Impact of Advances in Medical Technology on Healthcare Expenditure in Australia

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Victorian Department of Human Services submission

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Submission to the Productivity Commission by the Victorian Department of Human Services

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EXECUTIVE SUMMARY

Like innovations more generally, advances in medical technology help improve our quality of life and give all Victorians a higher standard of living.

At an individual treatment level, advances in medical technology can make treatment less burdensome or risky, or improve health outcomes, by deferring, reducing or eliminating the need for further treatment. Some advances, such as advances in *e*-health, improve efficiency and reduce errors. Many innovations make hospital treatment cheaper, because they decrease average length of stay. However, because this frees hospital beds, and because many innovations also expand treatment frontiers, gains from any cost reductions tend to be put into additional treatments, at least in public hospitals, offsetting potential overall expenditure savings.

Moreover some technological advances are predominantly cost increasing because they open entirely new treatment frontiers, or because they are introduced with the aim of increasing patient safety or quality of care. These developments are occurring against a background of improving overall health, but with the health improvements being distributed unevenly across the community. Technological advances can serve to reduce some of these inequities, such as the ability of telehealth and telemedicine to reduce the disadvantage in cost and access experienced by people in rural and remote areas.

The interaction of increased levels of private health insurance with rapid advances in medical technology is likely to drive up overall costs, and may increase access inequities. Recent data indicate that private patient treatment is around 15 per cent more costly than public treatment, and that private patient costs are escalating twice as fast as public patient costs.

Despite real per capita spending on health in Australia rising more rapidly in recent years than during the mid 1990s, it remains on a par with that of western Europe, and well below the level in the USA. Given the continuing decline in the Australian Government's share of public hospital funding and the prospect that the pace of technological change will quicken over the coming decade with no slackening in demand for public hospital treatment, the Victorian Government has moved to strengthen processes for evaluating new technologies before they are introduced into public hospitals.

Assessing the benefits and cost-effectiveness of technological developments across all health settings and treatment types is a major challenge, and is the subject of considerable effort on the part of Government committees, researchers and clinicians. The various processes are not well integrated and much greater collaboration between federal and state governments is desirable. An integrated national assessment process is the key to improving these processes and thereby the efficiency and effectiveness of health spending.

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PART 1: OVERVIEW

Key Points

- ⇒ The benefits of increased health spending are substantial, but they are hard to quantify and are not equally shared.
- ⇒ Per capita health spending in Australia is above that of the United Kingdom, a mainly publicly-funded system, and below that in the United States, a mainly privately-funded system, but is on a par with nations of western Europe.
- ⇒ There has been strong growth in public hospital spending by the Victorian Government in recent years.
- ⇒ New medical technologies can operate to increase or decrease cost of particular treatments. The net overall impact is that advances in technology increase hospital spending, adding to both unit costs and overall demand for treatment. In Victoria, these factors are estimated to have increased annual spending growth by around 2 per cent per annum in real terms.
- ⇒ Not all the cost growth due to advances in technology are due to innovative new treatments. Technologies that improve patient and staff safety and quality of care are also important cost drivers.
- ⇒ Increased private health insurance has contributed to the faster health expenditure growth in Australia and is also likely to increase the rate of uptake of new technologies.
- ⇒ It is difficult to forecast the future cost outlook for medical technologies in public hospitals. On the one hand, rapid advances in new clinical applications and pharmaceuticals are likely to increase costs (and enhance health outcomes), but ICT implementation in the public hospital system may substantially cut costs and improve safety and quality.

A high-quality health system that is available to all who need it, not just those who can afford to pay for it, is one of the hallmarks of a wealthy nation. But our strong health system is not just a consequence of Australia's economic fortune, it is also a reason for it. Good health is a pre-requisite for every person being able to contribute to the maximum extent possible to our well-being as a community. The productivity of our labour force, the resilience of our families and our ability to 'box above our weight' in international contests in sport, as well as in other areas such as science and in the arts, all depend in part on a healthy population.

It is also widely recognised that a strong publicly-funded health system is not only more equitable, but is better for curbing costs, including costs due to new technology. As shown in Table 1.1, in the UK, which has an almost wholly publicly-funded health system, health expenditure in 2002 amounted to 7.7 per cent of GDP, almost half the rate of the USA which has a predominantly private system. Australia,

with its mixed system, has a health expenditure/GDP ratio which lies in between. As a share of GDP, and in per capita terms health expenditure in Australia is above the OECD average, but sits close to the average of western European nations.

Table 1.1. Health expenditure (current prices) as a proportion of GDP and per person, Australia, UK, USA and OECD countries, 1992 and 2002[1]

	1992		2002		Average annual change in expenditure per person
Country	**Health to GDP ratio %**	**Per person expenditure (A$)**	**Health to GDP ratio %**	**Per person expenditure (A$)**	**(%)**
Australia	8.2	1,996	9.5	3,647	6.2
Commonwealth	*3.6*	*870*	*4.4*	*1,685*	*6.9*
States/territories	*1.9*	*467*	*2.1*	*788*	*5.4*
United Kingdom	6.9	1,610	7.7	2,938	6.2
United States	13.0	4,304	14.6	7,163	5.2
OECD average	**7.7**	**1,818**	**8.4**	**2,925**	**4.9**

Source

1. Australian Institute of Health and Welfare, *Health Expenditure Australia, 2002-03.* Tables 11, 13 and 33.

Table 1.1 also shows that health expenditure in Australia is growing strongly, with real per capita growth of 6.2 per cent per annum, or 3.3 per cent in real terms. Own source expenditure by states and territories has grown at the same rate, while Australian Government expenditure has risen more sharply. This sharper rise was largely driven by the Australian Government's private health insurance reforms, including the introduction of the 30 per cent private health insurance rebate.

However public hospital spending by the Victorian Government has also grown rapidly since the late 1990s. Figures submitted to the Australian Government as part of the acquittal requirements for the Australian Health Care Agreement (AHCA) show that from 1998-99 to 2003-04, Victorian Government own-source per capita hospital expenditure rose by 10.3 per cent per annum (7 per cent in real terms), far faster than the growth Australian Government spending[1].

While most of this state funding growth came from the restoration of hospital funding that had been cut by the previous Victorian Government, and from increased costs from changes to the Commonwealth taxation system in 2000 and from inadequate growth in Commonwealth AHCA funding, around 2 per cent of the real annual growth may be attributable to technology effects. Although State revenues have been growing strongly in recent years, this may not continue indefinitely and if the technology-driven growth rate was to accelerate, this could place real pressure on state budgets over the long term leaving future state governments facing difficult expenditure choices.

To help in avoiding such dilemmas, better systems to manage the uptake of new technology across the health system are imperative.

Longer and healthier lives

During the last three decades of the 20th century, life expectancy grew by 0.3 years per year for men and 0.25 year per year for women[2]. Improvements in the environment and in workplace health and safety, fewer motor vehicle accidents and

[1] DHS unpublished data. Based on recurrent hospital spending, excluding depreciation.

[2] Australian Bureau of Statistics. 2004. *Population Projections, Australia 2002-2101*. Cat No. 3222.0

reduced cigarette smoking have all contributed to these gains. However they have also been driven by improved access to healthcare services and by advances in medical technology. For example, it has been estimated that in the UK over the past 20 years, around half the mortality reduction from coronary heart disease was due to treatment, principally pharmacotherapy, and half due to reduced risk factors, mainly smoking[3].

Lower mortality rates in Australia over the past decade, equate to 640,000 extra years of life already lived[4]. If only two thirds of these added years were healthy years and if only half were due to improved health care, including public health programs and education campaigns as well as curative treatment, then taking the average monetary value of each healthy year as, say, $100 000, this represents a realised gain of $22 billion[5]. But the 640,000 extra years represents just under 20 per cent of the expected extra life years that each year's decline in mortality has delivered. When the years expected to be lived beyond the decade are included the gain rises to $110 billion.

But the benefits of health care are not just confined to reducing mortality. The health system has delivered improved quality of life for many people who live with a chronic disabling condition through better medication for diseases like arthritis, asthma, Parkinson's disease and depression, as well as new treatments such as cataract surgery, cochlear implants and artificial joints.

Both the Australian and Victorian Burden of Disease studies estimated that in 1996 mortality accounted for only around half the total burden of disease with the remainder accounted for by disability[6,7]. If the gain in health status attributable to the growth in health spending due to better treatment and reduced incidence of disabling conditions was commensurate with the gain in mortality, the total hypothetical health gain attributable to health spending over the past decade would equate to $220 billion. This can be compared with the growth in health care spending over the same period totalling $123 billion[8].

On the basis of this simple benefit cost analysis, the benefits of total health expenditure growth over the past decade outweigh the costs by almost 2:1. It has been estimated that the benefit:cost ratio from medical advances in the USA from 1950 to 2000 just in reduced mortality is between 1:1 and 3:1[9].

However aggregate figures such as these say nothing about differences in the cost effectiveness of different health interventions. And they reveal nothing about how the benefits are shared within the community. For example, the national burden of disease study estimated that the burden of disease and injury in 1996 was 37 per cent higher for males from the lowest socioeconomic quintile than those in the

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[3] Una B, Critchley J A, Capewell S. 2004. *Explaining the Decline in Coronary Heart Disease Mortality in England and Wales Between 1981 and 2000*. Circulation 109:1101-1107

[4] The difference between actual mortality in each year and the application of 1992-93 age-specific mortality rates, assuming the lives saved having the average life expectancy for that cohort.

[5] The figure of $100,000 is a plausible figure widely used in the international literature

[6] Mathers, C. Vos, T and Stevenson, C. 1999. *The Burden of Disease and Injury in Australia,* Australian Institute of Health and Welfare.

[7] Public Health and Development Division. 1999. *Victorian Burden of Disease Study: Mortality*. Department of Human Services

[8] Australian Institute of Health and Welfare. 2004. *Health Expenditure Australia, 2002-03,* Table 1. Calculated as the cumulative increments over the 1992-93 level, expressed in 2002-03 prices

[9] Cutler, D. 2004. *Why rising medical advances are good for you*. Institute of Medicine annual conference, 19 October, 2004.

highest quintile, and 27 per cent higher for females[10]. Aboriginal Australians are certainly not sharing in the health gains to the same extent as other Australians.

Such inequities have strong social and environmental determinants, but are compounded by inadequate access to health care. Yet even when access is available, there can be obstacles to effective care. A recent survey of a group of general practitioners involved in a diabetes program and practising in an area of socioeconomic disadvantage revealed that low health literacy, poverty and psychosocial issues, and negative attitudes towards health were all barriers to effective diabetes management[11].

In the USA, limited health literacy is associated with billions of dollars in avoidable health care costs. A recent study has found that nearly half of all American adults -- 90 million people -- have difficulty understanding and acting upon health information, and there is a higher rate of hospitalisation and use of emergency services among patients with limited health literacy[12].

Moreover, while government spending growth accounts for around 80 per cent of the total spending growth, the figures cannot tell how much of the benefit of improved individual health is also a benefit to the wider community.

There are also many contentious assumptions in constructing benefit estimates. For example, it could be argued that since most of the extra years arise at older ages, they should be discounted as being of lower value than for people of prime working age. This highlights one of the problems of health economics – determining what is a life, or a year of good health, worth.

However despite the shortcomings, economic analyses are essential tools in helping to decide where scarce public funding should be directed. Good public policy requires that all public spending on health, including spending on headline-grabbing medical technologies, be carefully evaluated in order that potentially more appropriate and cost-effective, but less newsworthy or harder to implement, interventions are ignored.

How much have technological advances added to hospital costs?

While some of the increased public hospital expenditure over the past decade is due to population growth and population ageing, advances in technology – broadly defined – are the major cost.

Aggregate estimates of the contribution made by technological advances are generally obtained by assuming that technology explains all residual expenditure after allowing for population growth and ageing. A study was undertaken in 2001 for the Victorian Department of Human Services looking at the contribution of technology to the growing cost of providing public hospital services using this and a number of other approaches[13]. The study estimated that over the preceding years the net expenditure impact of advances in technology was a real annual increase of around 2 per cent, comprising both increased cost and increased utilisation.

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[10] Mathers, C. Vos, T and Stevenson, C. 1999. op cit. Table 5.15

[11] Rose V, Harris M, Ho M. 2004. *GPs' views on how low socioeconomic position affects diabetes management: an exploratory study*. Australian Journal of Primary Health 10:120-123

[12] Nielsen-Bohlman L, Panzer A, Kindig D *(eds)*. 2004. *Health Literacy: A Prescription to End Confusion*. Institute of Medicine, Committee on Health Literacy. See www.nationalacademies.org

[13] KPMG Consulting. 2001. *Impact of new technology on Victorian public hospital costs*. Unpublished report

Consistent with this finding, in the Victorian Government's submission to the Commission's study of the economic implications of population ageing, the projections allowed for effects other than population growth to contribute a 2.5 per cent annual increase in health expenditure, comprising real price rises of 1 per cent per annum and increased utilisation of 1.5 per cent, in line with growth in real per capita income.

A UK Treasury review of health estimated that, historically, 2 per cent of the per annum growth in health spending had been due to new technology and that this would need to increase to 3 per cent in the next two decades to 'catch-up' with other developed countries[14].

This submission presents a new analysis of utilisation and cost trends based on patient type, confining itself to patients who are fully or partly funded through Medicare (ie public patients, privately-insured patients and self-insured patients). The analysis spans the period 1998-99 to 2002-03 and shows that:

- The use of inpatient services across Australia is rising at around 1.5 per annum on a casemix-adjusted basis after adjusting for growth in the age-sex weighted population. However, given the strict budget caps that apply to public hospitals, the level of growth in casemix-adjusted separations for private patients may better reflect underlying demand. On this basis underlying casemix-adjusted demand growth, after adjusting for growth in the age-sex weighted population, is growing by at least 2 per cent annually.
- On a casemix-adjusted basis, funding for private patients is around 7 per cent higher than for public patients, and this margin rises to around 16 per cent if health insurance overheads are counted. This suggests that if all private patients could be treated as efficiently as public patients, there could be an overall saving of around $1.8 billion annually.
- Real unit funding for private patients is growing faster than for public patients (1.3 per cent versus 0.7 per cent), with overall unit funding growth of 1.0 per cent. Recent reforms by the Australian Government to the reimbursement of prosthesis costs by private health funds may lead to a shrinking in the gap.

