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Features

Telehealth: The healthcare and aged care revolution that can pay for the whole NBN

Nick Ross ABC Technology and Games Updated 20 Sep 2013 (First posted 19 Sep 2013)
Comments (34)

In the toxic fact-free zone that represents the bulk of National Broadband Network discussion, most people would be shocked to know that the NBN is likely worth building for the healthcare benefits alone - especially for the old and infirm. And the NBN doesn't just offer a healthcare revolution, it's likely to save tax payers *billions* of dollars every year. Most important of all, however, is the notion that these new-generation 'Telehealthcare' applications are only viable using the current Fibre to the Home broadband policy and not the Coalition's alternative. Could it be that convalescing old ladies, who have never used a computer in their lives, are the pin-up girls for fibre-based broadband?

Meaningless phrases and numbers

Many people are sick of hearing nebulous terms like 'superfast broadband' and jargon like 'jigabits per second' and 'download speeds.'

Telehealthcare ignores all of that and treats the NBN like the infrastructure that it is - a network which provides a medical-grade, reliable connection to each home and a complete standardisation of equipment - i.e. 'one box and one interface for everyone' - instead of the hotchpotch, 'every-situation-is-different' situation that we have today.

Why is this important?

Australia's ballooning health spend

According to the Australian Institute of Health and Welfare, the country spent over $121bn on healthcare between 2009-10. The following year it surpassed $130bn and it's been rising at six per cent each year - twice the growth rate of GDP.

Healthcare expenditure currently makes up 10 per cent of GDP but analysts Mark Dougan from Frost and Sullivan says that, "At the current rate, in perhaps about ten years or so, it will hit 15 per cent of GDP - mostly from public sources." He points out that this growth rate is "unsustainable."

According to South Australia Health's October 2012 report:

> At the time we released the 2007 South Australian Health Care Plan, if SA Health had continued spending at the same rate, then by 2032 *the entire State budget will be consumed by Health alone*. Our efforts to reduce growth in demand has now pushed this back to 2038. Slowing the growth in demand, however, must be accompanied by providing more efficient services in order to deliver a balanced budget...

Peter Croft from Allocate (healthcare) Software adds, "Most State governments have identified a point in the future where the growth in funding for health is going to consume the entire state budget."

The problem is that improvements have to come from efficiency gains and not spending cuts. As Stephen Duckett and Cassie McGannon said recently in The Conversation:

> Reducing health spending growth will not be easy. As Grattan's Game-changers report last year showed, Australia already has one of the OECD's most efficient health systems, in terms of life expectancy achieved for dollars spent. Sweeping cuts to health funding, or shifting costs to consumers, could have serious consequences. Blunt cost-cutting risks reducing health and well-being, and could ultimately lead to higher government costs due to illness, increased health-care needs and lower workforce participation.

What do we spend the money on?

The Australian Institute of Health and Welfare published the following:

On an average day in Australia...

- 342,000 people visit a GP
- 6,800 people are transported by ambulance; a further 900 are treated but not transported
- 71,000 km are flown by the Royal Flying Doctor Service and 107 evacuations performed
- 23,000 people are admitted to hospital (including 5,000 for an elective surgery)
- 17,000 people visit an emergency department at larger public hospitals

So how much does do these things cost?

Hospital Stays

The Conversation points out:

> "The biggest and fastest-growing spending category in health is hospitals - they get almost $18 billion in real terms more than in 2002-03, an increase of over 95%."

Feros Healthcare puts the cost at $967 per patient per night.

Average Service Cost	Telecare	Telehealth	Average Acute Hospital Bed Cost
Per Day	$3.46	$7.14	$967

Source: Feros Healthcare

Around 11.8 per cent of all people (2.6 million) had been admitted to hospital in the last 12 months *(Source: Australian Bureau of Statistics)*.

Nationally, the average stay is six nights (see diagram)
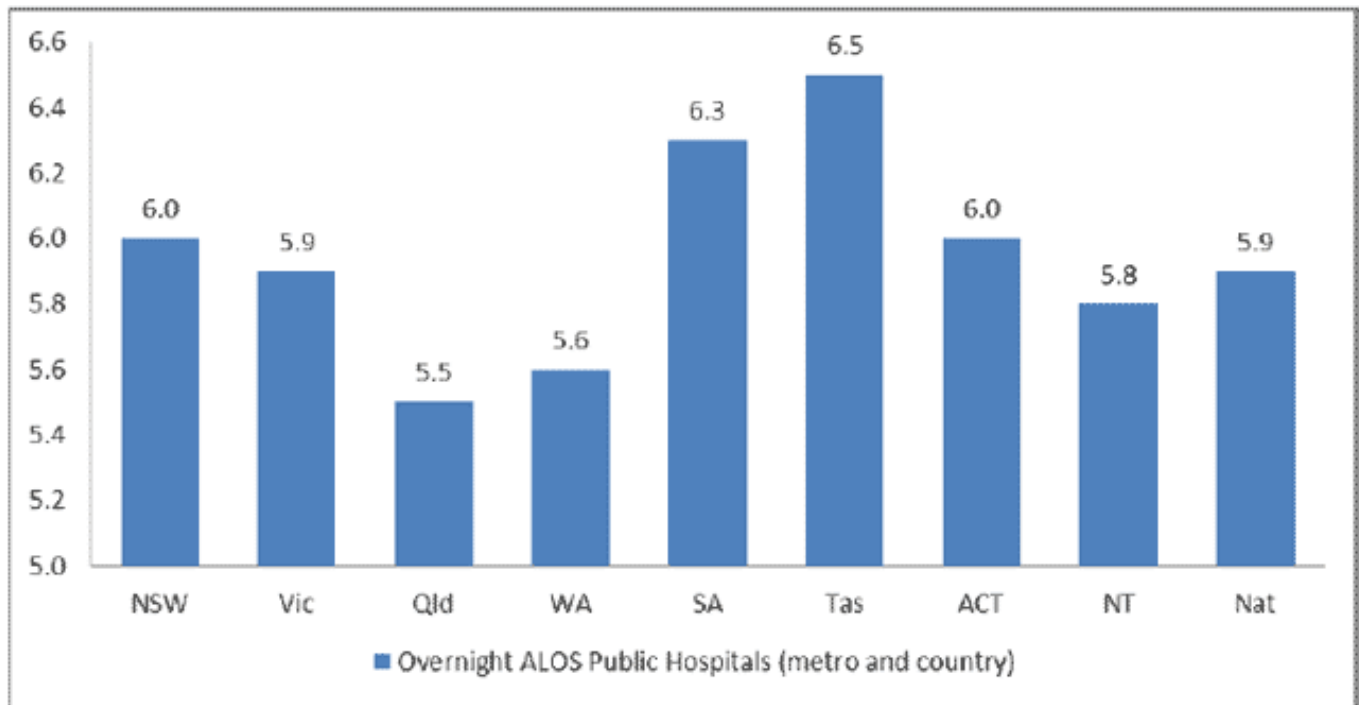
Source: [South Australia's Health's Response Oct 2012](#)

So the annual cost of Australian hospital stays is roughly:-

2.6 million Admissions x 6 nights x $967 per night = $15.1bn each year.

Many telehealth proponents state that most of the people in hospitals are there to primarily be monitored. If that is the case, with a reliable internet connection, a number of those patients could be monitored from home (where they'll recuperate quicker) and that would reduce the cost to less than $10 per day while freeing up beds for other people. In this instance, a hypothetical reduction of just 10% would be worth over *$1.5bn per annum* on its own.

