot occur in the home town where people are connected to it. There is just no reason; we are moving that fast. But connectivity becomes important.⁷⁶

- 3.83 As well as delivering lectures and tutorials, broadband has been used to provide surgical training. This was outlined in the submission of the Telehealth Society:

The ability of advanced networks to deliver several channels of high quality video in interactive settings has been used by the surgical community to provide training in advanced surgical techniques. Notable among the international demonstrations have been connections between Flinders Medical Centre and various Asian centres. Most of these exercises have been set up as 'one-off' events, but the availability of the NBN will facilitate making such interactive education available on a routine basis to medical practitioners wherever they are located. High quality video and interactivity (e.g. the ability to ask questions of the surgeon) are essential for the success of the learning experience.⁷⁷

- 3.84 Meredith Feist of the Flinders University Rural Clinical School explained that current broadband infrastructure in some areas is struggling to cope with new modes of delivery:

What we have here at the moment is a system – and I am not technical – that delivers two megabits per second for video-conference capacity. We manage, just, with that, here in Victor. In two of our other sites we have that capacity at 10, and that is now

76 *Committee Hansard*, Wollongong, 28 April 2011, p. 3.

77 *Australasian Telehealth Society, Submission 101*, pp. 10–11.

at maximum and stretched for the work we need to do. So we think it is vital to keep going.⁷⁸

Government leadership

- 3.85 Based on extensive evidence, the Committee accepts that the NBN will play a significant role in substantially improving the implementation of e-health systems, but that challenges remain in effecting wider change. The Telehealth Society noted that ‘the slow uptake of e-health technologies over the last few decades has shown that such paradigm shifts are very difficult to implement in the health system’. The Society further suggested that a national strategy is needed to facilitate and encourage ‘the changes to health care delivery which will justify the NBN on the basis of its ability to deliver healthcare services’.⁷⁹
- 3.86 While estimates of the savings to be gained from using coherent e-health systems range from 15 to 25 per cent⁸⁰, the health system involves a substantial number of unique providers of services, each with their own business models and proprietary administrative systems. This makes system-wide change very difficult. Furthermore, the Broadband Commission for Digital Development has noted that:
- A key reason for the delays in implementing e-health is that its benefits cover society as a whole and do not necessarily have immediate positive consequences for the commercial aspects of healthcare.⁸¹
- 3.87 The Committee agrees with the observation of the Broadband Commission that ‘leadership is needed to develop a trans-sectoral approach to these problems, so that the multiplier effects that broadband infrastructure has to offer are fully explored’.⁸²
- 3.88 The Government’s recently announced *National Digital Economy Strategy* identifies the need for government leadership and sets a number of digital economy goals for e-health:

78 *Committee Hansard*, Victor Harbor, 5 April 2011, p. 19.

79 Australasian Telehealth Society, *Submission 101*, p. 12.

80 Broadband Commission for Digital Development, *Broadband: A Platform for Progress*, June 2011, p. 106.

81 Broadband Commission for Digital Development, *Broadband: A Platform for Progress*, June 2011, p. 106.

82 Broadband Commission for Digital Development, *Broadband: A Platform for Progress*, June 2011, p. 106.

- By 2020, 90 per cent of high priority consumers such as older Australians, mothers and babies and those with a chronic disease, or their carers, can access individual electronic health records.
- By July 2015, 495 000 tele-health consultations will have been delivered providing remote access to specialists for patients in rural, remote and outer metropolitan areas.
- By 2020, 25 per cent of specialists will be participating in delivering tele-health consultations.⁸³

3.89 As discussed earlier in this chapter, the Government is now providing funding for Medicare rebates of tele-health consultations (including incentives for GPs and specialists), and is also progressing the development of e-health records. In addition, the Government is funding tele-health trials in the NBN early release sites of Kiama, Armidale and Townsville.⁸⁴

Box 3.3 Neuroscience Research Australia falls prevention software

The rollout of the NBN has enabled the trialling of an innovative new tele-health program that enables patients to access at home an interactive, video game-based exercise program designed to improve their balance and motor skills.

The project involves an exercise regime for older people using a dance mat video game, which can be monitored remotely by health professionals using high speed internet. It is envisioned that the technology will reduce the incidence of falls amongst its older users.

The project was developed by Dr Stuart Smith of Neuroscience Research Australia, who said:

With a growing number of people having to care for family members living with diseases that affect their mobility or their mind, a reliable high speed broadband network such as the NBN for monitoring and improving their state of health is a huge breakthrough.

The project was showcased at an NBN launch event in the coastal NSW town of Kiama on 29 July 2011.

Source: Neuroscience Research Australia, 'NeuRA falls prevention research showcased at NBN launch', 1 August 2011 <<http://www.neura.edu.au/news-events/news/neura-falls-prevention-research-showcased-nbn-launch>> viewed 8 August 2011.