Medical advances can be expected to continue to contribute to extending life expectancy over the next ten years. However, projecting the cost of these continuing gains is far less certain, especially since many of the developments in computing, information technology, biotechnology and medical research over the past decade – many of which will be cost-reducing - have yet to be translated into practical applications.

Many kinds of medical technology

Advances in technology are so pervasive in the health care system that identifying them as a separate expenditure element is almost impossible.

Technology encompasses not only improved diagnostic procedures, new devices, new pharmaceuticals, new equipment, but also the vast area of health ICT (e-health), including image technology, telemedicine, health record storage and health information dissemination. Technological advances can affect many areas, including clinical efficacy, cost-effectiveness, cost-efficiency, patient safety, staff safety and quality of care.

[14] Wanless D. 2002. Securing our Future Health: Taking a Long-term View. UK Treasury. See www.hm-treasury.gov.uk

As is illustrated by a range of examples presented in this submission, the introduction of new technologies can

- make existing treatments less costly, such as through facilitating a shift to same day treatment, without changing the patient group
- reduce the requirement for admission due to better diagnosis at emergency departments and better pharmacotherapy in the community
- lead to new more costly but more effective treatments displacing existing treatments for the same underlying condition, or
- extend the scope of conditions and circumstances that are treatable, for example by allowing older people to be treated, so leading to an increase in overall demand.

By creating additional capacity the first two of these effects can also lead to treatment volumes rising unless measures to limit this are put in place.

However, while many technology advances in hospitals are cutting edge interventions or diagnostic procedures, many represent essential improvements to patient and staff safety. For example, a decade ago there was no mandatory requirement for beds that were electric, ergonomic and fully adjustable and minimal patient lifting equipment was used. The significant number of injuries of nurses and other health care workers from manual lifting has now seen occupational health and safety guidelines require mechanical lifting equipment.

Changes in infection control guidelines and the hazards of exposing staff to gluteraldehyde now means endoscopy equipment requires specialised sterilising units. National infection control, cleaning and sterilising standards designed to minimise the potential for infection have seen a rising need for replacement and upgrade of general sterilising and associated equipment. Patient safety is a major reason why general wards now require large numbers of electronic monitoring and delivery devices for intravenous therapy, such as volumetric and syringe pumps, pulse oximeters and epidural pumps. While these items may be relatively low cost, the volume required is high[15].

Expenditures necessary as a result occupational health and patient safety requirements and to meet Australian and professional standards now consume a greater share of hospital equipment funding than in years past.

Community expectations of a safe blood supply required the introduction of nucleic acid testing cost by the Australian Red Cross Blood Service at a cost of around $10 million per annum. This is a highly sophisticated testing methodology which allows for the detection of viruses such as HIV and hepatitis C almost from the moment of infection. Donors are screened for these and other diseases prior to donating, and this test is in addition to screening. Since its introduction the test has detected one hepatitis C donor out of the millions of donations tested. A simple benefit:cost analysis might suggest a low return, but the testing is essential to give confidence to the community and regulatory authorities that blood and blood products have minimal risks.

The cost of thalidomide increased four fold early in 2004 because the Therapeutic Goods Administration required the sponsoring company to keep a database of users to prevent any chance of the unborn being exposed to this pharmaceutical. It is also

[15] for example Barwon Health's *2003-04 Annual Report* (p. 14) reports cost growth of 50% over two years.

understood that the sponsor company is required to be insured against the drug causing birth defects and this insurance premium adds significantly to its cost.

More such developments are in prospect. For example, community concern about the risk of injury (including the risk of blood-borne virus transmission) from inappropriately discarded needles and syringes in public places is likely to see the introduction of retractable syringes at a substantially increased cost.

Evaluating the introduction of new technologies

The strict budget control exercised over public hospital spending means that technological advances are not implemented without consideration of effectiveness, appropriateness, and affordability. These processes occur at all levels from State budget to department, to hospital, and down to clinical unit.

Health services have longstanding therapeutics advisory committees to assess requests to use new drugs in hospitals. These consider existing drugs for the same clinical indication and the clinical and cost effectiveness of the proposed new drug. A number of health services have committees to scrutinise other types of new technology, such as clinical procedures, medical devices and prostheses. They also consider ethical issues and clinician competence to ensure patient safety, as well as clinical and cost effectiveness.

Central control processes have long been in place in relation to hospital equipment purchases and in various other areas. Drugs can be made available to hospitals under the highly-specialised drugs program only after consideration by a working party of the AHMAC, and then only after consideration and listing by the PBAC[16]. In addition, the Victorian Drug Usage Advisory Committee – and its successor the Victorian Medicines Advisory Committee – advises on high cost drug usage and cost containment.

In 2004, the Victorian Government significantly strengthened its technology evaluation and control processes. This has occurred with the establishment of the Victorian Policy and Advisory Committee on Technology that will evaluate the introduction of new medical and surgical technologies, and through the replacement of the Victorian Drug Usage Advisory Committee with the Victorian Medicines Advisory Committee. And for the first time in Victoria, an explicit policy has been adopted in relation to a specific technology-intensive procedure – the use of stents in coronary angioplasty.

While the need for evidence of safety, clinical efficacy, cost efficiency and cost effectiveness, will underpin these processes, such a system can never be perfect. Obtaining evidence can be a costly and protracted process. And absence of evidence, whether of harm or benefit, is not necessarily evidence of absence. This means that mistakes can be made as the recent recall of the arthritis drug Vioxx illustrates. Determination of cost-effectiveness can be even more difficult.

Determination of economic benefit is also difficult, with numerous methodological and valuation uncertainties. And where long-term outcomes are important, the evidence can only be fully assembled many years after the interventions first commenced. For example, if the introduction of neonatal intensive care had depended on the results of a rigorous body of evidence and detailed cost-benefit evaluations, it could never have been introduced. In this case there would be at least 10,000 Australians who would not be alive today.

[16] See policy and program guidelines at www.health.vic.gov.au/hsdp

What may the coming decade bring?

As well as looking at how technology has affected health care over the past decade, this submission looks at what the next 10 years may bring. Change will occur through new pharmaceuticals, new kinds of medical equipment, new implantable devices and the replacement of outdated and fragmented information and communication technology systems.

A key area where advances in information and communication technology could deliver large health gains and potential cost reductions will be in reducing errors. Electronic prescribing will be a key outcome of Victoria's *HealthSMART* initiative and has the potential to reduce prescribing errors by over 80 per cent.

The capacity of diagnostic imaging systems will expand dramatically, along with the ability to store, transfer and analyse the images. Electronic image archive and retrieval systems will eliminate the problem of misplaced X-rays and be a key ingredient in the expansion of telemedicine.

Just as the cost and size of computers have fallen exponentially in relation to their storage capacity and speed, so may the cost, capacity and versatility of medical devices, with new kinds of cost-effective devices becoming available. For example, while cardiac pacemakers have been available for some time, ventricular assist devices (artificial hearts) are now available that will keep people alive while waiting for a heart transplant. A stomach pacemaker is now on the market that restores stomach functioning for people with gastroparesis – a very common condition for diabetics. While the device is currently not cheap, it can eliminate the need for long hospital stays, as well as leading to dramatic quality of life improvement[17].

Advanced drug delivery systems, such as depot (slow-releasing) injections, implanted pellets, and slow release ingestible forms will become widespread. Such developments often involve existing drugs but the new technology gives better targeting, less side effects, better compliance with treatment, and fewer visits to the pharmacy, doctor or hospital. These could result dramatically lower overall pharmaceutical costs.

New and improved treatments that allow the precise targeting and destruction of tumours will also become more widely available and see further major reductions in cancer deaths. Laparascopic surgery will continue to advance with the introduction of new devices such as the 'da Vinci robot', discussed elsewhere in this submission.

By the end of the decade, the introduction of advanced technologies may begin to transform the health system entirely.

Advances in genetics and stem cell research offer the prospect of radical changes in how medicine is practised and with predicted significant impacts on health outcomes and costs. One clear development trend, arising from the Human Genome Project, will be the increasing use of genetic markers to screen populations that will result in targeted prevention strategies or treatment via gene substitution.

Nanoscience and nanotechnologies will radically change medical diagnostics and treatments. Some of the promising developments discussed at a recent nanotechnology conference in the USA included an autoregulated, non-invasive insulin delivery system, biodegradable nanofibres for tissue regeneration and

[17] Fullarton, G. 2004. *Gastroparesis*. The Health Report. ABC 1 November, 2004. see www.abc.net.au/rn

intraocular retinal prostheses, which help the visually impaired to see[18]. However at a nanotechnology conference held in Melbourne in December 2004[19], several speakers stressed that converting research results into a safe, effective and reliable commercial devices, and then crossing the regulatory, marketing and supply chain hurdles, mean that it can take many years before promising technologies are adopted in routine practice.

Planning for the future proceeds in the face of these uncertainties. It is possible that the next ten years will see an increasing prevalence of certain chronic diseases, such as neurodegenerative diseases, as new and existing drugs and technologies continue to improve survival rates from cancer and various cardiovascular conditions. This has the potential to increase spending significantly with some patients receiving treatment over longer periods of time than would previously have been the case. This in turn may well be one of the drivers of greater development of technology for self-treatment and for care and monitoring in the home, including the miniaturisation of technology and increasing use of remote communications.

On the premise that prevention is better (and less expensive) than treatment, disease management programs will increasingly train patients to monitor symptoms, take prescribed medications, and make healthy lifestyle changes. Government policy is to direct service growth towards the prevention and early intervention end of the treatment spectrum as far as possible, and so technologies that assist disease management and prevention are actively encouraged.

Increased use of information technology will provide an ability to provide accurate medical information in a secure form when and where it is needed, whether by patients themselves or by clinicians. There will undoubtedly be better coordination of care and patients will increasingly interact with the health system from their own homes, including through greater electronic availability of health information, direct contact with health professionals via the internet, interactive digital TV, and remote self-testing and monitoring of certain conditions. Information technology should also improve clinical governance and safety through access to medical records from multiple locations, 'real time' sharing of medical information, prompting of latest evidence based protocols and care pathways, and safer prescribing.

Developments in telehealth and telemedicine will reduce cost and improve access to health services for people in rural and remote areas.

Given these many possible trajectories, cost trend forecasts are associated with a high degree of uncertainty. The Victorian Department of Treasury and Finance has applied some alternative technology cost assumptions through the budget model used in the State's submission to the Productivity Commission's population ageing study. This analysis suggested that if the combination of 'excess' demand and unit cost growth could be held to 1.5 per cent per annum compared to 2.5 per cent assumed in the submission, then Victorian Government spending on health as a share of GSP should hold constant[20]. On the other hand, if it were to grow at 3.5 per cent per annum, Victorian Government spending on health as a share of GSP would rise from 3.3 per cent now to 4.3 per cent by 2015.

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[18] *Nanotech Conference Tests Researchers' Ability to Work Across Disciplines*. National Academies. Press release 23 November 2004. See www.nationalacademies.org

[19] *Health Opportunities from Small Technologies*. See www.innovation.vic.gov.au/healthconf

[20] 'Excess' demand growth - demand in above and beyond that due simply to population growth and ageing – was projected to rise in line with growth in real per capita GSP (1.5 per cent per annum), and 'excess' unit cost growth – unit cost growth in excess of CPI – was projected to rise by 1 per cent per annum. See www.dtf.vic.gov.au

Medical technology innovation and industry development in Victoria

Encouraging technological innovation and commercialisation is one of the Victorian Government's priorities. Since May 2000 new commitments by the Victorian Government in innovation, science and technology total more than $900 million - more than any other Australian State[21]. Victoria has particular strengths in biotechnology, with more than 39 per cent of Australia's core and diversified biotechnology companies based in Victoria. Medical and scientific equipment companies are also an important part of the State's manufacturing sector.

Local development and commercialisation of health technologies brings substantial economic benefits. Victorian Government support for commercially focused collaborative R&D projects, including the Australian synchrotron, exceeds $250 million. In December 2004, the Victorian Department of Innovation, Industry and Regional Development organised a major international conference, *Healthy Opportunities from Small Technologies*, looking at prospects for commercialising micro and nanotechnologies[22]. It is also promoting Victoria as a desirable place for clinical trials to be conducted[23].

Promoting local research and innovation, and promoting clinical trials, naturally stimulates public awareness and interest and itself creates added public pressure for the uptake of new technologies more generally. This is to be welcomed. As the Victorian Minister for Innovation, John Brumby, has said[24]:

> *Innovation is not only about technology. Innovation is about people. It is about making sure we use ideas, technology and knowledge to give all Victorians a higher standard of living, more satisfying and rewarding jobs and a better environment in which to live, work and raise their families.*

[21] See www.innovation.vic.gov.au

[22] *Health Opportunities from Small Technologies*. See www.innovation.vic.gov.au/healthconf

[23] See www.clinicaltrialsvictoria.com

[24] Department of Innovation Industry and Regional Development. 2004. *Bright Ideas. Brilliant Future*. See www.innovation.vic.gov.au

PART 2: NATIONAL AND INTERNATIONAL FRAMEWORKS FOR HEALTH TECHNOLOGY ASSESSMENT

Key Points

⇒ Health technology assessment (HTA) is an integral part of ensuring that new and emerging technologies are effective, appropriate, cost effective and safe for consumers and clinicians.

⇒ There are various levels of HTA depending on the complexity and scope of analysis. The challenge is to utilise HTA effectively to inform clinical practice and funding decisions. There is also the challenge of implementing effective and useful horizon scanning systems to enable forewarning of upcoming technologies.

⇒ In Australia, HTA is undertaken by a variety of agencies. These processes are similar to those in other jurisdictions. HTA in Australia primarily informs funding decisions for the pharmaceutical and medical benefits schemes. Australia is recognised as a leader in using HTA to inform funding decisions. A horizon scanning process has recently been established.

⇒ International comparisons suggest that the main gap in the Australian system is lack of a systematic process or agency to translate information from technology assessment into practice guidance. This is the work undertaken by the National Institute for Clinical Excellence in the UK.