However, the matter is not undisputed with some doctors adamant that the vast majority of patients that are being monitored in hospital are there because they still require hospital *care*. There are certainly many anecdotal examples of long-term hospital residents who could be monitored from home. However, the limited available figures don't highlight their numbers as significant. [This report from 2006-07](#) lists the main reasons for which patients were hospitalised (along with the costs of doing so). Many conditions don't lend themselves to home monitoring.

In the spirit of open journalism, if you have any relevant personal experiences on this matter, please leave them in the comments below.

Avoiding hospital in the first place

The above savings would come from simply sending people home early. In reality, the biggest reductions to hospital admissions come from the home monitoring of *chronically*-ill patients (especially seniors) and making sure they didn't become *acutely*-ill in the first place.

Chris Stevens, CTO of New Zealand's Orion Health, works on Telehealth projects around the world. He points out that according to the USA's CDC ([Centers for Disease Control and Prevention](#)) some 75% of US health spending is on chronic conditions and that these cause problems if a long-term view of healthcare isn't heeded. For instance, if you don't monitor diabetes early on, then super-expensive dialysis will be needed 10-to-15 years down the line - or in other words, several political cycles away.

He adds, "In 2005, Australia spent $2.2 billion on diabetes and obesity that's only two chronic conditions amongst everything. One of the big trends we're seeing is with that movement to treatment occurring in your house, is that home medical devices are becoming cheaper and cheaper, things like blood pressure checks and glucometers for testing blood sugar levels if you're a diabetic, even things like scales or oxymeters for patients with asthma. Today they're more and more likely to be connected and this connectivity is going to provide a huge boon to managing chronic conditions."

The [Australian Bureau of Statistics backs this up](#):

> By regularly monitoring their health, people may help prevent illness or injury. Consultations with health professionals may assist in many ways, including the monitoring of lifestyle risk factors, the treatment and management of long-term health conditions as well as short-term illness and injury, and the maintenance of good health.

Stevens goes on to explain how normally after being given advice by a doctor the patient is then sent away to return in three months whereas their levels could be monitored on daily basis with abnormal rises and drops in measurements setting off an alarm to alert medical professionals that there may be a problem. He also points out that monitoring people in this way, in America, has also led to lower health premiums being charged by insurance companies as it reduces the likelihood of subsequent, more serious health matters.

[The Australian](#) reports on the glowing success of one such case study in Armidale from just a few weeks ago.

> "The NBN has "really changed my life", adding: "Before, I'd get to lunchtime and want to get home, have a sleep. I'm now on insulin and that (advice) came out through the telehealth monitoring of my sugars."

A recent [Precedence Healthcare release](#), which [cites this study](#), states diabetes is a "runaway epidemic in Australia" and said that the internet was the key to dealing with it:

> In Australia, there are at least 1.5 million known cases of diabetes and a similar number with pre-diabetes. Moreover, for every diagnosed person with diabetes, there is likely to be one undiagnosed case. So, we are looking at potentially more than 4 million people, either with diabetes or who are at risk. It is possible therefore that some 20% of the Australian population is affected by diabetes in some way... "More than seven million Australians have a chronic disease, costing the health care system more than $70 billion per year. The losses to the economy through reduced workforce participation rates and productivity are more than $8 billion per year. Diabetes alone accounts for nearly a quarter of avoidable hospitalisations and 9% of deaths."

According to those figures, just a 10 per cent reduction in chronic disease costs through telehealth would be almost $8bn every year. And that comes with dramatic improvements to patients' lives.

So what exactly is Telehealth and how does the internet help?

Telehealth refers to the provision of healthcare remotely. Telehealth*care* refers to remotely-monitoring patients in their own homes. It's all separate to E-Health which deals with patient health records and we won't be discussing that here.

At a basic level Telehealth can be a panic button which dials a number using a phone line. As broadband has improved, extra monitoring devices have been installed in homes and there have been attempts at providing health consultations. But the latter have been hampered by slow internet speeds, unreliability and the requirement for at least some computing skills. An example of broadband failing (coupled with an illustration of

the impact on families and the economy) can be seen on *4Corners*, here:
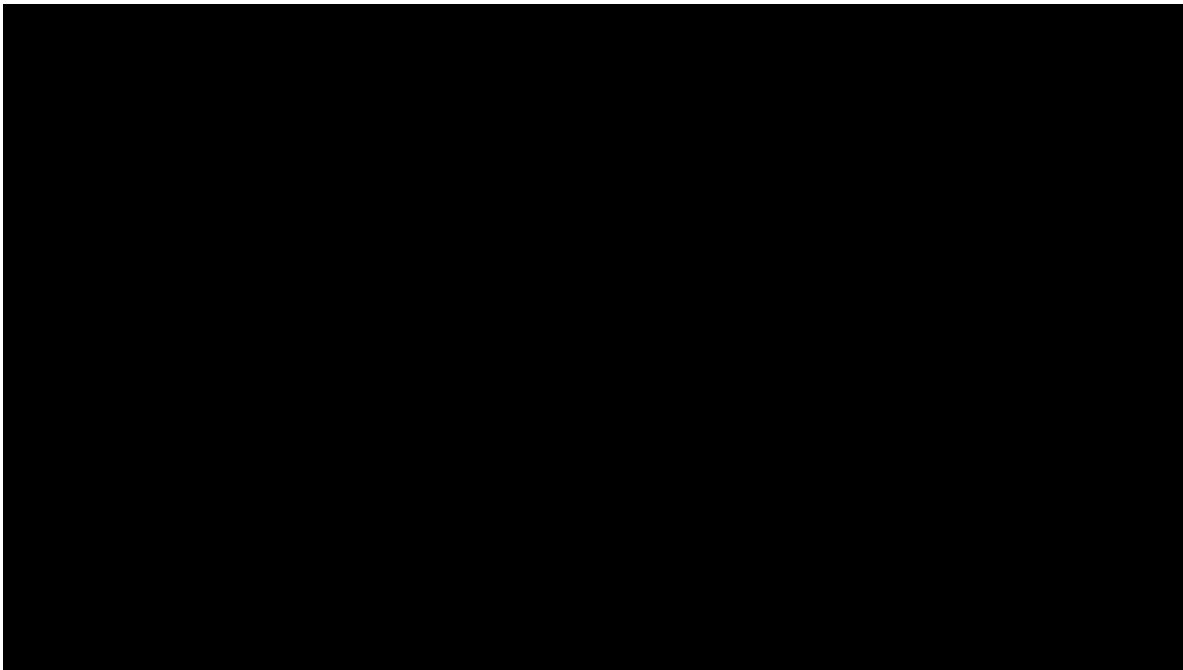
Not surprisingly, home consultations haven't flourished but things have improved. Some remote doctors' clinics, with reasonable broadband, are now allowing patients to talk to specialists without having to wait, in some cases, 18 months for one to visit.

Dr Mukesh Haikerwal states that 30-to-40 per cent of NBN usage will be for health applications and gives a demonstration of some benefits here.

Medibank's Anywhere Healthcare service offers specialist consults over "high-speed" broadband using a system that's essentially a secure version of Skype. At present this service is new and only available to GPs in a limited number of areas from their own offices. You can watch the video here.