83 Australian Government, *National Digital Economy Strategy*, May 2011, p. 14.

84 Australian Government, *National Digital Economy Strategy*, May 2011, pp. 34–35.

- 3.90 Notwithstanding these initiatives, several submissions and witnesses commented on issues that will need to be addressed by governments to achieve widespread e-health implementation, beyond the technical and infrastructure requirements for reliable and ubiquitous broadband. At the Committee's Sydney hearing, Ms Rosemary Sinclair, Managing Director of the Australian Telecommunications Users Group, described some of the practical considerations, resulting from a pragmatic understanding of how the Medicare system works:

As a general rule there is no mechanism in Medicare for paying for e-delivered health services apart from psychiatric services in regional Australia and the election commitment last year which created another small element for regional services. But GPs get funded through Medicare when people turn up to the surgeries for attendance.⁸⁵

- 3.91 The Telehealth Society's submission also commented on the importance of Medicare arrangements:

All medical practitioner members who contributed to [our] submission emphasised that the ability to deliver health care services via tele-health needs to be recognised through the ability to be remunerated through the Medicare Benefits Schedule (MBS) for a wider range of services than currently available.⁸⁶

- 3.92 The RACP submission identified that in general specialists have not adopted technology, which could act as a significant barrier to widespread adoption of tele-health applications:

Unlike the situation in general practice, computer use is not a central part of the way in which physicians conduct their practices in their consulting rooms, the most usual venue in which they deal with patients.

Against this background, the Australian Government's specific proposal to provide incentives is welcomed by the RACP, as this will assist greatly in helping physicians engage with tele-health. The development and implementation of a specialist practice incentives program is encouraged.⁸⁷

- 3.93 The RACP also identified privacy issues that are relevant to both tele-health and the implementation of e-health records:
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85 *Committee Hansard*, Sydney, 29 April 2011, p. 42

86 *Australasian Telehealth Society, Submission 101*, p. 14.

87 *RACP, Submission 58*, p. 5.

Patients may initially be reluctant to engage in video-conferencing because of uncertainty that their privacy and the confidentiality of their information will be adequately protected. The patients, and the Australian public generally, will need reassurance of the security and integrity of information obtained and transmitted during tele-health consultations.⁸⁸

Committee conclusions

- 3.94 The availability of fast and ubiquitous broadband will fundamentally change the delivery of health services in Australia. It will enable more efficient service delivery, resulting in cost and time savings for citizens and health care providers. It will also enable better access to services for those who are isolated by distance or incapacity, resulting in improved health outcomes and enhanced quality of life.
- 3.95 The ability to deliver services more efficiently is extremely important in the context of the ageing population and the related increases in healthcare spending. There have been a number of estimates made about the savings that might be possible, including a recent UNESCO report which estimated savings of between 10 and 20 per cent of total healthcare spending. Savings can be realised in a range of ways, from reduced hospital admissions through to more productive use of the stretched medical workforce.
- 3.96 The Committee received evidence about numerous tele-health applications—some which are available now, some which are being developed, and others which are still in a conceptual stage. It is difficult to generalise about the broadband speeds required to enable these applications, although it is possible to conclude that the reliability of service and ubiquitous coverage are paramount. In terms of speed, there are home-monitoring applications that rely on the ability to upload at just 512 kbit/s. The Committee heard that even these speeds are not achievable in many areas today. But, more importantly, there are very few homes that can receive the broadband speeds required for the high-definition video interactions required by some tele-health applications.
- 3.97 Participation in remote consultations with specialists may be commonplace in the foreseeable future. CSIRO told the Committee about its remote diagnostic system which involves 3D imaging and requires a

88 RACP, *Submission 58*, p. 7.

symmetric connection of between 30 and 50 Mbit/s. Other similarly bandwidth-intensive applications were outlined and demonstrated to the Committee, including tele-dentistry and tele-ophthalmology. It is expected that tele-health applications will be used in hospitals, clinics, aged-care facilities, and in the home – hence the need for ubiquitous high-speed coverage.

- 3.98 The ability to store and forward high volumes of medical data is an important factor in improving the efficiency of the health system, and will become particularly important when there is a move toward full-scale implementation of electronic health records. High quality medical imagery generates large amounts of data and high-definition video generates even more. A more efficient health system will rely upon the ability to transmit this data seamlessly, including from the home. The asymmetric broadband connections available to most Australian premises are not suited to uploading data quickly.
- 3.99 As well as enabling video consultations from the home, the NBN will expand the opportunities for health monitoring in the home. Current activities in this area including monitoring blood glucose and pressure, as well as tracking the performance of implanted devices such as pacemakers. The Committee heard that home monitoring devices can be supported by video-conferencing capability, which further reduces the need for medical staff to be physically present.
- 3.100 The Committee received compelling evidence about the importance of online delivery of mental health services, particularly for young people. It is clear that ubiquitous availability of fast broadband will enable improved content-rich and interactive mental health services.
- 3.101 Australians who have the greatest difficulty accessing services in person are likely to benefit most from advances in e-health. This includes the elderly, those with a physical disability, and those located in regional communities. For the elderly, the provision of broadband-enabled consultations and in-home monitoring will delay or even remove the need to move to an aged-care facility. For regional Australians, the NBN provide greater access to metropolitan standard health services, without having to travel to metropolitan areas. Improved access to broadband is also likely help attract and retain medical professionals in regional areas, providing better networking and ongoing development and training opportunities.
- 3.102 The Federal Government has identified the importance of e-health in its recent digital economy strategy, setting goals for e-health uptake and providing funding for tele-health trials in three NBN early release sites. In

addition, Medicare rebates have recently commenced for tele-health consultations, and work continues toward the development of electronic health records.

- 3.103 The Committee was made aware of the difficulties of effecting change in a health system that involves so many unique organisations and systems. Key challenges to e-health implementation include privacy and the low uptake of technology by specialists. These are not new issues and are undoubtedly central to considerations on the e-health agenda. Government leadership on these and other issues will determine the extent to which the benefits offered by the NBN are realised.