Health technology assessment (HTA) is an integral part of ensuring that new and emerging technologies are effective, appropriate, cost effective and safe for consumers and clinicians. HTA encompasses a hierarchy of activities with increasingly detailed assessment:

- Full HTA – a systematic review of a technology incorporating a meta-analysis of all relevant clinical trials and analyses of safety, clinical effectiveness and cost effectiveness.
- Rapid review or overview – a 'mini' systematic review of a technology that identifies all relevant clinical trials of effectiveness and provides an indication of cost effectiveness.
- Horizon scanning – an 'early warning' alert to policy makers of technologies that are emerging and may have a significant impact on the health system. Horizon scanning information is often presented in an abbreviated format, usually only several pages in length, due to the lack of available information.

There are multiple HTA agencies in industrial countries. Generally, their findings are freely available except for Euroscan and private agencies such as ECRI in the USA. Only the United Kingdom has explicitly defined processes for the use of horizon scanning information by policy makers. In 2001, the Alberta Heritage Foundation for Medical Research (AHFMR) in Canada evaluated its horizon scanning pilot project and found that there had been little use of information for policy and planning during the period of the project.

In Australia, assessment of new technologies occurs across a range of national bodies include the Therapeutic Goods Administration (TGA), the Medical Services Advisory Committee (MSAC) and the Pharmaceutical Benefits Advisory Committee (PBAC). The TGA assesses the safety and efficacy of technology to give marketing approval. It does not consider clinical and cost effectiveness.

MSAC and PBAC undertake full technology assessments. They accept applications from the medical profession, medical industry and others. PBAC also accepts submissions from the pharmaceutical industry. The Australian Department of Health and Ageing (DoHA) contracts academic and private agencies to assess technologies for MSAC. Only academics are contracted to assess technologies for PBAC. MSAC and PBAC advise the Australian Minister for Health on evidence relating to health technologies to inform decisions on public funding via the Medicare Benefits Schedule (MBS) or Pharmaceutical Benefits Scheme (PBS).

The Royal Australasian College of Surgeons provides HTA through the work undertaken by the Australian Safety and Efficacy Register of New Interventional Procedures - Surgical (ASERNIPS). This is to inform surgical practice and also may inform MBS funding decisions if the HTA is commissioned by MSAC.

Other agencies that review technology include the Australian Technical Advisory Group on Immunisation, and the new Prostheses and Devices Committee.

All these bodies advise the Australian Government and/or professional associations. In 2003 a new body, the Health Policy Advisory Committee on Technology (HealthPACT), which is described below, was established to provide advice on emerging technology issues. There are various approaches and differing institutional arrangements in other countries to assess technology and its use, and the translation of HTA to practice guidance. Assessment arrangements in other countries – Canada, Europe, the USA and the UK – are described below.

Health Policy Advisory Committee on Technology (HealthPACT)

In 1998, the Australian Health Technology Advisory Council was dissolved and replaced by MSAC. A key stimulus to the establishment of HealthPACT was the recognition that jurisdictions did not have a structure to input into the national new technology agenda.

HealthPACT, was established by AHMAC in 2003 to advise AHMAC and MSAC on the implications of the introduction of new technology into the Australian health care system. HealthPACT also oversees the operations of the Horizon Scanning Unit (HSU) and considers horizon scanning and HTA undertaken by ASERNIPS. It comprises MSAC, ASERNIPS and jurisdictional representation.

The HSU is located within the Department of Public Health at the University of South Australia and is contracted by DoHA to identify health technologies that are new and/or likely to emerge and may have a significant impact on the health system within a three-year time horizon. Identified technologies are prioritised for a horizon scanning report, referral to another body for consideration (eg the Safety and Quality Council), archiving or monitoring. Work generated is shared among HealthPACT members via a members-only website and to date includes bi-monthly lists of identified and prioritised health technologies and horizon scanning reports. If a technology requires full assessment, it is referred to MSAC.

Since its commencement in November 2003, HealthPACT, has considered almost 150 new and emergent technologies/clinical practices, completed 14 Horizon Scanning

Reviews, and requested MSAC to undertake eight HTAs. This is new process. The function and use of HealthPACT in informing government policy is evolving and yet to be clearly realised. A two-day workshop was recently held to review activities to date and consider future directions. Some consideration was given to how HTA can be utilised by public sector providers and how it can best utilise, and make available, the information it generates and can access information from international agencies.

HealthPACT is a member of EuroScan, an international collaboration of government-funded agencies undertaking horizon scanning activities for their respective jurisdictions. EuroScan membership allows access to all Horizon Scanning Reports, which are not usually publicly available, undertaken by these agencies.

Funding for Health PACT and the HSU is provided by AHMAC. It is around $300,000 per annum. The feasibility of HealthPACT providing ongoing robust advice to Government with this level of funding is uncertain.

International Comparisons

Canada

In 1989, the federal, provincial and territorial ministers of health established the Canadian Coordinating Office for Health Technology Assessment (CCOHTA) as a non-profit corporation for a three-year trial period. Funding was contributed from the ministries of health. Its function was to provide evidence-based information focusing on evaluations of clinical effectiveness and cost-effectiveness of emerging and existing health technologies, primarily to Canadian health care policy makers and managers. 'Technologies' is broadly defined as any medical procedures, devices, systems or drugs used in the maintenance, treatment and promotion of health.

Its goal is to increase access to and use of evidence as a basis for informed decisions about technology use in Canada's publicly funded health care system. In September 2002, CCOHTA's mandate was expanded to include responsibility for managing a common review process for new drugs submitted to participating federal, provincial and territorial drug benefit programs for funding consideration.

The Alberta Heritage Foundation for Medical Research (AHFMR) was established by the Government of Alberta in 1980 to support biomedical and health research at Alberta universities, affiliated institutions, and other medical and technology-related institutions. Its programs comprise provision of grants and awards, technology commercialisation, applied health research programs, HTA, and communications and education.

Operating funds come from a portion of the interest revenue from a Government endowment, with an initial investment of $300 million. Grants and awards include personnel awards and establishment grants for senior scientists, training awards for students, infrastructure grants, including equipment and conference grants, and special initiative funding in health research.

The AHFMR Technology Commercialisation program aids development of innovations through support for new companies and licensing agreements with other companies. Its HTA Unit performs assessment of medical therapies, devices and practices. AHFMR's Applied Health Research Program is the umbrella unit that coordinates programs and initiatives geared towards building the capacity for research to be put into use by the health system.

USA

The Agency for Healthcare Research and Quality (AHRQ), part of the United States Department of Health and Human Services, is the lead agency charged with supporting research designed to improve the quality of healthcare, reduce its cost, improve patient safety, decrease medical errors and broaden access to essential services. AHRQ sponsors and conducts research that provides evidence-based information on healthcare outcomes; quality; and cost, use and access. The information helps healthcare decision-makers – patients and clinicians, health system leaders and policymakers – make more informed decisions and improve the quality of healthcare services.

AHRQ provides technology assessments for the Centers for Medicare and Medicaid Services (CMS). These assessments are used to inform national coverage decisions for the Medicare Program as well as provide information to Medicare carriers. Generally, a HTA provides an independent analysis of all scientific and clinical evidence available on a particular health care technology. The HTA may be requested where there is conflicting or complex medical and scientific literature available, or when CMS believes an independent analysis of all relevant literature will assist in determining whether an item or service is reasonable and necessary.

Technology assessments are based on a systematic review of the available literature along with appropriate qualitative and quantitative methods of synthesising data from multiple studies. The assessments may be done in-house by AHRQ staff or in collaboration with an evidence-based practice centre (EPC).

Under the EPC program, five year contracts are awarded by AHRQ to institutions in the USA and Canada to serve as EPCs. EPCs develop evidence reports and technology assessments based on comprehensive syntheses and analyses. Their reports and assessments emphasise explicit and detailed documentation of methods, rationale and assumptions and collaborate with other medical and research organisations so that a broad range of experts are included in the development of the process.

The evidence reports and technology assessments are used by Federal and State agencies, private sector professional societies, health delivery systems, providers, payers and others committed to evidence-based health care. The findings also serve as the foundation for organisations to develop clinical practice guidelines as well as tools and strategies for improving the quality of health care services they provide. There are currently 13 EPCs in operation.

ECRI (formerly the Emergency Care Research Institute) is an independent nonprofit health services research agency in the USA. It undertakes full health technology assessments and horizon scanning, and also research into health risk and quality management. There are strict requirements in relation to accessing and using information from ECRI. Information is provided on a subscription basis. An example of the information available is the Health Technology Forecast database for new and emerging technologies. There are few agencies in Australia that are ECRI members because of requirements relating to copyright and use of information.

United Kingdom

The National Institute for Clinical Excellence (NICE) was set up as a Special Health Authority in 1999 and is a part of the National Health Service (NHS). It is the independent organisation responsible for providing national guidance on treatments and care of people using the NHS in England and Wales. NICE does not undertake HTA. Its function is to translate HTA into practice guidance.

NICE produces guidance in three areas of health:

- Technology appraisals - guidance on the use of new and existing medicines and treatments within the NHS in England and Wales.
- Clinical guidelines - guidance on the appropriate treatment and care of people with specific diseases and conditions within the NHS in England and Wales.
- Interventional procedures - guidance on whether interventional procedures used for diagnosis or treatment are safe enough and work well enough for routine use in England, Wales and Scotland.

The Secretary of State for Health and the Welsh Assembly Government formally refer technologies to NICE for benefit and cost appraisal. Technologies that are referred include new pharmaceuticals, new medical devices, new diagnostic techniques and new surgical procedures. However, health promotion activities, for example new ways of helping people with diabetes manage their condition, can also be referred. The appraisal by NICE results in recommendations being made to the NHS in England and Wales[25].

Technologies are selected for appraisal based on one or more of the following criteria:

- Is the technology likely to result in a significant health benefit, taken across the NHS as a whole, if given to all patients for whom it is indicated?
- Is the technology likely to result in a significant impact on other health-related Government policies (for example, reduction in health inequalities)?
- Is the technology likely to have a significant impact on NHS resources (financial or other) if given to all patients for whom it is indicated?
- Is the NICE likely to be able to add value by issuing national guidance? For example, in the absence of such guidelines is there likely to be significant controversy over the interpretation or significance of the available evidence on clinical and cost effectiveness.

The benefit and cost appraisal includes the impact on quality of life (for example, relief of pain and disability), and the probable effects on mortality. It also considers estimates of the associated costs, focusing particularly on costs to the NHS and personal social services.

There are three phases to the appraisal process – scoping, assessment and appraisal itself. During the scoping process, NICE determines the specific questions to be addressed for each technology appraisal so as to define the areas of interest and the questions that should be addressed by an appraisals committee when considering the clinical and cost effectiveness of the technology. Consultation is undertaken during the scoping process and NICE may revise the scope in response to comments received. Bodies consulted include national groups representing patients and carers, healthcare professional associations and the manufacturers of the technology

The assessment process is a systematic and independent evaluation of the relevant evidence available on the technology. The aim is to produce an estimate, including uncertainty, of its clinical and cost effectiveness for a specific indication. Assessment comprises a systematic review of the evidence and an economic evaluation. Strengths, weaknesses and gaps in the evidence are also identified. Through the NHS health technology assessment program, NICE commissions an independent academic centre to review the published evidence on the technology and prepare an

[25] National Institute for Clinical Evidence. 2004. *Guide to the Method of Technology Appraisal*, April 2004, see www.nice.org.uk

assessment report. Comments are sought on this report, and an evaluation report is then prepared.

The evaluation report is then considered by an appraisal committee which evaluates the overall costs and benefits of the technology under consideration. An appraisal committee judges whether, on balance, the technology can be recommended as a cost-effective use of NHS resources in general, or whether it can be recommended for specific indications or subgroups of patients, if more appropriate. A range of experts sit on these committees, including statisticians, general practitioners, patient advocates, physicians, public health specialists, health economists, clinical pharmacists or pharmacologists, nurses, surgeons, NHS management, healthcare industry representatives, psychiatrists, allied health professionals, and paediatricians.

Once the appraisal committee's judgment, or determination, is complete, it is submitted to NICE. The determination becomes the basis of the guidance that NICE issues to the NHS in England and Wales.

In reaching the decision, the appraisal committee takes into account the factors listed in the directions of the Secretary of State for Health and the Welsh Assembly Government, which comprise:

- the broad clinical priorities of the Secretary of State for Health and the Welsh Assembly Government (for example, as set out in the National Priorities and Planning Framework 2003-06)
- the degree of clinical need of the patients with the condition under consideration
- the broad balance of benefits and costs
- any guidance from the Secretary of State for Health and the Welsh Assembly Government on the resources likely to be available and on such other matters as they think fit
- the effective use of available resources.

The National Coordinating Centre for Health Technology Assessment (NCCHTA) manages, supports and develops the NHS HTA program under contract from the Department of Health's Research and Development Division. NCCHTA is part of the Wessex Institute for Health Research and Development at the University of Southampton.

The HTA program is a national program of research to ensure that high quality research information on the costs, effectiveness and broader impact of health technologies is produced in the most effective way for those who use, manage and provide care in the NHS.

Once NICE has identified the technologies it wishes to appraise and the timetable leading to the publication of NICE guidance, the HTA program becomes the interface between NICE and the review groups contracted to produce the assessment reports.

The purpose of the program is to ensure that high quality research information on the costs, effectiveness and broader impact of health information technologies is produced in the most effective way for those who use, manage and provide care in the NHS.

NCCHTA manages and develops the HTA Program through five key functions:

- identifying possible topics for health technology assessment
- prioritising the topics
- commissioning research to meet the priorities

- monitoring research in progress and assessing reports
- communicating openly about the processes and publishing products of the program.

Every year the HTA program and its advisory panels, supported by the NCCHTA, decides which of the many suggestions received from the NHS and its users should become research priorities.

The HTA Program works closely with the NICE and commissions technology assessment reports from independent, academic centres. These reports are an important source of information that the NICE Appraisal Committee uses in its decision-making processes. Once the Department of Health has identified the technologies it wishes NICE to appraise, the HTA program becomes the interface between NICE and the review groups contracted to produce the technology assessment reports (TARs).