The next evolution of Telehealth has seen NBN-like fibre-connected medical clinics sprout up in remote areas. The ABC's Peter Ryan reported the following:

> At the moment, many patients travel to rural health centres to connect remotely with doctors but in the future under the NBN, patients won't have to leave their homes. Gayle Boschert of Grampians Health says that prospect has many patients excited: "The patients talk about going to see the doctor on the telly and they talk about that down the street so it is not an unusual thing now. It is something that has been totally accepted by the community and it has been ongoing now for nearly three years."

In Queensland, similar trials have also been carried out by the Princess Alexandra hospital. The PA Online service, which runs rural Telehealth clinics in places such as Rockhampton, Ipswich, Dalby and Toowoomba, is reckoned to save around $30 million in annual travel costs alone. Rockhampton's Morning Bulletin reported:

> "Annette Maunder, speaking via video link from a Warwick hospital room to the Princess Alexandra Hospital, said she was relieved she did not have to make the four-hour trek to Brisbane to consult with specialists.
>
> "She fits with the 95% of patients who reported during trial consultations that they were just as happy as they would be face-to-face.

"And they were ecstatic to have avoided a 600km round trip with all of the expenses, petrol, traffic, parking" Dr Richard Ashby said.

Queensland Health spends over $100 million a year supporting the transport of patients to come down to Brisbane and other major centres.

"We believe probably 30% of that can be avoided... but the savings go beyond that because we only subsidise the travel, we don't pay for all of it."

Ambulance costs

HBF points out that "the [patient's] bill for calling an ambulance in an emergency in Western Australia is $779 and unless the patient has urgent ambulance health cover that amount comes straight from their wallet... aged pensioners receive free ambulance services and senior citizens 65+ receive a 50% subsidy."

Grampians Health's Gayle Boschert points out that the *actual* cost of each ambulance trip "can be several thousand dollars [for acute-care ambulances]." Indeed, A Current Affair cites the case of one granny who falsely called out an ambulance on a thousand occasions, costing the tax payer "about $1 million."

The Productivity Commission lists figures running from 2005-2010 showing that the current annual cost of ambulances is over $2.1bn and rising.

The Ambulance Service of NSW reveals that falls are the most common medical emergencies that paramedics respond to:

"Ambulances attend approximately 74,000 emergencies categorised as falls, out of about 840,000 emergencies. An estimated 60 per cent of falls involve patients aged 65 years and over. **Falls has become a major public health issue, which costs NSW taxpayers at least $558.5 million per year**.

"Falls cost the state's health system more than any other injury cause, including road trauma.

Ambulance recognises that as the population ages, falls will place a bigger burden on Ambulance resources. Already, falls are the most common medical emergencies attended to by paramedics."

That falls cost over half-a-billion dollars every year to NSW alone is extraordinary. And this brings us on to the primary benefit of the latest-generation Telehealthcare applications and that is helping seniors from within their own homes.

Aged Care

Aged care will be a key NBN application, and next-generation healthcare applications are now the subject of several trials around Australia.

We're not talking about last-generation monitors which send out an alarm if someone falls over, but houses full of sensors which transmit data in real time to monitor things like health and mobility degeneration. Is someone getting up and moving around the house? Are they feeding themselves? Has the patient set their house on fire or wandered away?

All the while there's a console which can provide a connection to friends, family, local nurses, doctors and specialists (at the same time) - without thinking twice about whether it might work or not due to the limitations of broadband infrastructure or having to deal with new-fangled computers or worrying about bandwidths and

internets or even the weather.

The prime reason for these trials is to equip healthcare providers with new business models to provide for better aged care and put a stop to the ballooning cost of health provision.

The South Australia Health report states:

> Like all States and Territories, and indeed like all Western jurisdictions, South Australia is facing the challenge of meeting the increasing health care requirements of an ageing population at a time when the cost of providing health care is increasing.

The Grattan Institute provides some sobering statistics on Australia's ageing population. Currently just over 10% of the population is aged over 65. By 2050 it will be almost a quarter. It illustrates that health costs are much higher at end of life and that soon, most of the health budget will be spent on older people (who have retired and don't pay tax).
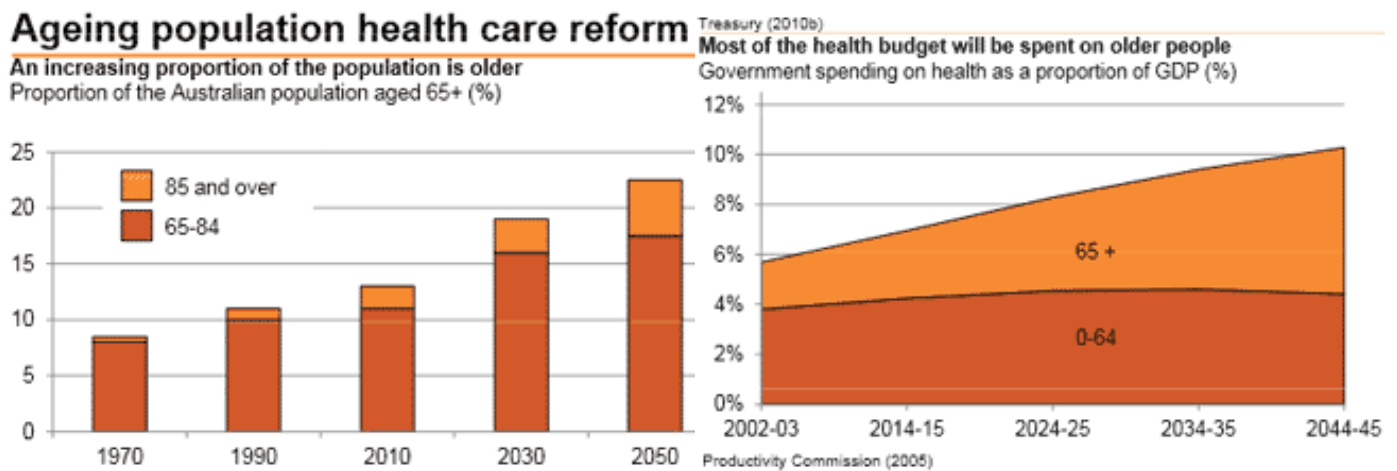
Source: Grattan Institute.

In general, according to the Australian Bureau of Statistics: the use of medical facilities increased with age. People aged 75 years and over reported the highest use of medical facilities in 2011-12.

All persons - Proportion who attended a medical facility in last 12 months, 2011-12
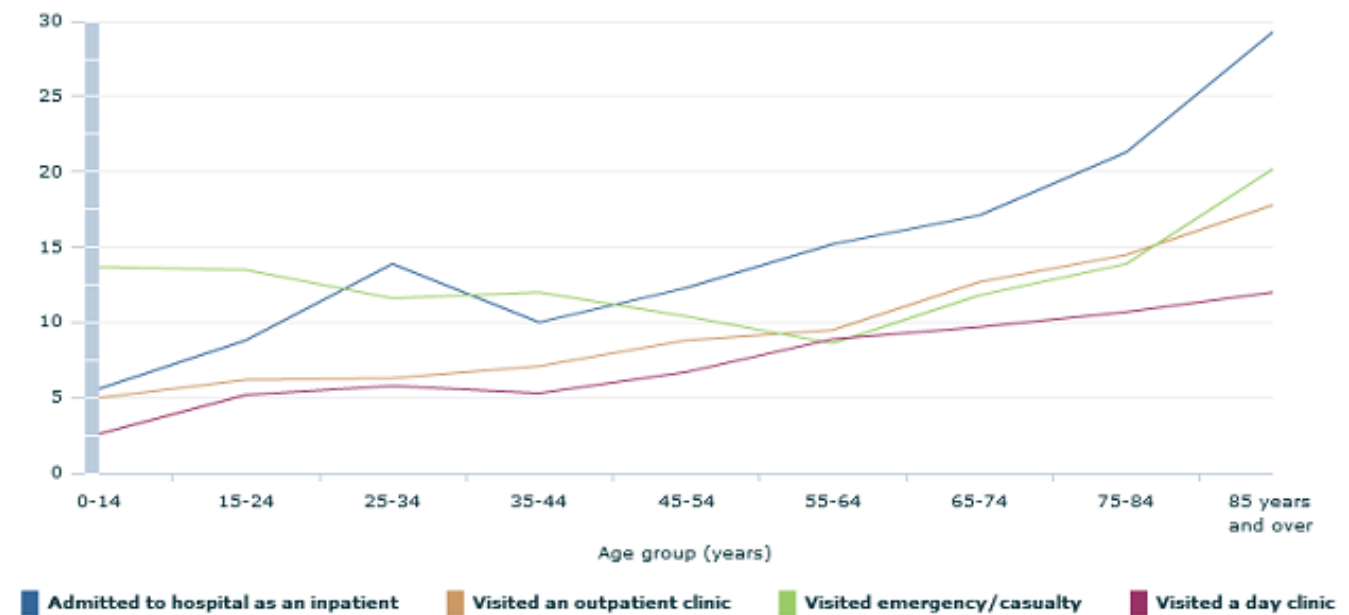
Australian Bureau of Statistics

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The Australian Academy of Technological Sciences and Engineering says that by 2050 the number of people of working age in Australia (20 to 64) relative to older people (65+), will fall from the current ratio of 5:1 to 2.7:1.

According to the Productivity Commission, total government expenditure reported on aged care services in 2010-11 was $12.2 billion. This included residential care services ($8.1 billion) and community care services ($3.4 billion).

The cost of residential care is complicated but generally large. It involves paying bonds which are dependent on personal assets and according to the Productivity Commission, the average bond paid by new residents rose from $58,000 in 1997-98 to over $230,000 in 2009-10. More on that here.

So staying in one's own home is naturally preferable not just from a health, happiness and wellbeing perspective but also from a pecuniary sense.

Feros Care is a not for profit Aged Care service provider operating on the East Coast of Australia, with a mission, "To assist older people to live their life, their way, by applying innovative thinking to create new opportunities to meet changing needs, expectations and challenges."

Feros says:

> For many ageing Australians, the desire to remain living independently in their own homes is a strong priority. The various combinations of frailty, anxiety, disease and disability can place a considerable burden on the capacity of individuals to live independently. Carers and family members who provide informal care are constantly seeking solutions to help maintain the elderly in safety and comfort in their own home.

This is echoed by The CSIRO's Geoff Haydon who is working on the NBN Telehealthcare trial in Northern NSW. **Their new equipment allows them to, "Manage and monitor people as though they were in a**

retirement village, while they're still in their own home."

He also speaks of his personal experience with his own family and the incredibly difficult problems that come with transitioning into an aged care facility. He had, "Ten years of false starts" and paid, "Lots and lots of deposits" before withdrawing because, "It wasn't quite right for us... And then when they get into that facility they find that everybody they meet has been through that same process." Constant measuring of all aspects of healthcare from within one's own home doesn't just prolong a senior's ability to stay there, it improves their health and makes it far more obvious when it's time to moved into a full-time care facility. It softens the blow and it saves a fortune.

Depression amongst those entering aged care is well documented. As Jane McCredie puts it:

> Depression is also linked to physical outcomes: poorer response to treatment for other health problems, less effort in rehabilitation programs and earlier death... Up to half of all people in residential aged care may have symptoms of depression, which is three times the estimated rate in elderly people living in the community.

As such the ability to be monitored in their own homes doesn't just mean that their quality of life is dramatically improved, they are less of a financial burden on the health system. The CSIRO trial is currently focusing on the benefits of home monitoring and links to family rather than medical professionals, but the equipment is the same for everyone with chronic health issues:

The CSIRO's brand new console plugs into a home's NBN connection and monitors all aspects of a patient's vital signs and alerts family and or medical staff if there are any changes. It also has a built-in high definition video camera for conferencing with both GPs and specialists at the same time. It plugs into the NBN and costs around $3000 - potentially less than a single ambulance journey.

This console, coupled with sensors within the home provides a level of care and monitoring that in many ways is superior to residential homes.

Elsewhere, a high-speed network's support for video games might look more like entertainment than healthcare, but it's a serious application. Games are already prescribed for rehabilitation after a stroke, but there is much more that can be done. Games can also help deal with mobility degeneration. In the video below, from NeuRA (Neuroscience Research Australia) we see how movement can be monitored using a basic dance game mat which helps diagnose motion-degeneration issues and subsequently reduces the amount of costly (and painful) falls. A brief video from NeuRA (Neuroscience Research Australia) demonstrates this and other next-gen NBN-based care.
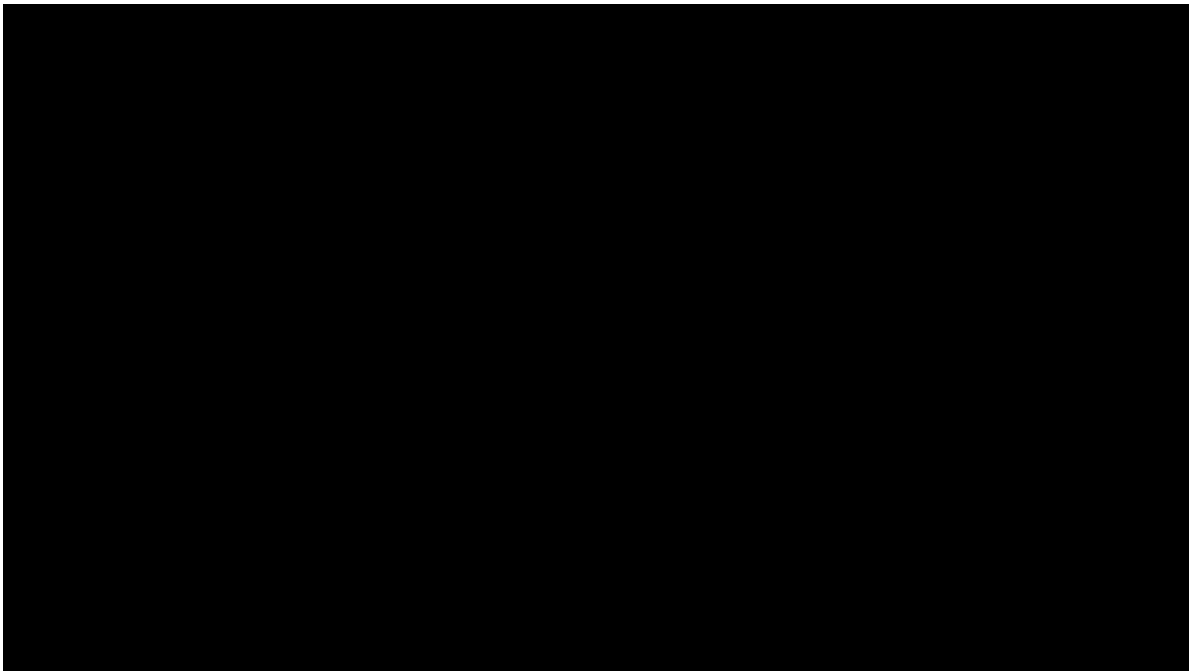
Dr. Stuart Smith of NeuRA sums the situation up thus, "NBN-connected telehealth technologies are a vital next step in being able to build a better health service."