The HTA Program liaises both with NICE and the review groups to:

- identify the groups most suited to produce each technology assessment report
- formally commission the work on behalf of NICE
- develop and review documentation for a standard protocol formal, a standard report format and for the declaration of competing interests, and
- monitor the groups to ensure submission of the reports on schedule.

One the technology assessment reports have been submitted to NICE, the HTA Program intends to publish the review groups' TAR in the HTA monograph series.

The National Horizon Scanning Centre (NHSC) is funded under contract by the Department of Health's Research and Development Directorate. It aims to provide advance notice to the Department of Health in England and Wales of selected key new and emerging health technologies. This also includes changing applications and uses of existing technologies that might require urgent evaluation, consideration of clinical and cost impact or modification of clinical guidance.

The scope of the horizon scanning activity comprises health technologies in the broadest sense and includes pharmaceuticals, devices, diagnostic tests and procedures, surgical and other interventions, rehabilitation, and therapy, public health and health promotion activities. A balance of sources is used to identify advances up to 5 years before launch in the NHS and includes focused routine scanning and a specialty-based work program.

Once technologies have been identified there is a multi-stage filtration and prioritisation process. This initially discards trivial developments and groups related technologies together. A search for additional information, including contacting commercial developers and clinical or technological experts in the field, is then undertaken to enable an assessment of potential significance. For inclusion on the NHSC's final list a technology must have one of the following characteristics:

- be new and available
- be emerging and likely to be available to the NHS within 3 years
- represent a significant change in indication or use of an existing technology
- be part of a group of developing technologies that, as a whole, may make a significant impact.

It must also be likely to have a significant impact. This could include a

- significant health benefit if the technology is widely adopted
- major cost impact if the technology is widely diffused because of moderate to high unit costs and/or patient numbers and/or service re-organisation or training requirements
- likelihood that the speed of diffusion of the technology may be either too slow or too fast given the available evidence
- significant ethical, social, political or legal concern
- significant impact on current guidelines and clinical practice.

NHSC provides technology briefings to the Department of Health that describe the technology and outline the likely patient group, the current treatment alternatives, the level and amount of research evidence available and a prediction of its relevance both clinically and to the wider NHS.

Western Europe

There are a number of agencies in Europe with functions similar to those described for USA and UK bodies. These agencies include the:

- Basque Office for Health Technology Assessment in Spain
- Swedish Council on Technology Assessment in Health Care,
- Committee for Evaluation & Diffusion of Innovative Technologies in France
- Danish Centre for Evaluation & Health Technology Assessment
- Norwegian Centre for Health Technology Assessment
- Federal Social Insurance Office of Switzerland and
- Health Council of the Netherlands.

There is also EuroScan which is a collaborative network of agencies for the exchange of information on important emerging new drugs, devices, procedures, processes and settings in health care. The members of EuroScan aim to establish a permanent network among agencies and organisations in the field of HTA to:

- evaluate and exchange information on new and changing technologies;
- develop the sources of information used;
- develop applied methods for early assessment; and
- disseminate information on early identification and assessment activities.

EuroScan members undertake full health technology assessments and horizon scanning for their respective governments, and share this information with network members. Network membership and access to information is contingent upon undertaking assessments which contribute to the body of information. Australia is a member of this network and will contribute information generated by the newly formed Horizon Scanning Unit described above.

PART 3: POLICIES, PROCESSES AND INITIATIVES IN VICTORIAN PUBLIC HOSPITALS AND HEALTH SERVICES

Key Points

- ⇒ There is a range of technology-related processes, policies and initiatives in place in the Victorian public hospital sector, which have recently been strengthened as part of overall hospital governance reforms.
- ⇒ Indexation factors in the Australian Health Care Agreement are well below the level needed to meet technology-related cost pressures.
- ⇒ Collaborative planning between federal, state and territory jurisdictions is essential in planning and introducing new technology. The single machine unit trial for radiotherapy is an example of effective federal and state collaboration, whereas current processes for improving access to magnetic resonance imaging have not been implemented collaboratively.
- ⇒ A review of the process for establishing Nationally Funded Centres is suggested.
- ⇒ Well-researched evidence-based policies for specific interventions can lead to successful cost containment, as is the case with the use of drug eluting cardiac stents in public hospitals.
- ⇒ Health*SMART*, the Victorian Government's whole-of-health strategy to modernise information and communication technologies, is expected to deliver substantial benefits to health care in Victoria.

The Victorian public health system is a large, complex system made up of a diverse range of individual providers providing a large range of different types and levels of services. There are currently 15 metropolitan health services comprising 36 hospitals, five rural health alliances comprising 77 hospitals and more than 800 primary health agencies.

This section outlines a range of technology-related processes, policies and initiatives in place in the Victorian public hospital sector.

Commonwealth and State budget controls

Future technology take-up in the Victorian public hospital system will not simply continue past trends, but will be significantly dependent on Australian and State government funding. Top-level expenditure control through determination by the Australian Government funding for public hospitals, mainly under the Australian Health Care Agreements (AHCAs), and through the annual State budget process is a key determinant of the rate of adoption of new technologies.

Australian Government hospital funding grants

The AHCAs are the major source of Australian government funding for public hospitals. Other significant funding streams include reimbursements for the treatment of veterans in public hospitals from the Department of Veterans' Affairs, and for pharmaceuticals provided under the PBS and the highly-specialised drugs program.

In Victoria, the grant indexation rate in the AHCA influences the extent to which expectations of technology-related growth can be met.

The 1998-2003 AHCA included an annual 2.1 per cent growth factor (applied to 83 per cent of the base grant) to account for expenditure growth in excess of the age-weighted population. This was specified as an inpatient utilisation growth factor, although for a variety of reasons most states did not achieve this utilisation growth[26]. In the current agreement the allowance has been cut by 27 per cent which, in combination of a price indexation factor that is around 1 per cent below the CPI, allows for effective real growth above population growth and ageing of only 0.3 per cent per annum.

Nationally Funded Centres

The Nationally Funded Centre (NFC) program was established in 1991, with the endorsement of the Australian Health Ministers' Conference (AHMC), as a national program for the efficient provision of highly specialised low demand medical technologies in the public hospital system. The NFC program is intended to provide equitable access for all Australians to specified high cost, low demand, new and emerging technologies to be delivered at least cost, and to enable monitoring and evaluation of health and cost outcomes.

The types of technologies considered for NFC status are those where the provision of services at a single or small number of designated centres is appropriate, i.e. a high level of expertise or combination of equipment and expertise is required for efficient and effective service provision, and/or there is a low national demand for the service in the medium to long term. There are two types of technologies that can be considered for NFC status:

- Clinical specialty diagnostic or treatment procedures which are 'on trial'. These are procedures which have not yet been incorporated into standard medical practice.
- Established clinical treatments and procedures which require a national population base in order for an efficient and effective service to be provided.

Since the NFC program was introduced, several procedures, initially endorsed as NFCs, were subsequently re-evaluated and changed to superspecialty status (eg NFCs were established for adult liver transplants at Royal Prince Alfred, Princess Alexandra and Austin Hospitals in 1990 but changed to superspecialties in 1993).

There are currently three procedures designated for NFC status – paediatric heart transplants, paediatric liver transplants, and pancreas transplants. The New Children's Hospital Westmead, Royal Children's Hospital Brisbane and Royal Children's Hospital Melbourne are approved NFCs for paediatric liver transplants for young people up to 15 years of age. The Royal Children's Hospital Melbourne is an approved NFC status for paediatric heart transplants for young people up to 15 years of age. Westmead Hospital is an approved NFC for pancreas transplants.

[26] Contributing factors include changed admission practices (leading to more work being done in outpatient settings) and the fact that the allowance was offset by a price index that is well below the CPI.

New South Wales and Victoria have or are planning to submit proposals for establishment of NFCs for Islet Cell Transplantation.

Recommendations for services and procedures to be approved as NFCs status are made by MSAC. MSAC also undertakes reviews of existing NFCs for AHMAC. The three existing NFCs have been reviewed in recent years. In these reviews, the assessment was that the standard of care compared well with international standards, and that existing NFCs in all three areas should continue for another three years. It was also recommended that Monash Medical Centre be approved as a NFC for pancreas transplants. This recommendation has been referred by AHMAC to the recently re-established NFC Reference Group for consideration of funding implications.

Since the introduction of the concept of NFCs, there have been special funding arrangements agreed by the federal and state governments, outside of normal funding of public hospital services and normal cross-border agreements, for treatment of interstate residents. The Australian Government's contribution to NFCs was broadbanded into the first AHCA from 1 July 1998, and is no longer identifiable. States have continued to subscribe to arrangements to reimburse NFCs for procedures at an agreed price.

Key tasks of the NFC Reference Group include:

- refinement of costings for NFCs as it is not clear if a consistent methodology is being applied to all NFCs with inclusion of items such as the cost of organ retrieval, general teaching and research costs
- examination of options for annual indexation and consideration of review of costs every three years
- development of processes for submission and assessment of new applications for NFCs
- data collection and payments.

A basic tenet of the NFC approach is to limit the number of centres in Australia undertaking a specified procedure in order to ensure a sufficient volume of work to develop and maintain world class expertise in the staff. However, according to the MSAC reviews, in two of the three procedures currently delivered under NFC arrangements, hospitals in other states perform the procedures, apparently with far lower levels of funding than the NFC price. One example is Monash Medical Centre which has been performing pancreas transplants since the 1980s, although Westmead is and always has been the only endorsed NFC. The other example is paediatric heart transplants, where the Royal Childrens' Hospital in Melbourne is and always has been the only endorsed NFC, but a number of procedures have been carried out in NSW and QLD since the 1980s. In both these cases, it is questionable whether clinicians have taken the concept of a NFC seriously.

It is considered that the NFC program provides a useful mechanism to establish and undertake low volume high cost procedures. However, the NFC guidelines have not been updated since 1998, and there has only one new application for NFC status over the last five years. It may be timely to review the NFC process and seek advice from HealthPACT on emerging technologies that may warrant consideration for NFC status over the next five to ten years.

Commonwealth licensing of magnetic resonance imaging machines (MRIs)

Currently the Commonwealth Government controls the diffusion of MRIs by controlling the number and location of machines that attract reimbursement via Medicare. The Australian Government determines which MRI machines are licensed for MBS eligibility. States are free to purchase their own machines for use in public hospitals, however if a Commonwealth licence has not been granted, they will not be able to bill Medicare for services, including for public as well as private patients. There are 16 MRI machines in public hospitals in Victoria. Eight of these are not MBS eligible with five (four provided by private operators) in tertiary or regional hospitals that have a clear clinical need for MRI. The remaining three are second machines in large hospitals.

There are a number of issues around the allocation of additional MRI licences. The report of the Review of Magnetic Resonance Imaging (the Blandford Review) in March 2000 proposed that the need for additional MRI services be reviewed on an annual basis. Following the Report, the MRI Monitoring and Evaluation Group was established and is responsible for this review. To date, it appears that one review has been undertaken resulting in an additional six licensed machines nationally in 2001.

In June 2003, the Australian Government and the radiology profession signed a Memorandum of Understanding (MoU) on MBS funding for diagnostic imaging, including MRI funding, for five years. State governments were not involved in this process. It was subsequently announced that the MoU provided for four additional licences in regional areas and that further additional licences would be funded by a reduction in the MBS rebate.

In June 2004, the Australian Government announced a tender process for the allocation of 23 additional MBS licences for MRI machines. The stated objective is to increase availability of MBS eligible MRI in areas of high demand by privately funded patients or in under-serviced geographic areas.

The inclusion of availability for private patients in the selection criteria suggests that the Australian Government is aiming to constrain MBS licensed machines in services located in the public sector. This would be contrary to previous policy whereby MBS licences were based on need rather than public or private patient status or location of services in the public or private hospital sector.

The private patient criterion suggests that services in private hospitals and/or standalone community based facilities may be favoured for allocation of additional licences. Private hospitals generally provide services of lower complexity and MRI scans undertaken in standalone facilities are all for non admitted patients. Hence, there is an inbuilt bias towards the private sector and low complexity services for allocation of these additional licences. The outcome of this tender process has not been announced. The problem of an inadequate number of overall licences may be compounded if a disproportionate number of licences are going to private providers. This may cause a channeling of patients requiring higher complexity scans to public hospitals.

While this may be an effective way of controlling costs, it is not the best way of ensuring cost-effective delivery of health care services. The College of Radiologists has argued that Australia is lagging other countries by at least 10 years in patient access to these services and has presented a proposal to the Australian Minister for

Health that would entail all MRIs being licensed, but with better controls in place to prevent over-servicing[27].

The peak body for children's hospitals in Australia has recently argued that MRI is the best complex imaging modality for early intervention in childhood disease, yet is often the least accessible[28]. This is a problem specific to the public sector, since all children's hospitals in Australia are public.

It is considered that state governments as well as the radiology profession should be included in discussion and negotiation relating to policy for funding of MRI services to ensure accepted planning processes inform the distribution and number of funded services to meet clinical need.

Radiotherapy services

Cancer is one of the major causes of mortality and morbidity in developed countries, and one whose incidence will continue to grow with the ageing of the population. Radiotherapy is an expensive technology that is increasingly used as part of a multi-modal approach to the treatment of cancer. It may be used as the primary treatment mode or in addition to surgery or chemotherapy. It may be used for curative or palliative treatment. It involves the use of ionising radiation (such as from x-rays, electron beams or gamma rays) to kill tumour cells.

In Victoria, cancer patients have access to both public and private sector radiotherapy services, although the majority of services are provided in the public sector. For services with such a high capital cost, it is important that a collaborative service planning approach is taken. For example, in 1999 the Department of Human Services entered a funding arrangement with Wodonga Regional Health Service and the Murray Valley Private Hospital to ensure public patient access to radiotherapy services to rural patients in Wodonga and surrounding region. In 2002, two new radiotherapy centres began operations in Ballarat and Bendigo, after an agreement was reached with the Commonwealth to commence the national radiotherapy single machine unit (SMU) trial. The third SMU at Traralgon is currently being constructed. As part of the Victorian Government's 'Fighting Cancer' plan, an extensive radiotherapy capital and equipment upgrade and treatment services expansion has been budgeted. In 2004-05, capital spending on expanding radiotherapy services will total $35 million.