Case Studies

The advanced NBN-related trials are primarily being conducted for research purposes at present and few seem to focus on ALL of the issues at hand. Nonetheless, it doesn't take a leap of faith to see that advanced home monitoring is highly-likely to dramatically improve the lives of the old and infirm. At the same time, successful monitoring will reduce the number of ambulance journeys, reduce travel to doctors and specialists, and reduce the number of acute incidents arising out of chronic illness. The cumulative outcome should be fewer hospital visits, admissions and stays. All of these come with an annual pice tag in the billions.

Even basic telehealth studies have found the results to be dramatic. Feros' study in 2010 found:

> "A general endorsement that Telehealthcare Technologies can improve the likelihood of Clients being able to remain safely in their own homes for longer than would otherwise be possible with:
>
> a. 80% of Clients reporting that Telecare had improved their quality of life during the program;
> b. 69% of Clients reporting being less concerned about the daily severity of their condition;
> c. 44% of Clients feeling that they need to visit their General Practitioner (GP) less frequently; and
>
> d. 44% of Clients feeling that their quality of life had improved relative to the beginning of the program.

The results of the trial were wholly positive. You can read the full report, here.

Other findings included knock-on benefits to carers who were often frail spouses themselves or other family members. The burden and need for respite care (which is expensive and highly-limited in availability) was dramatically reduced. One said, "I can't provide much assistance myself, but with the Feros visits and Telehealth services I think Mum can remain at home for years... Maybe as Mum deteriorates she will need more frequent services, but she has a strong desire to stay at home."

A financial conclusion was drawn:

The Pilot Program has shown that technology is proving to be an affordable cost model and viable service option for Feros Care who believes there is significant potential cost savings for both the Health and Aged Care service sectors, compared to the cost of providing direct care.

Another telling quote is, "With Telehealth the Registered Nurse is monitoring Mum's vitals every day. No hospital admission this winter - the first time in three years."

There are numerous personal case studies listed in the report from page 32 onwards. All of them positive.

The result of the trial established that the cost of daily Telecare and Telehealth supervision per day was $3.46 and $7.14 respectively while the average acute hospital bed cost $967.

2007 figures showed that some 2,300 seniors were waiting in acute-treatment hospital beds for a place in a care home. The cost of this was around $700 million for the year. When patients get to this point it's unlikely that home monitoring will help. However, the figure is yet another example of the level of savings that could be made if seniors were monitored at home over the long-term and admissions were reduced.

Global examples

There are numerous case studies from around the world. Here are just a few highlights:

Tunstall is a Telehealth specialist which operates in Australia and New Zealand as well as globally. It cites a trial in the UK's Sheffield Primary Care Trust for Chronic obstructive pulmonary disease sufferers. The results were:

Sheffield PCT case study

- Telehealth pilot project conducted to determine benefit of using telehealth in the home

Outcomes

- COPD admissions decreased by 50%
- Patients able to be remotely triaged helping staff to prioritise visits
- Patients able to be discharged from hospital earlier
- Patients more aware of their own condition
- Fewer unplanned hospital admissions

Source: Tunstall Telehealth trial results.

One success story led a patient to say, "Before the Telehealth program I had no idea what was going on with my diabetes, now I feel more independent and in charge... It really does make you more aware"

Meanwhile, in America, a US Chronic Disease Center study found:

The U.S. health care system could reduce costs by nearly $200 billion during the next 25 years if remote monitoring tools were utilized in congestive heart failure, diabetes, chronic obstructive pulmonary disease (COPD), and chronic wounds or skin ulcers. People with chronic disease cost 3.5 times as much to serve compared to others, and account for 80% of all hospital bed days and 96% of home care visits

While the figures aren't directly comparable to Australia, they're not wholly unrelated and are arguably significant enough to warrant studies into the extent which Australia suffers from the same problem. Orion Health's Chris Stevens underlines the importance of keeping chronically-ill patients away from hospital with another example:-

"In some US emergency rooms, it costs US$10,000 every time a new patient turns up. Every chronically ill patient that can be dealt with remotely saves significant money."

New Zealand got the highly-regarded Bell Labs to perform a Cost Benefit Analysis of its fibre-based NBN equivalent and found that the benefits were enormous and that the rollout would pay for itself:

In the healthcare domain, the savings considered as part of the analysis included lower hospital admission and test costs, fewer emergency room visits, lower travel-related costs, lower long-term prescription drug costs, faster access to physicians and faster care delivery leading to savings in government expenditure on healthcare. The result was a NZ$5.9 billion [$4.8 billion] consumer surplus over 20 years.
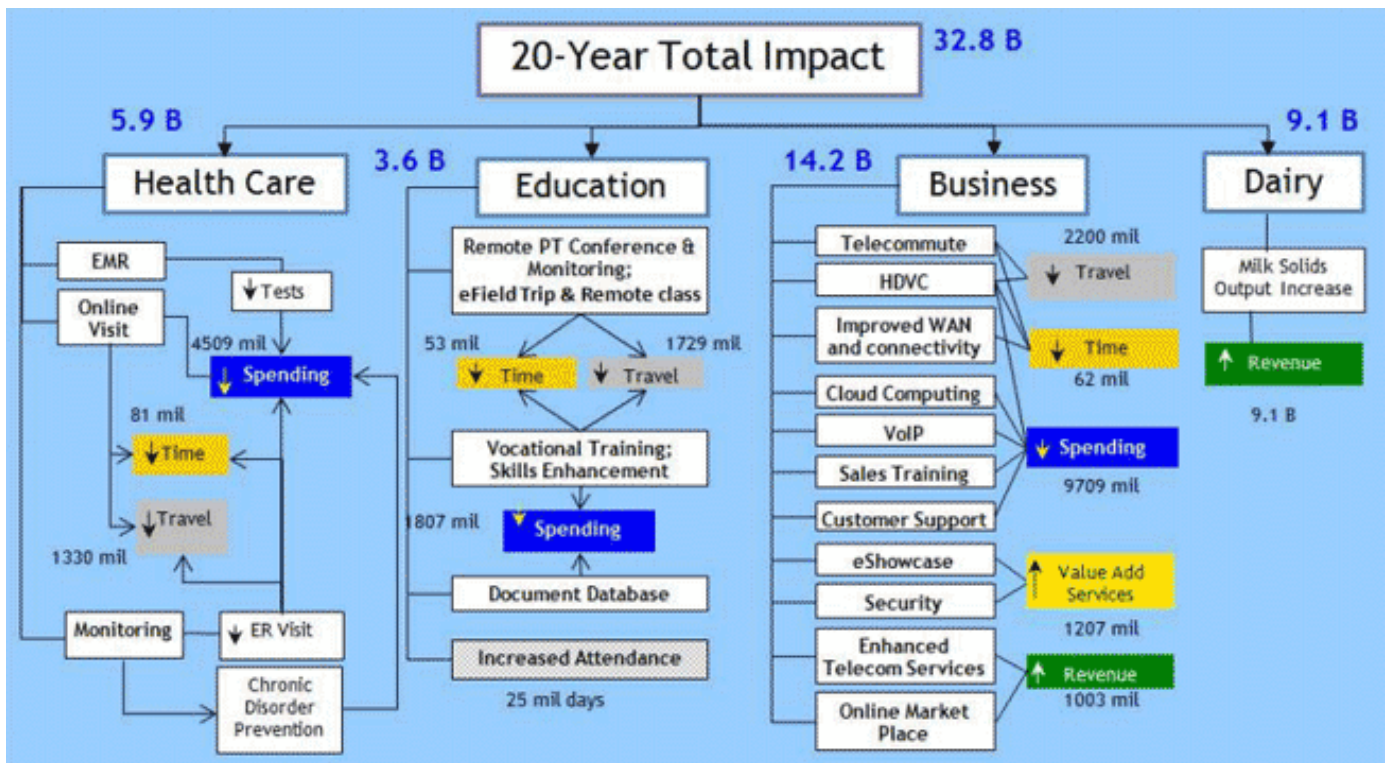
Summary of New Zealand's Cost Benefit Analysis of it's NBN-equivalent rollout. Source: Bell Labs.