Preliminary results from an evaluation of the impact of the Bendigo and Ballarat SMUs indicate that these services have achieved their primary aim to increase access to safe and quality Radiotherapy services for rural residents. The SMU Trial is an example of an effective federal/state collaborative planning process.

Collaborative service planning across all jurisdictions is being undertaken as part of the work of the Radiation Oncology Reform Implementation Committee. This Committee comprises representation from all jurisdictions and was established subsequent to the Baume Radiation Oncology Review undertaken in 2002. The outcome of this planning process and its utilisation by governments is not yet clear.

[27] Letter from Paul Sprague, President, Royal Australian and New Zealand Society of Radiologists to Australian Minister for Health and Ageing, Tony Abbott. 11 December 2003. See www.ranzcr.edu.au
[28] Children's Hospitals Australasia. *Advocacy Statement*. 24 May 2004. See www.wcha.asn.au

Victorian Policy and Advisory Committee on Technology (VPACT)

VPACT was established in 2004 to enable a systematic approach to the introduction and use of new and existing technologies and clinical practices in Victorian public health services. VPACT will complement public hospital decision-making structures and procedures, particularly around the introduction and use of, and disseminating information on, new and existing technologies and clinical practices. Its role is to advise and make recommendations on:

- mechanisms for early identification of new technologies and clinical practices with potential implications for public health services
- assessment of clinical and cost effectiveness of new and existing technologies and clinical practices
- priorities for the introduction and use of new technologies and clinical practices
- policies and procedures for best practice for introduction and use of new and existing technologies and clinical practices in public health services
- requirements for evaluating and monitoring the introduction and use of new technologies and clinical practices in public health services
- dissemination of information on the introduction and use of new and existing technologies and clinical practices.

The activities of VPACT will complement and supplement those being undertaken by HealthPACT. It will address Victorian specific issues and utilise HealthPACT information where available. From time to time, VPACT may also sponsor work on behalf of HealthPACT. VPACT will also consider good practice management of medical and surgical supplies for new or existing technologies or clinical practices. The scope of technology and clinical practice to be considered by VPACT includes all types of clinical diagnostic or treatment interventions excluding pharmaceuticals. However, the Victorian Medicines Advisory Committee may from time to time seek advice from VPACT.

Key factors for VPACT to consider will include:

- health and safety for patients, clinicians and the community
- risk management to reduce adverse events
- evidence-based practice to inform conditions and logistics for introduction
- ethics to protect patients, clinicians and the community
- patient information and informed consent to minimise risk
- costs and benefits to inform clinical and cost effectiveness analysis
- no conflict of interest between the clinician and technology supplier
- appropriate staffing and staff training for introduction of the new technology
- monitoring introduction via data collection systems.

VPACT is currently considering paediatric lung transplant, islet cell transplant, and establishment of a statewide primary pulmonary hypertension program which includes use of the high cost drug Prostacyclin.

Victorian Medicines Advisory Committee

The Victorian Medicines Advisory Committee (VMAC), which replaces the Victorian Drug Use Advisory Committee, is being established to advise the Department of Human Services on strategic directions and policy development for the safe, efficient and effective use of medicines in the Victorian health care setting. The work of the committee is in line with the aim of the National Medicines Policy.

VMAC will have several working groups. One working group will deal with access issues, and will consider applications for the introduction of new high cost, high volume and highly-specialised drugs. A second working group will promote improved usage of medicines, focusing on medication safety and quality issues, and a third will be focused on evaluation of existing usage and expenditure.

Evidence Review

As well as supporting these various policy initiatives, the Department of Human Services assists the informed adoption of technology in various other ways such as through analysis and commentary on Cochrane Reviews, health technology assessments, horizon scanning and other report from local and international government and non-government agencies. Examples of areas advised on include:

- laparoscopic gastric banding for obesity;
- autologous chondrocyte implantation for knee cartilage defects;
- new technologies for ear, nose and throat services;
- newborn hearing screening;
- cervical screening and medical imaging.

New Technology Grants Program

Since 1996 the Department of Human Services has funded new technology for new clinical practices and procedures, pharmaceuticals, prostheses, medical devices and diagnostic tests, known after 1998 as the New Technology Grant Program.

This was a submission-based program for individual patient interventions. It was continually adapted and strengthened to ensure that introduction of the technology and associated funding allocations were informed by transparent and robust assessment. It included involvement of external reviewers with expertise in health policy and evidence-based assessment to review clinical and cost effectiveness of the technology.

The submission process ceased in 2004 as part of the restructure of the program, including the establishment of VPACT. This was to enable a proactive and systematic, rather than reactive, approach to the introduction and funding of new clinical practice and technology.

Drug-eluting cardiac stents: An example of cost capping a new technology

Bare metal cardiac stents have been used in percutaneuous coronary interventions (PCI) to unblock coronary arteries in symptomatic patients for some years. Since 2002, evidence has strengthened for the use of drug-eluting stents in blocked coronary arteries of patients with a higher risk of restenosis (rate of further blocking of the treated coronary artery) and major adverse cardiac events (e.g. heart attack). However, drug-eluting stents, often referred to as coated stents, cost three times more than bare metal stents.

Given the strengthening evidence, in 2003 DHS met with cardiologists from Victoria's nine public sector hospitals undertaking PCI to consider the use and funding of coated stents. Since October 2003 funding for coated stents has been approved but only for patients having at least one of nine agreed clinical indications for which there were some published evidence. Despite initial resistance from some clinicians on which clinical indications should be eligible, consensus was ultimately achieved.

Public hospitals are now reimbursed the difference in cost between a coated stent and a bare metal stent following receipt of a quarterly claim for reimbursement, accompanied by a proforma detailing their use, signed by the Chief Executive Officer

(CEO) of the relevant hospital. Reimbursement was capped at an activity level that took into account annual growth, which was approved by the CEO. In 2003-04 utilisation of coated stents was below the level predicted. The approach was reaffirmed by cardiologists and CEOs, and is being maintained for 2004-05.

Case Study: Coated stents

The introduction of drug-eluting cardiac stents, also known as coated stents, into routine practice in Victorian public hospitals was based on the need:

- to ensure that coated stents are used only for the specific patient conditions informed by evidence and agreed to by representatives from participating organisations
- to provide a mechanism for monitoring the efficacy, safety and efficiency of drug-eluting stents.

In determining the scope of use, the following steps were taken:

- a literature review of the efficacy and effectiveness of coated stents from clinical trials
- a review of guidelines on the use coated stents in other countries
- advice from other Australian states and territories on the use of coated stents in the public sector
- consultation with cardiologists from all Victorian public hospitals providing PCI.

It was agreed with the cardiologists that coated stents should only be provided to patients with the following characteristics, presentation of which represents a high-risk of developing restenosis within a 12 month period following PCI:

- diabetes (type I or type II)
- long coronary artery lesions (>20mm in length)
- small diameter coronary arteries (≤2.5mm in diameter)
- chronic renal failure
- ostial lesions
- bifurcation lesions
- chronic total occlusions
- previous surgery for coronary artery bypass graft CABG
- in-stent restenosis.

The following were also agreed:

- the maximum number of patients requiring coated stents for each health service
- the average number of stents per patient
- the amount of funding per stent taking into account existing funding for bare metal stents
- quarterly reimbursement of stent costs based on data provided from each health service detailing numbers of patients and stents, and clinical indications for stent use.

The process now in place allows patients, clinicians and managers to be confident that use of coated stents was supported by evidence of efficacy, safety and effective resource utilisation and to ensure an agreed process for monitoring utilisation and outcomes.

Health*SMART*

Health is an information dependent industry that will continue to increase its use of, and dependence on, information and communication technology (ICT). However, health has been a slow adopter of ICT primarily due to chronic under-investment and the complexity of many of the information systems and their implementation.

Health*SMART*, which was launched in 2003, is the Victorian Government's whole-of-health strategy to modernise information and communication technologies (ICT) in Victoria's public health care system. Activity is occurring in six major areas: resource management systems across health services; patient management systems across health services; clinical systems including access to results and an initial structure for the electronic health record; electronic medication ordering across health services; and a technology 'refresh' plan and governance structure for shared ICT services.[29]

The benefits from Health*SMART* are expected to be substantial. They include:

- reduced delays in patient discharge from speedy availability of test results (3.2 per cent shorter length of stay with associated cost reductions)
- reduction in additional bed days associated with adverse events (estimated at 3.3 million patient days and $800 million per year Australia wide)
- reduction in redundant pathology tests resulting from transcription errors (up to 40 per cent in some cases with a total expenditure of $1.4 billion, around 4 per cent of total health service expenditure nationally)
- earlier discharge through increased use of clinical pathways and protocols allowing the admission/treatment of more patients
- decreased turnaround time for radiology results (estimated at 43 per cent) and pathology results (25 per cent)
- admission medication orders filled over one hour quicker and daily drug orders filled 34 times faster with electronic prescribing
- clinical staff freed-up from administration to spend more time with patients (up to 15 per cent more time available)
- the availability of complete case history to all health care providers involved in a patient's care leading to fewer repeat tests and histories
- a reduction in medication errors with an 81 per cent decrease in medication errors achieved from electronic prescribing. It is estimated that around 140,000 hospital admissions each year are associated with problems with the use of medicines and that inappropriate use of medicines costs the public hospital system approximately $380 million per year[30].

Health*SMART* is occurring in the context of overarching national reforms in health information management and information communication technology (IM&ICT). The National Health Information Group (NHIG) and the Australian Health Information Council (AHIC) identified a number of critical national health IM&ICT priorities that required urgent attention. These priorities relate to the common standards and fundamental 'building blocks' that will enable interconnectivity of health information systems.

In July 2004, Health Ministers endorsed the establishment of a national entity to drive these critical national health IM&ICT priorities.

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[29] Department of Human Services. 2003. *Whole of health Information and Communication Technology Strategic Plan 2003-2007*. see http://www.health.vic.gov.au/healthsmart

[30] Australian Council for Safety and Quality in Health care. 2002. *Second National Report on Patient Safety. Improving Medication Safety.* See www.safetyandquality.org

The need to build an interconnected health system in support of health reform is especially strong in Australia, where responsibility for health care provision is split across governments and the private and public sectors. Some initiatives can be advanced independently by the various jurisdictions, but in the areas of systems and information interoperability national co-ordination is essential. Therefore there is a strong case for decisive national action in priority areas of health IM&ICT.

A nationally coordinated effort is the most cost-effective path forward. The benefits of successful national collaboration are likely to far outweigh the cost savings from a once-only development approach. Seamless movement of patients and their data across different parts of the health system (such as from GPs to hospitals) will only occur when we have consistent approaches and standards around interconnectivity. In Canada, it has been estimated that a national effort to standardise electronic health data would cost half the amount needed if each province were to head in this direction independently[31].

Delivery of a better connected health system will result in system-wide cost benefits, although these are difficult to quantify given the indirect and diffuse nature of the benefits. Various attempts have been made to quantify these benefits and develop business cases. The Healthcare Information and Management System Society in the US estimates net savings in excess of US$87 billion per annum from standardised electronic health data alone[32]. In addition, work jointly commissioned by the Australian and Tasmanian Governments in relation to a state-wide rollout of HealthConnect has outlined a business case for creating standard electronic health records.

Better Health Channel and Clinicians Health Channel

Improved availability of information to consumers on health through the internet is an important driver of the rate of uptake of new technology. Victoria has two health information channels – one for consumers and one for clinicians - developed to provide high quality, reliable and relevant health information.

The Better Health Channel at www.betterhealth.vic.gov.au is the Victorian Government's online consumer health information website. It seeks to provide the Victorian community with comprehensive, quality assured, accessible, on-line health and health service information.

The site was launched in 1999 and is the leading national health information site and also the leading Victorian government site. Currently, the site receives about 900,000 sessions per month totalling 2.5 million page views. A recent survey of the Better Health Channel indicated that health professionals use the site three times more often than general health consumers. Significant amounts of this information provision can be demonstrated to be replacing hard copy alternatives.

The Clinicians Health Channel at www.health.vic.gov.au/clinicians aims to:

- provide access to critical clinical knowledge bases for clinicians in the public health care sector in metropolitan, regional and rural Victoria
- facilitate electronic dissemination of information - to ensure that clinical information is available whenever and wherever required
- support integration of evidence based practice into the health care system.

[31] Boston Consulting Group: Executive Summary – National Health Information Management and Information and Communications Strategy (April 2004)
[32] ibid.

Since March 2000, the Clinicians Health Channel has provided access to additional resources for staff of public hospitals and community health centres. Clinicians employed in these settings can log on at work, at home or anywhere Internet access is available to the following resources, free of subscription costs:

- citation databases with direct links to 400+ full text journals (covering a range of medical, nursing and allied health literature);
- detailed drug and prescribing information including emergency and toxicology management;
- clinical practice guidelines, 40+ core textbooks and a range of other information resources.

Public hospital decision-making structures and procedures

Technology assessment and evaluation is also part of the responsibility of each public hospital to provide services safely, efficiently and cost-effectively.

There has been a longstanding role for therapeutics advisory committees in health services to assess requests to use new drugs in hospitals. These consider existing drugs for the same clinical indication and the clinical and cost effectiveness of the proposed new drug. A role for health services in evaluating new technology was reaffirmed by the recent report of the Victorian public hospitals governance reform panel[33].

Some Melbourne public sector health services have established internal committees to consider and oversee the introduction of new clinical and interventional procedures. This process aims to ensure that uptake of a new clinical procedure is monitored to ensure its efficacy and effectiveness in the heath service prior to widespread diffusion.

Two such committees are the New Clinical/Interventional Procedures Committee at Southern Health and the Alfred Innovations Committee at Bayside Health. Both committees report to the health service executive and have a rotating membership and comprise executive and clinical (medical and surgical) representatives. The committees consider new technology and clinical practice changes in the light of:

- evidence of efficacy, and clinical and cost effectiveness
- processes for informed consent, and scientific and ethical standards
- legislative requirements
- medical credentials and training, including clinician skills and experience
- costs, including medical and resource implications
- proposed data collection.

[33] Department of Human Services. 2003. *Report of the Victorian public hospitals governance reform panel*. See www.health.vic.gov.au/governance

PART 4: EVIDENCE, TRENDS AND PROSPECTS

Key Points

⇒ A major study conducted for the Department of Human Services in 2001 estimated that the net impact of new technology on hospital expenditure in Victorian public hospitals was in the range of 1.1 per cent to 2.8 per cent during the previous four years.