Considering that New Zealand's economy is 90 per cent smaller than our own, and the country doesn't have to deal with the extraordinary challenges of rural and remote care that face Australia, one wonders what numbers an Australian Cost Benefit analysis would turn up?

Australian Figures

There's an excellent, and very readable paper on Telehealth from the Internet Medicine Journal here. It goes through most of the benefits and cites a telling case study which further details family impact, taking time off

work to take somebody else to the doctors, but also cites [another paper which applied US data to Australia in 2010 and found that](#):

> Access Economics estimates that steady state benefits to Australia from wide scale implementation of tele-health may be in the vicinity of $2 billion to $4 billion dollars per annum.

Basing a simple model around the US figures which show [chronic disease sufferers account for 80 per cent of hospital bed days](#) would mean that they account for $12.1bn of the annual $15.1bn price of Australian hospital stays. An ultra-conservative 10 per cent saving would come to $1.2bn annually (and rising).

If we revisit [Precedence Healthcare's diabetes and chronic disease figures](#) which state that over seven million chronically-ill Australians annually cost the health care system more than $70 billion and cost the economy a further $8 billion per year - and apply a 10 per cent reduction through telehealth - that would be worth almost $8bn every year.

Significant savings scale down to small, specialist healthcare levels too. Steve Pascoe of the Cochlear Implant Centre says the dollar savings from broadband consultations are significant. His team of just twelve people are saving about $500,000 a year.

> "We reckon we don't have to employ as many people to do this because instead of having four clinicians out in our region, we only maybe have two out there and the rest will be serviced by remote."

Ultimately, we can make models of various aspects of telehealth savings forever - and many figures overlap. The important thing is to realise is that the annual figures are in the billions and just to hammer home the point...

What if Telehealth saved just one per cent of the annual health budget

If we make an ultra-conservative model based on the premise that the NBN can save just one per cent of health spending per year, the figures get huge quickly. A [spreadsheet shows the working here](#), but ultimately we've taken [2010-2011's $130bn health spend figure...](#)

Table 2.1: Total health expenditure, current and constant prices[a], and annual rates of change, 2000–01 to 2010–11

Year	Amount ($ million)		Change from previous year (%)	
	Current	Constant	Nominal change[b]	Real growth[b]
2000–01	58,269	77,471	. .	. .
2001–02	63,099	81,573	8.3	5.3
2002–03	68,798	85,683	9.0	5.0
2003–04	73,509	88,699	6.8	3.5
2004–05	81,061	94,345	10.3	6.4
2005–06	86,685	96,977	6.9	2.8
2006–07	94,938	102,656	9.5	5.9
2007–08	103,563	109,467	9.1	6.6
2008–09	113,661	117,496	9.8	7.3
2009–10	121,353	122,464	6.8	4.2
2010–11	130,266	130,266	7.3	6.4
Average annual change (%)				
2000–01 to 2005–06	. .	. .	8.3	4.6
2005–06 to 2010–11	. .	. .	8.5	6.1
2000–01 to 2010–11	. .	. .	8.4	5.3

(a) Constant price health expenditure for 2000–01 to 2010–11 is expressed in terms of 2010–11 prices. Refer to Appendix C for further details.

(b) Nominal changes in expenditure from year to year refer to the change in current price estimates. Real growth is the growth in expenditure at constant prices. Refer to Box 1.1 for more information.

Source: AIHW health expenditure database.

...and made it rise by a very-conservative five per cent each year.

Year	Annual Health Spend ($bn)	1% saving ($bn)	Running total of saving ($bn)	Total Health Spend ($bn)
2010	$121.0	$1.2		$121.0
2011	$130.3	$1.3		$251.3
2012	$136.8	$1.4		$388.0
2013	$143.6	$1.4		$531.7
2014	$150.8	$1.5		$682.5
2015	$158.3	$1.6		$840.8
2016	$166.3	$1.7		$1,007.1
2017	$174.6	$1.7		$1,181.6
2018	$183.3	$1.8		$1,364.9
2019	$192.5	$1.9		$1,557.4
2020	$202.1	$2.0		$1,759.5
2021	$212.2	$2.1	$2.1	$1,971.7
2022	$222.8	$2.2	$4.3	$2,194.5
2023	$233.9	$2.3	$6.7	$2,428.4
2024	$245.6	$2.5	$9.1	$2,674.0
2025	$257.9	$2.6	$11.7	$2,932.0
2026	$270.8	$2.7	$14.4	$3,202.8
2027	$284.4	$2.8	$17.3	$3,487.1
2028	$298.6	$3.0	$20.3	$3,785.7
2029	$313.5	$3.1	$23.4	$4,099.2
2030	$329.2	$3.3	$26.7	$4,428.4
2031	$345.6	$3.5	$30.1	$4,774.0
2032	$362.9	$3.6	$33.8	$5,136.9
2033	$381.1	$3.8	$37.6	$5,518.0
2034	$400.1	$4.0	$41.6	$5,918.1
2035	$420.1	$4.2	$45.8	$6,338.2
2036	$441.1	$4.4	$50.2	$6,779.3
2037	$463.2	$4.6	$54.8	$7,242.5
2038	$486.3	$4.9	$59.7	$7,728.9
2039	$510.7	$5.1	$64.8	$8,239.5
2040	$536.2	$5.4	$70.2	$8,775.7
2041	$563.0	$5.6	$75.8	$9,338.7
2042	$591.2	$5.9	$81.7	$9,929.9
2043	$620.7	$6.2	$87.9	$10,550.6
2044	$651.7	$6.5	$94.4	$11,202.3
2045	$684.3	$6.8	$101.3	$11,886.7

Doing this shows that over $3bn per year would be saved by 2030 on the assumption that Telehealthcare was up and running in 2021 - the proposed finish date of the NBN. That means healthcare would cover the costs of the total $30bn tax payer's investment in the NBN in a decade. (Note: for the model I've assumed any delay in finishing date is, to some extent, balanced by a probable earlier start date for Telehealth savings to kick in.)

Even if we use the Coalition's controversially-inflated $94bn figure for the total cost of the NBN, it would still cover that cost by 2044.

Indeed the health spend is growing so high that any rollout delay-related cost blowout can easily be absorbed.

Rural Australia

The current economic model of the NBN, coupled with the failure to do a Cost Benefit Analysis, meant that

much of rural Australia got lumbered with second-rate Fixed Wireless broadband access. It's not yet clear how suitable this infrastructure will be for the latest advanced telehealth benefits. In family homes where other broadband applications are in operation, it may be that the ability to make an urgent health-related call to a medical professional is compromised. Maybe not. Every situation is likely to be different due to the lack of guaranteed minimum performance provided by fibre-based broadband.

However, what *IS* known is that the cost of providing healthcare to these people is considerably higher than to metropolitan dwellers thanks to Australia's tyranny of distance. Could it be that the [$16.3bn it would cost to provide Fibre to the Home for rural Australia](link) is justified due to health savings? If Telehealth can shave just $1 billion off rural Australia's annual health costs, that would pay for a fibre rollout in less than two decades. That could have made for some interesting pre-election promises. As it is, the Coalition's long-promised forthcoming Cost Benefit Analysis will hopefully give us a better idea.

Other savings and health benefits

Going into every possible health benefit that Telehealth can bring is beyond the scope of this article but the following are anecdotal examples that have cropped up in the past three years of this investigation and are worth mentioning:

Medical Imaging - Richard Chirgwin describes how being able to [share large files using fibre-based broadband saves people time and money each year](link). It's worth around $60m annually and rising.

[**Tresillian**](link) **care for new mums** - A friend's new baby highlighted the problem that some new mothers have when their newborn won't feed. One acquaintance was desperate to be admitted to a Tresillian monitoring center for a week to get help. The ability to monitor new mums and their bubs at home would be transformative.

Home triage for sick kids - Parents with sick children can get an initial diagnosis from home - possibly by talking to their TVs'. This reduces hospitals getting clogged up with parents who are worrying over nothing, negates the high cost of administration and means that adults needn't take time off work at the expense to businesses and the economy. Nor do they need to make an unnecessary journey. There are currently trials to add apps and other special software to televisions to provide secure health connections (Skype is not secure.)

The effect on the economy of not having to go to the doctors - The [ABS states](link) that in 2011-12, of all people who were currently employed or studying/at school:

> 13.3% had taken time off work or study/school in the last 2 weeks due to their own illness or injury; and 3.9% had taken time off to care for someone else.

Barrier nursing - There are many medical conditions that require examination rooms to be fully disinfected and decontaminated after a patient has visited. Telehealth offers a simpler-to-use form of barrier nursing.

Low-latency mobile medical apps - Peter Croft from Allocate Software states that medical professionals, like nurses, need a responsive experience when dealing with medical apps. If there's a lot of latency in the user experience, when accessing the cloud (medical information stored on the internet), that can kill uptake.

Ultra High Definition - Another benefit of the new Ultra HD 4K televisions and monitors is that the improved colour performance dramatically improves sight diagnosis. The more a doctor can see how much a patient is trembling, what colour their skin is or what a rash looks like, the better the diagnosis. This resolution can only be broadcast over fibre.

Eye checks - This [Western Australia article](#) shows how eye checks can be performed remotely. Just like Cochlear's aural checks.

Stroke victims - The benefits of treating stroke victims using telehealth has already become so common that the term [Telestroke](#) has evolved.

Basically any medical application can develop if there's a reliable infrastructure in place that will be guaranteed to work, when needed, without people having to think about it. If you have any more ideas, let us know in the comments.

All this brings us on to one of the most important issues.

Can it be done using copper-based broadband?

We could add dozens of expert quotes here but everyone says the same thing. Some of the above can be done over copper depending on the state of the copper that connects to each house, how far each house is from each exchange or node cabinet, how many people in a neighbourhood are using the internet plus what they're using it for at different times of day (this is particularly true for cable broadband), whether there are other devices in the premises which are automatically using data, whether anyone else is sharing a domestic or doctor's practice's broadband connection and what they are doing with it and many more facets [including the weather](#).

On the one hand basic telehealth and telecare monitoring has already been performed using minimal connections. At a home monitoring level, this generally involves sending stats and very-basic monitor readings over a basic broadband network.

In terms of remote diagnosis Anywhere Healthcare makes use of what's available. Their current business is more governed by government funding policy than infrastructure. They use the connections they are given and have made very efficient use of secure, relatively-high definition video for their specialist consults which also allow high-resolution digital photos to be uploaded in the background while talking.

It could be that if the current government ramped up incentives for doctors to use telehealth, adoption would ramp up considerably and even allow the public to be consulted in their own homes using such a system. But dramatic policy changes would be needed to allow GPs to bill someone every time they say they've spoken to a patient online.

A problem with early Telehealth incentives saw GPs charging hundreds of dollars for making a brief Skype call. There were many accusations of rorts and ultimately the system didn't catch on. Continuing funding from Medicare for such incentives, in order to achieve nationwide adoption, would have to be substantial and it would need to be administered far better.

As it is, Anywhere Health doesn't treat people in their homes but only deals with GP practices in remote areas and offers specialist consults to those who would otherwise have to wait many months. It's a revolution for those remote dwellers, but that's as far as it goes and without a substantial, and expensive push, it's not likely to catch on nationwide.

As Samuel Holt, Director of Online Services, states:

> "These days you can conduct very high quality video conferencing on 250Kb/s to 400Kb/s up and download as long as you've got that in both directions."

He goes on:

> "But certainly the advent of the NBN will provide a lot of benefits for Telehealth. Just having everyone to be able to have access to ubiquitous, stable internet connections will mean that you will be able to move from a somewhat manual process."

This manual process refers to Anywhere Health's full-practice management team who have to support and set up each connection and check that parties at each end can hear and see each other before each of their hundreds of consults each week:

> "Because there are still technical problems that occur at various end points that you need support. You need some kind of intervention to ensure that both ends of the conversation are working well enough to be able to do clinical applications and consultations."

GPs using the system will be familiar with the foibles of their internet connections and can work with the tech support people to get the connection running. It's extremely unlikely that support staff would be able to diagnose and support domestic users, who will have different connection speeds and domestic circumstances coupled with different levels of tech-familiarity in every instance. This is especially true for the old and infirm and those who don't own a computer or who have never used one.

As we saw in the 4Corners clip above, copper-based domestic consults do happen, but in very specific instances - where a tech-savvy patient knows how to set up the meeting. But even then they are hampered by connection issues caused by the unpredictable infrastructure. They are almost certainly unable to reliably 'conference in' third parties due to copper's limited upload performance.

Holt goes on:

> "If you want Telehealth to be efficient, what you don't want is specialists and GPs allocating their time to Telehealth only for consultations not to go ahead because of technical reasons, be that user related or connectivity related... so all the specialist has to do is focus on doing their clinical work. "Now if everyone in Australia was sitting on an NBN connection and therefore had higher speed, synchronous up and down connections and it was more reliable then you could remove that human element and you could automate those connections to a much higher level. It will mean that Telehealth will become more cost effective and efficient. And certainly for some types of services, delivered by Telehealth, there will be a broader scope of practice."

Ubiquity is a word that crops up with all Telehealth providers. It means knowing that everyone has access to the same, minimum, guaranteed performance which, incidentally, is only possible with fibre-based broadband and not copper-based broadband. The same goes for symmetry (fast upload AND download speeds) and reliability.