⇒ It is difficult to gauge whether medical technology uptake (and costs) will be relatively higher for older age groups and potentially compound population ageing effects, or whether the overall effect will be 'age-neutral'.

⇒ There are prospects for major advances in telemedicine and telehealth in both reducing costs and increasing access.

⇒ Improving preventive care services will help curtail growth in the treatment of chronic heart failure, however there will be continuing growth in demand for pacemakers and defibrillators to maintain heart function. New left ventricular assist devices that can be used for permanent implantation in heart failure patients are currently being trialled.

⇒ Care of very premature babies is costly and technology-intensive, and although survival rates have risen, disability rates of surviving babies have reduced more slowly, so contributing to a rise in overall disability rates among children. However, if recent evidence that the likelihood of premature birth can be reduced through a low technology intervention, such as through better oral health care, then this would be one of many examples where relatively simple primary health care interventions should slow technology-related cost increases.

⇒ A new analysis of public private patient utilisation cost differentials showing faster growth, high costs, and higher unit cost growth for private patients.

⇒ Analysis also reveals prostheses are much more costly for private patients.

⇒ There is little data on whether the uptake of advanced medical equipment is faster in the private sector, although it is likely that this is the case.

Impact of new technology on Victorian public hospital costs: KPMG Study

In 2001, DHS commissioned a study into the impact of new technology on Victorian public hospital costs, involving the consideration of new technology in relation to demand and cost growth[34]. The study examined the relationship between new technology and Victorian public hospital expenditure and the framework within which new technology is identified and assessed.

[34] KPMG Consulting. 2001. *Impact of new technology on Victorian public hospital costs*. Unpublished report

Some key findings were:

- Consideration of new technology needs to take into account not only technologies that have recently emerged but also established technologies that are able to be applied in their existing or adapted form to new areas.
- New technologies are generally not available for use in Australia without first having undergone various forms of assessment. There are opportunities at the state and hospital level to build upon these practices through greater cooperation between hospitals and the use of more structured assessment protocols.
- There is no evidence from the literature of a generalisable relationship between new technology and hospital expenditure. The impact of technology on hospital expenditure and costs is dependant upon a range of factors and is moderated by the prevailing budgetary environment. Some technologies reduce expenditure while others increase expenditure within a budgetary year or in the longer term. The net effect of these technologies and the take up of these technologies is determined by the choices of clinicians and hospitals and is influenced by cost impact, potential for patients to gain, assessed benefit and overall resource constraints. Thus the estimated impact of new technology does not reflect the underlying or potential impact by the 'net' impact influenced by these moderating factors.
- The estimated net impact of new technology on hospital expenditure in Victorian public hospitals is in the range of 1.1 per cent to 2.8 per cent during the period under review.
- New technologies have had a considerable impact on length of stay resulting in a significant trend towards same day admissions and reduced hospital costs. This has enabled hospitals to take up cost increasing technologies and to treat additional patients, whilst simultaneously meeting government productivity requirements.
- There are indications that this trend is levelling off and it will limit the capacity of hospitals to take up new technologies that improve patient outcomes but that increase hospital costs. This will limit their capacity to meet demands for further performance improvements in terms of, for example, efficiency and/or treating more patients without appropriate additional funding such as adjustment to hospital pricing structures or addition of specific grants.
- Investment in new technology is necessary, but should be accompanied by an improved assessment and monitoring framework for new technologies.
- Historical patterns of uptake or cost impact are not useful guides for making decisions regarding the level of future investments. Rather, such decisions should be guided by a more systematic assessment and monitoring process.

Drawing on data from cost weight studies and discussions with clinicians, the KPMG Report provided three case studies of the impact of specific technologies. These were

- Hip replacement – where new forms of a technology are introduced without the support of supportive cost effectiveness information ie justification of the additional costs of the technology compared to the existing technology;
- Oncology pharmaceuticals – a group of pharmaceuticals that are of high cost and low volume, hence struggle to be funded; and
- Stents – a single innovation adapted for a range of conditions, replacing or complementing existing practice and providing treatment for groups of patients who otherwise would not have been treated.

The Department of Human Services has analysed more recent trends in relation to these three technologies in Victoria as well as a some of the 30 technologies cited in the Commission's *Issues Paper* as among the most important recent advances based on a survey of medical practitioners in the USA (Box 1, Page 9 of *Issues Paper*).

These analyses can be made available to the Commission upon request.

Telemedicine and Telehealth

Australia is dominated by distance, isolating many patients and healthcare workers from centres of expertise. The development of telehealth and telemedicine will, in many cases avoid the need for patients to travel, or be transported, long distances and will vastly improve access to health services for people in rural and remote areas.

Telehealth involves the transmission of images, voice and data between two or more sites using telecommunications to provide health services such as clinical advice, consultation, education and training services.[35] Telemedicine is the term used to describe the use of telecommunication technologies for the provision of medical services to distant locations.[36]

Telehealth allows clinical and non-clinical services, education and support to be delivered without the need for expensive and time consuming travel. High quality interactive video combined with supporting images allow health professionals to interact face to face with remote peers or patients. Benefits for consumers include:

- reduced travel and associated costs
- reduced waiting times for people in rural and remote locations,
- possibility of local treatment and/or early return to local community
- statewide access to services
- increased access to specialised services for people in rural and remote locations and assistance the management of chronic illness in a community setting,

Benefits for health professionals include:

- reduced cost of providing particular health care services or enable substitution
- enhanced statewide capability
- support a continuum of care across several healthcare providers e.g. case management.
- potential to avoid admission
- gaps in service provision addressed
- provision of more appropriate services through improved or more rapid diagnosis
- extend the range of specialised services available to those in rural and remote locations to include services such as psychiatry, radiology and dermatology.

There are a number of telehealth/telemedicine networks across Australia that are highly developed and are increasing in number. A variety of applications are being piloted and successfully implemented, improving access to quality health care and reducing the need to travel long distances to cities or larger towns. Some examples are outlined on the following page.

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[35] See www.telehealth.health.wa.gov.au/general

[36] Mitchell J & Associates. 1999. *The cost effectiveness of telemedicine enhanced by embracing e-health*, TeleMed99, presented at the Seventh International Conference on Telemedicine and Telecare, London, UK, 28 November to 1 December 1999

Bayside e-health

In partnership with the Department of Human Services, Global Telehealth and eleven hospitals in the Gippsland region, a telehealth services model has been implemented by Bayside Health to ensure that utilising telehealth is easy, co-ordinated and sustainable. The main aims of this project are to reduce the costs associated with patient transport for outpatient appointments, provide patients with timely access to off-campus health providers without leaving their primary site and increase access for medical staff to off-campus events such as meetings and in-service education.

Alfred/Medseed Wound Imaging System (AMWIS)

AMWIS is a wound management software system developed in a collaborative venture between The Alfred Hospital in Melbourne and Medseed. AMWIS provides a previously unavailable level of wound measurement precision and documentation[37]. The system is designed to enable the wound images and assessment data to be securely transmitted via the internet for review or consultation to any site equipped with the wound imaging system.

AMWIS can provide significant benefits to rural and remote communities that may not have easy access to a wound care consultant. A 2003 study in the Kimberley region in Western Australia examined the clincial outcomes of using AMWIS to undertake remote wound consultation for diabetic Aboriginal people with chronic leg ulcers. It found that clincial outcomes were significantly improved and costs reduced when this system was used to gain remote clinical consultation from a wound care expert located 2,500 kilometres from the Kimberley region[38].

South West Alliance of Rural Health (SWARH)

Victoria's SWARH is an alliance of public health agencies in the South West of Victoria covering an area of approximately 60,000 square kilometres connecting all public acute hospitals and associated health services from west of Melbourne to the South Australian border[39]. The system offers major benefits including:

- virtual visiting for patients whose families live long distances away
- virtual reception for remote rural health facilities
- virutal staffing for the emergency departments of smaller hospitals
- remote patient monitoring and telemedicine.

Teleradiology

The cost effectiveness of teleradiology was a focus of a major trial conducted by the Women's and Children's Hospital in Adelaide from February 1998 to February 1999[40]. The primary aim of the project was to evaluate the advantages, limitations, benefits and costs of a teleradiology service for selected country and Northern Territory locations. The project demonstrated that, with the large distances between remote hospitals and metropolitan hospitals, the cost effectiveness of teleradiology in comparison with retrieving remote patients, can be dramatic.

Breastscreen Victoria has a proposal that has attracted funding from a number of sources, including Multimedia Victoria, Telstra, and potentially the Australian

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[37] *Telehealth FOCUS*, Edition 3, November 2001

[38] The Alfred Hospital, 2003 Annual Review

[39] The extent of the SWARH network can be seen in the October 2004 SWARH Newsletter at www.swarh.com.au

[40] Hayward, T & Mitchell J. 2000. *The cost effectiveness of teleradiology at the Women's and Children's Hospital in Adelaide, South Australia*. Journal of Telemedicine and Telecare, 2000, Volume 6. See www.jma.com.au

Government for an integrated mobile teleradiology mammography service that has the potential to dramatically improve turnaround times, improve convenience for women and reduce costs[41].

Teleopthalmology

A pilot study conducted on the use of telemedicine ophthalmology in remote Queensland indicated that ophthalmology is well suited to telemedicine for the diagnosis and management of acute conditions and postoperative assessment of patients in remote areas[42]. Many ocular conditions present acutely and require immediate specialist referral. While Mt Isa has a visiting specialist ophthalmology service, the clinics are too infrequent to be useful for acute problems and patients often require transfer to Townsville, 900 kilometres away. In 1996, Mt Isa Base Hospital transferred 196 ophthalmology patients, representing almost 25 per cent of patients transferred under the Patient Transfer Scheme in that year. Base on the cost of a return flight to Townsville of $500 and not allowing the cost of patient escorts or accommodation, the cost to the hospital was approximately $100,000.

No adverse outcomes related to the use of the technology were identified and patients transferred for urgent assessment fell from 17 for the corresponding period in the previous year to four during the study period. The service for patients seemed to improve, with specialist consultation being provided within 24 hours, allowing appropriate prompt management. Patients within the study seemed to respond well to the technology, with no patient refusing a teleconsultation, and all saying that in future they would prefer such a consultation rather than travelling to Townsville.

Telepsychiatry

The use of telepsychiatry in Australia is becoming more widespread. In October 2002, the Australian government introduced Medicare rebates for consumers with mental health disorders living in rural and remote areas so that they can participate in telepsychiatry consultations with their psychiatrist.

Five new Medicare items were introduced to enable consultant psychiatrists to conduct up to 12 consultations per year per consumer via telepsychiatry. These items may be used when the consumer is located in a rural or remote area and the consultant psychiatrist is located in a metropolitan or regional area. However, there is a requirement that if the consumer requires more than four consultations with their psychiatrist, every fifth consultation shall be a face-to-face consultation.

In many instances, telepsychiatry has been found to improve recovery because patients can be treated close to home and in familiar surroundings[43]. It also eliminates the hours of travel often required to reach the nearest psychiatrist. A comparison of the costs associated with delivering a mental health service in northern Queensland by telepsychiatry and by conventional methods showed considerable savings from reduced travel by patients and health-care workers[44]. While consumers and mental health professionals rate face-to-face consultations more favourably than videoconferencing, telepsychiatry remains a valuable tool in meeting the mental health needs of regional and remote Australians.

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[41] See Breastscreen Victoria submission to this Inquiry

[42] Blackwell N, Kelly G & Lenton L. 1997. *Telemedicine ophthalmology consultation in remote Queensland.* Medical Journal of Australia, 167: 583-586

[43] The Royal Australian and New Zealand College of Psychiatrists. 2002. *Major Break-through in Regional and Remote Mental Health*, Media Release, 8 October 2002

[44] Trott, P & Blignault T. 1998. Cost evaluation of a telepsychiatry service in northern Queensland. Journal of Telemedicine and Telehealth, 4:66-68

Technology trends in the management of heart failure

Heart failure is a condition when the heart is no longer capable of pumping blood around the body. It is the end stage of heart disease and often follows recurrent heart attacks and hypertension. Approximately 300,000 Australians are affected by heart failure and over 40,000 new cases are diagnosed annually[45]. Heart failure accounts for almost 3,000 deaths annually in Australia. Heart failure occurs predominantly amongst those aged 75 years and over. In Victoria in 2003-04, more than 6,000 public hospital separations were reported for heart failure without complications totalling over 31,000 admitted days. Heart failure is growing in prevalence due to the increasing age of the population.

Modern drug treatment markedly improves survival, as does surgical treatment to implant devices that correct cardiac conditions (such as arrhythmia).

In March 2003, a report was published by a Victorian Government working party outlining a multi-disciplinary approach to the medical management of heart failure to improve outcomes[46]. The report indicated that application of evidence-based knowledge, derived from randomised controlled clinical trials, was lacking regarding the care of patients with heart failure. Funds were allocated to develop new programs to provide better care of patients with heart failure, with improved medical management likely to see fewer patients attending emergency departments and needing more costly surgical treatment.

Notwithstanding improve medical management, surgical treatment using implantable devices will often be required. As treatments improve and case fatality recedes, more follow-up procedures to replace devices and batteries that exceed their lifespan will be required. Technological advances have also seen higher device costs as technologies are combined into a single unit. Some trends in the use of these devices used are set out below

Pacemakers	There is a marked growth in the number of pacemakers inserted annually in Australia. Pacemaker insertion is generally confined to centres with specialist cardiology services with the capacity to provide coronary artery bypass graft surgery. The increasing numbers of pacemakers required puts pressure on hospital budgets that have capped targets.
Biventricular pacemakers (BVPs)	This technology, which paces left and a right ventricle simultaneously, has been shown to improve quality of life, exercise tolerance and survival in selected patients and reduce hospitalisations for heart failure. The cost of a BVP (approximately $15,000) exceeds the current payment for a standard pacemaker ($7,000). Consequently, most public hospitals are either not implanting or are restricting the number of BVPs.
Automatic implantable cardiac defibrillators (AICDs)	AICDs have been shown to improve survival in patients who have survived cardiac arrest. The cost of an AICD is covered by the current payment ($25,000). However, most hospitals have capped targets regarding the number of AICD implantations.

[45] Australian Institute of Health and Welfare. 2004. *Heart, Stroke and Vascular Diseases Australian Facts 2004.*

[46] Department of Human Services. 2003. *Hospital Admission Risk Program (HARP) Technology Working Party Report.* See www.health.vic.gov.au/hdms

Combined BVPs and AICDs	This technology has been shown to improve survival. However, the cost of a device (approximately $30,000) exceeds current payments for any implantable cardiovascular device. A recent technological advance, whereby automatic fluid status monitoring technology in the thoracic cavity was merged with a combined BVP/AICD device, was approved for use in Europe, Canada and the USA. This new device (not yet approved for use in Australia) costs around $45,000.
Left Ventricular Assist Devices (LVADs)	LVADs are devices that receive blood from the left ventricle via an inflow cannula and then pump it into the aorta via an outflow cannula. The pump may be internal or external, and a variety of power sources are possible. LVADs have been in widespread use as a circulatory support since the late 1980s for use in patients with chronic heart failure as a bridge-to-transplant to extend the waiting time for access to a donor heart.

The 'gold standard' treatment for heart failure is heart transplantation. However, with organ donors in short supply, the waiting list for transplant is long and many patients die before receiving a transplant. Because the waiting time for a donor heart can exceed two years, LVADs as a bridge-to-transplant cannot extend time to transplant indefinitely. A challenge has been to develop an LVAD for permanent implantation for patients with heart failure or for patients deemed unsuitable for heart transplant.

With increasing heart failure cases and hospital admissions, decreasing donor numbers and the devices becoming smaller in size, LVADs suitable for permanent implantation are now on the horizon[47]. Should this technology become accepted practice to treat heart failure it could have a significant impact on health outcomes and health care expenditure.

A number of serious ethical issues are associated with the implantation of a permanent LVAD, including the process of withdrawing therapy, the balance of benefits and harms of therapy, and access to treatment and ongoing care.

Currently the only device being clinically trialled in Australia is the VentraAssist LVAD. The manufacturer has estimated that a single unit would cost between $82,000 and $137,000. The best approximation of cost for the surgical insertion of a LVAD for permanent implantation is the cost of insertion of LVAD as bridging therapy, $24,700, includes theatre, hotel, nursing and overhead costs with a mean length of stay of 8.54 days in a public hospital. As the average length of stay for the implantation of a LVAD, as described by the REMATCH study, is 43.5 days, additional hospital costs of approximately $14,000 per patient may be expected.

Clinical trials are underway in Australia (VentrAssist), United Kingdom (Jarvik 2000) and the United States (HeartMate) assessing the use of LVADs for permanent implantation[48].

Will technological advances compound the growth in health expenditure due to population ageing?

In its draft report on the economic impacts of population ageing, the Commission has suggested that the rate of cost growth due to new technology, encompassing both

[47] Australian and New Zealand Horizon Scanning Network. 2004. *Left Ventricular Assist Devices for Destination Therapy*. Commonwealth of Australia. see www.horizonscanning.gov.au
[48] ibid.

the rate of uptake and the expansion of the treatment frontier, may be faster for older than for younger people. The draft report cites the possible steepening of the age-cost profile as evidence that this may be occurring.

It seems intuitively plausible that this would be occurring. A combination of improved lifestyles, low-cost primary prevention such as the 'poly-pill'[49], improved low-cost treatments, plus a disproportionately rapid expansion of treatment options for older people, mean that chronic diseases associated with age are likely to increasingly dominate the health care system, especially in hospitals.

For example, heart surgery on people over 80 is also increasing and largely successful, despite many patients being advised not to go undergo surgery, according to a review published last year. The review found that the number of patients over 80 having procedures ranging from bypass grafts to valve replacements has more than quadrupled since 1991[50]. The prospect of permanently implantable LVADs for heart failure could substantially increase treatment costs if widely used.

However, changes in relative rates may have a predictable dynamic. Some technology frontiers, for example laparoscopic surgery, may expand in waves, extending over time from younger to older ages. If this is the case, then over time costs for those in the younger older age groups could fall sharply, as will have occurred at younger ages in prior years. Overlaid on this are changes in lifestyles and health conditions that are associated with particular birth cohorts, smoking patterns being the obvious example.

The potential countervailing tendencies must also be considered. Around half of all deaths occur in hospitals, and there is good evidence that health care costs rise sharply in the last year or so of life. In line with general recognition that not all of this care is appropriate, palliative care services have expanded substantially across Australia over the last decade. In Victoria the Department of Human Services has recently embarked on a campaign to improve awareness of the Medical Treatment Act 1988, and has funded a number of projects aimed at improving the way end of life care is discussed between patients, families and clinicians. While the goal of these initiatives is to improve the quality of care for patients, a corollary of this should be reduced costs as well.

Equally, the increasing prevalence of obesity among younger people, could – unless the trend is arrested - substantially alter age-cost profiles. From 1985 to 1997, the prevalence of overweight and obese 7- to 15-year-olds doubled. Children as young as nine found to have thickening of the artery walls and impaired blood vessels and a quarter of all Australian children are now considered overweight or obese. These children have a 25-50 per cent change of becoming obese adults[51].

Also some treatments, such as knee replacement, are growing rapidly at younger ages. While hip replacements are almost exclusively for elderly patients, the number of Australians aged 40 to 60 having knee replacements has doubled in five years. One in five replacements are for this age group. While joint replacement in general has gone up between 5 and 10 per cent every year in Australia for the past decade, knee replacements have increased by more than 60 per cent in five years[52].

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[49] Professor Nick Wald. 2003. *Polypill*. The Health Report, 30 June 2003. Australian Broadcasting Commission. See www.abc.net.au/rn/talks/8.30/helthrpt

[50] Hewitt TD, Santa Maria PL, Alvarez JM. 2003. *Cardiac surgery in Australian octogenarians: 1996-2001*. ANZ Journal of Surgery 73:749-754

[51] Central Sydney Area Health Service. 2004. *New links: childhood obesity and heart disease.* Media Release April 27 2004. See www.cs.nsw.gov.au/mediacentre

[52] National Joint Replacement Registry. 2003. Annual Report.

Advances in bio-engineering technology and an increasingly overweight population are likely to see the trend continue.

Another way in which future technological developments may result in a flattening of the cost profile relates to the ability of the national e-health initiative, and Victoria's Health*SMART* initiative, to improve health system efficiency. There are various ways in which this will help reduce costs over the long term, including, for example, through a reduction in adverse events. It would be fair to speculate that a high proportion of adverse events occur in older patients[53], and the health cost consequences for older patients due to adverse events will be higher.

Care of very low birthweight babies – past technology trends and future prospects

One of the many success stories of modern medical care is the survival of very premature low birth weight babies.

Of the quarter of a million babies born in Australia each year, around 1 per cent are under 1.5 kilograms and around 0.4 per cent are under one kilogram. In Victoria, survival rates for babies under one kilogram have increased from less than 10 per cent in the 1960s, to 25 per cent in the late 1970s, to 38 per cent in the mid 1980s, to 56 per cent in the early 1990s, and to 72 per cent in the late 1990s[54]. Victoria now has the world's best survival rate for premature babies[55].

However, neonatal intensive care – which underpins this success – is a costly, high technology area. During the 1990s, survival rates rose due to advances in neonatal intensive care, principally due to the administration of surfactant to improve lung function, but also due to an increase in the provision of ventilatory assistance and corticosteroids[56].

Despite these gains, many of these babies will grow up with more long-term impairments than their normal birthweight counterparts. Premature babies that survive are more likely to suffer developmental problems than babies born at term. Recently published results from the Victorian Infant Collaborative Study (VICS) found that even in the post-surfactant era, very low birthweight babies were twice as likely to suffer significant neurobehavioral impairment and need additional educational assistance as their normal birthweight counterparts[57]. Problems can also arise as a result of the life-saving treatment itself. For example, very premature infants sometimes need drugs that can lead to deafness, leading to the need for further interventions, such as a cochlear implant[58].

Researchers in the VICS group have pointed out that more of these children are now reaching school age since survival rates in geographic cohorts are 3 times higher in the 1990s compared with the 1970s[59]. This may be contributing to the rise in

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[53] For example the rate of medication incidents is higher for older people (Australian Council for Safety and Quality in Health care. 2002. *Second National Report on Patient Safety. Improving Medication Safety.*)

[54] Victorian Infant Collaborative Study, 2004. see www.vics-infantstudy.org.au.

[55] ibid.

[56] Anderson P, Doyle LW, and the Victorian Infant Collaborative Study Group. 2003. *Neurobehavioral outcomes of school-age children born extremely low birth weight or very preterm in the 1990s*. Journal of the American Medical Association 289:3264-72

[57] ibid.

[58] Horton, J. . 2004. *Resounding victory for Lily*. The Scotsman. June 28, 2004

[59] Anderson P, Doyle LW, for the Victorian Infant Collaborative Study Group. 2004. *Executive functioning in school-aged children who were born very preterm or with extremely low birth weight in the 1990s.* Pediatrics 114:50-57.

disability rates among children that ABS disability surveys have recorded since 1981[60].

In Victoria, the challenge is to now make sure that more of those early premature babies who do survive are able to look forward to a healthy life free of any major health problems. The VICS work revealed a widening gap in survival rates between very premature infants born in hospitals with specialist perinatal centres, and thus ready access to intensive care facilities, and those born elsewhere[61]. The quality of life of survivors born elsewhere was also found to be inferior.

The researchers argued that one way to improve the survival rates of these infants was to increase the proportion who are born within level 3 tertiary hospitals if needed and the recent establishment by the Victorian Government of a perinatal emergency referral service at a cost of $500,000 aims, in part, to achieve this[62]. The Government is also providing availability payments totalling $8 million in 2004-05 to ensure that sufficient beds are available at all times to meet system demands[63].

Nationally, the total cost of hospital treatment for very low birth weight babies (<1kg) in 2001-02 was around $70 million, or over $90,000 per separation[64]. These are average figures and individual cases can be much more expensive.[65] Following a funding review earlier this year, the Victorian Government put substantial extra funding into paediatric services including a 34 per cent rise in unit prices for neonatal intensive care[66].

Endeavouring to improve survival rates and outcomes, and ensuring all at-risk pregnancies are identified and appropriately referred, increases the overall cost of neonatal services. Both these pressures could be considered as cost-increasing effects of technology, although the latter could be seen as simply ensuring that the benefits of high quality health care – ie past technological developments - are available to all Victorians, not just those who may be lucky enough to live close to a tertiary hospital.

Regardless of how they may be categorised, the offsetting benefits should be considered. Apart from the prospect of an entire life of reduced or no disability, these benefits include decreased costs for families, and decreased costs for other Government services if disability rates of the surviving babies can be reduced.

A comprehensive analysis of these other effects may reveal that the overall effect of improved access to high technology neonatal care is cost reducing. However, as with many areas of medical care, proving this to be the case – finding the evidence – is itself costly. And where long-term outcomes are important, the evidence can only be fully assembled many years after the interventions first commenced. If the

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[60] Australian Institute of Health and Welfare. 2004. *Children with Disabilities in Australia*.

[61] Doyle L. 2004. *Changing availability of neonatal intensive care for extremely low birthweight infants in Victoria over two decades*. Medical Journal of Australia, 181:136-139

[62] Bronwyn Pike, Minister for Health. 2004. *New Maternity Services Give More Choice To Mothers*, Media release 22 June 2004. See www.dpc.vic.gov.au/pressrel

[63] Department of Human Services. 2004. *Public hospitals and mental health services policy and funding guidelines 2004-05*. Government of Victoria. see www.health.vic.gov.au/pfg2004/

[64] Department of Health and Ageing. 2003. *National Hospital Cost data Collection, Cost Report Round 6, 2001-02*. See http://www.health.gov.au/casemix

[65] A recent episode of the Australian Broadcasting Corporation's Catalyst program, *The Cost of Living* (28 October), discussed premature births and the huge costs associated with this – financial, emotional and psychological. It presented the case of a baby born 17 weeks early who subsequently died and whose care costs totalled approximately $385,000. See www.abc.net.au/catalyst

[66] Department of Human Services. 2004. *Review of funding for paediatric clinical care services in Victoria*. See www.health.vic.gov.au/casemix

introduction of neonatal intensive care had been dependent on the results of a rigorous body of evidence and detailed cost-benefit evaluations, it may never have been introduced. In this case there would be at least 10,000 Australians who would not be alive today.

A full analysis also requires that a value be put on the future life of the unimpaired survivors as well as on the potential life-long impairments that some of the survivors will experience. These are difficult and often contentious issues, however a comprehensive discussion of the impacts of technology requires that they be considered.

However, as with many other areas of medical care, there may be an unequivocally beneficial cost-reducing future outlook. Reducing prematurity is recognised as the best way of increasing survival rates and improving health outcomes. Delaying the birth will generally reduce the acuity of those born and therefore reduce the length of stay that these infants require in a neonatal intensive care or special care unit.

Discoveries about reducing prematurity can sometimes come from unexpected quarters. Evidence is now accumulating that periodontal disease may be an important cause of prematurity[67,68] and the National Health and Medical Research Council recently awarded a major grant to researchers in Perth to examine the relationship between premature birth and improved oral health[69].

If there is a clear-cut cause-and-effect relationship, at risk patients can be offered the appropriate advice on oral hygiene, antibiotics and dental treatment. Equally, such a finding would be further confirmation of the potential spin-offs from investments in public health programs directed towards improved oral health, recently affirmed by Australian Health Ministers[70]. It would be just one of many examples where relatively simple primary health care interventions may lead to dramatic cost reductions.

DIFFERENTIAL IMPACTS: PUBLIC AND PRIVATE PATIENTS

One of the reasons people take out private health insurance is so that they can access technological advances more readily than if they relied on the public system. Indeed, ease of access was the basis for the advertising campaign that accompanied the introduction of the lifetime health insurance cover. As the analysis of trends in costs of prostheses later in this section illustrates, these effects can be sizable.