Former telecoms analyst, Richard Chirgwin, adds the importance to ubiquity for the, "Standardisation of equipment" and having, "A standard interface that enables the creation of 'zero configuration' end-user systems." He notes that under the current NBN policy, this would apply across the both the fibre and fixed wireless platforms.

> "Once you know that the home WILL have an Ethernet port on the NTU (Network Termination Unit - the box that gets put on everybody's wall) to use, equipment can be pre-configured so the patient needs nothing more than to plug it in. Second, a standardised unit minimises the provider's inventory and admin costs. Neither of these are quantifiable yet, but a standard interface removes a barrier to implementation."

The people running the Northern NSW CSIRO NBN Telehealthcare trials, which are looking for new business models for healthcare providers, are adamant that the three things needed for broadband-based healthcare are, "Ubiquity, symmetry and reliability."

The CSIRO's Geoff Haydon also points out that:

> "Unless the technology is invisible, then health providers won't touch it." "[The] average sensor generates 20MB data every day or two and, even when you're running high definition video to a tablet, you still need a couple of megabits per second symmetrically... and plus when you've got all these sensors throwing their little bits of data backwards and forwards which does have to deliver a lot of information in real time, it does add up..."

The Coalition's upload speeds have been stated as 6Mb/s which doesn't leave a lot of room to manoeuvre. If the internet connection is shared in any way it puts guaranteed transmission at risk. As Cisco, the major global networking provider says, by 2016 there will be 142 million networked devices in Australia and growing. That's 5.7 per person - up from 4 in 2011. Furthermore, the amount of data each household is consuming is ballooning and showing no signs of slowing down.

Cisco also deals in Telehealth and is working on a standard whereby high definition medical-grade video conferencing requires 5Mb/s upstream, 5Mb/s downstream and several Mb/s overhead to allow for network congestion.

As such the home monitoring might work - depending on the connection speed, state of the copper that connects to each premises, the distance to the Node and the weather. But is there room for 'might' in life-dependant Telehealthcare? CSIRO is adamant that there is not. Haydon says:

> "What is very important in this business model is that as those service providers start to look at delivering these sorts of services what really matters to them is the ubiquity of the broadband that's available so that they don't have to go fishing around trying to work out who is able to be connected to the service. They can eventually know that every home containing an elderly person is able to be connected to their service. That's very important piece of this business equation. Also the improved symmetry of broadband services is very important to this as well so that you don't have to be concerned whether a person has enough bandwidth in the upstream direction to actually get a satisfactory video service. Because all of these services really rely very heavily on working very reliably because these people are not generally computer literate... unless it works seamlessly without them even having to give it a second thought it is very difficult to make these sorts of services broadly available and that's what the service providers need to get all of the savings."

This is backed up by Steve Pascoe of Cochlear - one of the earliest adopters of telehealth in Australia - who spoke on behalf of The Australian Center for Health Innovation at Melbourne's Alfred Hospital saying that the two main things they needed were "Bandwidth and reliability."

In the industry, iiNet's CEO, Mike Malone, recently told a group of Telecomms journalists that the copper which the Coalition was relying on to deliver fast broadband wasn't in a state to reliably run applications like telehealth.

Kirsty Skene from Tunstall Healthcare says, "Tunstall recommends a 50/20 Mb/s [NBN connection] with 50GB of data. That will enable them to have a half-hour video conference at least once a week with up to two other parties."

If that is unavailable then "3G will provide a reasonable quality video quality video conference but obviously not as good quality as a 4G or certainly not as good as an NBN (connection)... a Skype [level] of quality." Interestingly, they avoid ADSL which is unable to do multi-party video conferencing because it's, "Too slow."

This article is being [published alongside an extensive study into the state of Australia's copper network](). The results are complex, but what is clear is that there's abundant evidence that a prolonged lack of maintenance has left the network in a sorry state, but to what degree is unclear.

Ultimately, while some tech-savvy old and/or infirm people may be able to speak to a doctor over copper-based broadband right now, it's not without provisions being made and support needed to be in place. Even with amped up download speeds, upload speeds would still be low, every premises will receive different performance and reliability would vary dramatically.

On the available evidence, there's almost nothing to suggest that seniors will be able to dodge aged care facilities for years longer, that parents will be able to flick on the TV and talk to a doctor without taking them to hospital, the hospitals can consider sending some patients home for monitoring or that the chronically ill can monitor their health better from home - on a nationwide scale - using the copper-based infrastructure.

The P word

Everyone is doubtless sick of NBN politics but it's worth mentioning the political issues that affect healthcare.

As we mentioned above, many investments in healthcare right now will only pay off down the line - several political cycles away - and this is often an antithesis in politics.

But Australia also has other issues as Anywhere's Holt points out, "You've got this crazy situation where State Governments don't fund primary care but they fund hospitals. So there's little incentive for State Governments to get behind Telehealth even though the Federal Government is trying to push it. Yet at the end of the day it's the State Governments who end up wearing all the costs to the hospital system when people are presenting unnecessarily. So if you get State Governments to support healthcare at the primary level whether that's through telehealth incentives or whatever and you can reduce unnecessary presentations and unnecessary readmissions in hospitals it will benefit the State Governments ultimately."

This is one reason why it's worth focussing on the financial side of matters. As we saw above in the Queensland Telehealth trials, once you start focusing on dollar savings with lots of zeros in the number, politicians start to get a '[Growing appreciation for Telehealth]().'

Conclusion

It's unfortunate that Telehealth has hardly been mentioned in relation to the NBN and that, on the rare occasions which it has, people have focused on what applications *can't* be done instead of what *can*, *is* and *will be* done.

Ultimately, you can talk forever about justifying the NBN spend on health but the harder question to answer is actually, "Why wouldn't you?" The $7bn difference between the $30bn and $37bn policies resembles a rounding error in the face of Australia's health spending which, [at a conservative estimate, will have a cumulative cost of $10 trillion over the next three decades](). The difference in projected rollout completion dates of just two years, seems practically irrelevant.

Quite simply, the more bandwidth and reliability there is, the more that can be done to an exponential degree. While fibre-based broadband doesn't on its own guarantee a healthcare revolution, it does bring the

guaranteed performance required by healthcare providers to *provide* a healthcare revolution - something they are all keen to do in order to bring about major cost efficiencies and service improvements.

The above health spend trends are well documented and crystal clear. So are those for general broadband growth requirements.

This may explain why this one particular policy has such a lingering outcry that won't go away. It comes from those who are informed and illustrates how totally the former government and the media failed to inform everyone else.

Many people are currently railing at the new government for destroying the NBN but they're forgetting the long-and-oft promised Cost Benefit Analysis that will precede any final decision. The legacy of not doing the due diligence now, and depriving Australia of all these potential benefits which will affect generations, would resonate through the ages and leave quite the unfavourable legacy for all involved. After all, these aren't applications that will simply cease to exist. Those who already live in fibre-based NBN areas (and fibre-based areas in other countries) *will* eventually get these services and, in some places, they're already here.

On the other hand, it may be that a CBA uncovers yet more information that throws a spanner in the works of all of the above. At the end of the day this is one article from one journalist that aims to kickstart a discussion that's long overdue and it's far from being all encompassing - even though it did take three years to write. As such, and in the spirit of open journalism, if you have any additional facts and figures which might further influence the conclusions and models described in this article, one way or another, let us know in the comments below.

Additional information: The Australian Telehealth Conference runs in Melbourne from on March 19 and 20. More information can be found here.

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