An example of the potential scale of the unrestricted penetration of technological advances, is seen in the USA where full-body computed tomography (CT) scans are popular among patients as a way to spot health problems such as heart disease and cancer at an early stage[71]. In Australia, some providers have advertised CT scans to detect coronary artery calcification, and while such scans are not eligible for reimbursement through Medicare and the cardiology profession here has issued a

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[67] World Health Organisation. 2004. *Adverse pregnancy outcomes and periodontal diseases*. See www.whocollab.od.mah.se

[68] Boggess. K. 2003. *Is there a link between periodontal disease and preterm birth?* Contemporary Ob/Gyn. 48:79-84. see www.contemporaryobgyn.net

[69] See www.nhmrc.gov.au

[70] National Advisory Committee on Oral Health. 2004. *Healthy Mouths Healthy Lives. Australia's National Oral Health Plan 2004-2013*. Government of South Australia, on behalf of the Australian Health Ministers' Conference.

[71] The subject of a US National Academies seminar in Washington on 12 November (see http://www7.nationalacademies.org/policyfellows/Events.html)

position statement rejecting their use in this way[72], it illustrates what could happen without careful control.

Another new technology that is now available in the USA is the insertion of artificial lenses to correct nearsightedness and so avoid the need for spectacles[73]. Like CT scans to detect coronary artery calcification, lens replacement for this purpose is not eligible for Medicare reimbursement. However, both procedures will still attract a 20 per cent public subsidy (via the tax system) in cases where a family's net medical expenses exceed an annual limit, which in 2003-04 is $1,500.

A recent paper examining trends in public and private hospital admissions in Victoria over the same period as that studied here discusses the way in which the recent private health insurance reforms is contributing to heightened overall demand. It argues[74]:

> *The relationship between the supply of and demand for hospital care is uncertain. Traditionally, waiting list statistics have been used to measure demand for services. However, these data are difficult to interpret. One common finding is that as hospital activity increases, additions to the list also increase, often resulting in an increase in the numbers of people waiting. An explanation for this effect is that the availability of health services changes decision making process by clinicians, that is, if a service is seen as readily available it is more likely to be recommended to the patient amongst a variety of treatment options. If elective surgery is seen as readily available, then clinicians are more likely to recommend surgery than a less aggressive treatment regime, or even adopting a 'wait and see' approach. Under such a hypothesis it is even possible that, in the longer term, the increased use of private hospitals by the privately insured may result in increased pressure on the public sector through changed clinical practice.*

This section analyses national utilisation and funding data for public and private admitted patients[75] to look at the evidence for possible differential rates of technology uptake. Like most analyses of the aggregate effects of technology, it is based on a residual decomposition approach. It assumes that all utilisation growth in excess of growth in the population (weighted by age and sex-specific health costs) and all unit cost growth in excess of economy-wide price movements is attributable to technology.

Growth in separations.

Comparing growth in public and private patients requires that the differing casemix be taken into account. Although the casemix-adjusted separation is the commonly used measure, it is not well suited to this purpose, since it properly applies only to acute separations. It is not possible to correct for this with available data, so a judgement needs to be made about whether the characteristics and proportion of non-acute separations for public and private patients in each sector are stable enough to be confident about the identified relativities and trends. Based on an

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[72] Cardiac Society of Australia and New Zealand. 2003. *Position statement on high speed computed tomography to detect coronary calcification*.

[73] Food and Drug Administration. 2004. *FDA approves implanted lens to correct nearsightedness.* See www.fda.gov

[74] Sundararajan V, Brown K, Henderson T, and Hindle D. 2004. *Effects of increased private health insurance on hospital utilisation in Victoria*. Australian Health Review. 28:320-329

[75] Throughout this section, 'private patients' refers to self-insured and privately insured patients only. It excludes patients funded by Department of Veterans Affairs, and patients funded by statutory workers' compensation and transport accident compensation schemes.

examination of the non-acute separation data published in *Australian Hospital Statistics,* it is considered that the results hold, despite this problem.

Even so, comparing casemix-adjusted separations across the public and private sectors, is not straightforward because of the way the private hospital case weights are derived, in particular the exclusion of virtually all medical costs from the private hospital cost survey. To overcome this problem, national public hospital case weights have applied to separations from both private and public hospitals, on the grounds that the public case weights are a much better reflection of the full range of treatment costs. For the period 1998-99 to 2002-03, a consistent data series is available based on the application of the cost weights derived from the 2001-02 national hospital cost data collection using AR-DRG 4.2[76].

On this basis, the total number of weighted separations for public and private patients in public and private hospitals grew at an average annual rate of 2.7 per cent between 1998-99 and 2002-03 (Table 4.1). This growth rate is roughly 1 percentage point higher than the growth in the weighted population of 1.9 per cent, which adjusts for the changing age and sex profile of the Australian population.

Table 4.1. Growth in weighted hospital separations and weighted population, Australia, 1997-98 to 2002-03

	Case-weighted separations ('000)[1]			Age- and sex-weighted population[3] ('000)
	Public patients	Private patients[2,3]	Public plus private	
1998-99	3,416	1,772	5,189	18,831
1999-00	3,448	1,868	5,316	19,186
2000-01	3,388	1,995	5,383	19,593
2001-02	3,423	2,180	5,603	19,961
2002-03	3,513	2,278	5,791	20,338
	Average annual growth rate (%)			
1998-99 to 2002-03	0.7	6.4	2.7	1.9
2000-01 to 2002-03	1.8	6.8	3.7	1.9
2001-02 to 2002-03	2.6	4.5	3.3	1.9

1. Australian Institute of Health and Welfare, *Australian Hospital Statistics*, various years, relevant public national cost weight multiplied by relevant total separations figure. Casemix is based on AR-DRG 4.2 using 2001-02 public national expenditure weights. These figures are approximations only since the case weights are applied to all separations, not just acute separations. See text for discussion
2. Excluding DVA and compensable patients (ie. privately-insured and self-insured patients only).
3. The case weights by patient type published by AIHW for patients in private hospitals are based on private national cost weights only. To obtain the relevant public case weights these values are scaled in proportion to the ratio between the private and public national cost weights for private hospitals.
4. 2000-01 casemix adjusted population weights (as used in 2003-2008 Australian Health Care Agreements) applied to estimated resident population (as published by ABS).

However, changes in admission practices, particularly in NSW, mean that these growth figures are not a good measure of the real growth over the period. This is seen in highly divergent trends in average public hospital case weights among the States, particularly at the start of the period[77]. By 2001-02, average public hospital case weights across the States were relatively stable, and so the figure of 2.6 per

[76] Australian Institute of Health and Welfare. 2004. *Australian Hospital* Statistics*, 2002-03,* Table 2.3

[77] Between 1998-99 and 2000-01 average public patient case weights in NSW rose by over 1 per cent compared with a national drop of more than 2 per cent. See *Australian Hospital Statistics,* for these years.

cent for public patient growth between 2001-02 and 2002-03 is likely to be the most reliable measure of underlying public patient growth.

A shortcoming of this method of measuring rates of change is that while the use of constant cost weights overcomes the problem of each year's cost weight survey being re-based to an index value of 1.00, it necessarily, but mistakenly, assumes the same cost weight for each DRG across the years. The same problem applies to the use of a fixed set of adjustments for the age and sex-weighted population. Consideration of the results presented below must take these limitations into account.

In relation to private patients, because of the introduction of the 30 per cent rebate on private health insurance premiums from January 1999 and lifetime health insurance cover from July 2000, it is probably also only from 2001-02 that a reliable picture of private patient activity emerges.

Taking only the period from 2001-02 onwards, the annual growth in combined public and private patient weighted separations is around 1.5 percentage points faster than the growth in the weighted population. This 'excess' growth may be an indication of the propensity of technological change to expand the ages or circumstances at which treatment is feasible, but given that it is principally accounted for by private patients, is more likely due to private patients being able to gain access to treatment at an earlier stage of their condition than public patients.

Thus, the aggregate 'excess' growth in met demand of around 1.5 percentage points understates the real impact of total underlying demand because services for public patients – which still comprise more than 60 per cent of the total case-weighted load - operate under supply constraints due to budget caps.

Public and private patient unit costs

Since increasing unit costs is one of the other ways new medical technology manifests itself, if private patients are accessing more advanced technologies then this might be expected to flow through to higher unit costs. However, to properly compare costs across the sectors account needs to be taken of the underlying sectoral differences.

Major differences that cannot be accounted for simply by applying public national cost weights to private hospital separations include

- all the major teaching hospitals are in the public sector;
- all specialist paediatric hospitals are in the public sector;
- almost all superspecialty work (eg organ transplants) is carried out in the public sector; and
- in many rural, regional and remote areas - where unit costs for the same casemix are higher - public hospitals are the only hospitals available.

Because these differences all make the provision of public hospital services more costly, the application of public sector case weights to private hospital separations needs to be adjusted to allow for them.

Adjustment for the much smaller training and development load in the private sector can be calculated from the results of the national hospital cost data collection (NHDC). NHDC data show that the casemix-adjusted cost margin between teaching

and non-teaching hospitals in major cities is 6 per cent[78]. With teaching hospitals accounting for almost two thirds of casemix-adjusted separations in the public hospital system[79], this translates to an overall private hospital adjustment factor of 0.96. Since all super specialty work is carried out in teaching hospitals, and all specialist paediatric hospitals are also teaching hospitals, this adjustment also corrects for these differences.

The adjustment factor to apply for regional, rural and remote hospitals also can be estimated from AIHW data showing that while 83 per cent of public hospital separations are for people residing in or near major cities and regional centres, for private hospitals the figure is 92 per cent[80]. Measured on the basis of the location of the hospital, rather than the residence of the patient, this latter figure will be nearer 100 per cent, however AIHW does not publish utilisation data by hospital remoteness and sector. AIHW figures indicate that cost per case-weighted separation for small and medium-sized public hospitals (those that provide the bulk of services in more distant regional areas) are, respectively, 5 per cent and 10 per cent higher than for larger non-teaching hospitals[81]. These figures result in a private sector case weight adjustment factor of 0.99 to reflect locational factors.

The case-weighted separation figures in Table 4.1 above are thus multiplied by a factor of 0.95 to allow comparability for the purposes of the cost comparisons set out below. Even these two adjustments are unlikely to fully account for the underlying cost differences. For example, unavoidable diseconomies in the public hospital system are likely because public hospitals are multiservice entities, covering outpatient departments, emergency departments, outreach services, residential aged care, and various other services. Cancellations and delays are unavoidably higher in public hospitals due to high emergency admission loads and this means that utilisation efficiency will be lower than in private hospitals where planned elective admissions predominate[82]. Capital investment in public hospitals is also likely to be less optimal than in the private sector[83].

Secondly, determining the full extent of expenditure on private inpatients is not simple since there are no readily available figures indicating how much the Australian Government spends on medical (MBS) and pharmaceutical (PBS) services for private inpatients, or the size of patient out-of-pocket expenses on inpatient medical services. Fortunately, in a recent development the medical expenditure figures are now reported by the Australian Government (through AIHW) to the OECD, and have been published in *OECD Health Data, 2004*[84]. Using the published data for 2001-02, a good estimate of the amounts for preceding and subsequent years can be derived from published Medicare figures for other years[85].

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[78] Department of Health and Ageing. 2003. National Hospital Cost data Collection, Cost Report Round 6, 2001-02. Table 2. See http://www.health.gov.au/casemix

[79] Australian Institute of Health and Welfare. 2004. *Australian Hospital* Statistics*, 2002-03,* Table 4.3

[80] Australian Institute of Health and Welfare. 2004. *Australian Hospital* Statistics*, 2002-03,* Table 7.12

[81] Australian Institute of Health and Welfare. 2004. *Australian Hospital* Statistics*, 2002-03,* Table 4.3

[82] Sundararajan V, Brown K, Henderson T, and Hindle D. 2004. *Effects of increased private health insurance on hospital utilisation in Victoria*. Australian Health Review. 28:320-329

[83] e.g. see, Deeble, J. 2002. *Capital investment in public hospitals*. Australian Health Review. 25:45-60

[84] OECD. 2004. OECD Health data. See www.oecd.org

[85] Department of Health and Ageing. 2004. Quarterly Medicare statistics www7.health.gov.au/haf/medstats/. Inpatient services are reimbursed at 75 per cent of the schedule fee, while non in-patient services are reimbursed at the higher of 85 per cent of the schedule fee, or the schedule fee minus an indexed cap ($58.60 in 2003-04). Using the ratio of the rebate amount to the schedule fee, and allowing for the cap (and also allowing for non-inpatient services being reimbursed at 100% of the schedule fee under the previous safety net arrangements), the inpatient amount can be derived. Patient out-of-pocket expenses for inpatient services were also calculated, based on Health

The Private Health Insurance Administration Council publishes data on expenditure by private health insurance funds on hospital benefits[86] and the Department of Health and Ageing publishes figures on funding under the highly specialised drugs program[87] directed to public and private hospitals. An estimate of PBS expenditure on private inpatients is obtained by assuming that the pharmacy share of total inpatient expenditure in public hospitals reported in the 2001-02 National Hospital Cost Data Collection[88] (4.4 per cent) applies to patients in private hospitals[89].

Expenditure on public patients is derived from data published by AIHW, and is calculated as total public hospital expenditure, less expenditure funded by private insurers, Department of Veterans' Affairs, and other payers, principally statutory motor accident and workers' compensation insurers. Based on the fraction of total public hospital expenditure attributable to inpatients, which is published each year by AIHW in *Australian Hospital Statistics*, the proportion of total public hospital expenditure on inpatient services can be obtained.

Out-of-pocket payments by individuals for hospital services (ie non-MBS services) are reported in *Health Expenditure, Australia*[90]. It is estimated that 95 per cent of these are for private inpatients, since public outpatient services are free, and apart from emergency departments in a few major private hospitals, any outpatient clinics run by private hospitals will be largely funded through Medicare.

The results are shown in Table 4.2. The public patient figures for 2001-02 and 2002-03 are very close to the published AIHW figures on the cost per casemix-adjusted separation for public hospitals ($3,004 and $3,184 respectively[91]), these being the only two years where the same DRG version and cost weights are used.

Table 4.2. Funding for public and private inpatients per case weighted separation, Australia, 1998-99 to 2002-03[1]

	Funding per case weighted separation ($)			Private funding margin (%)
	Public patients	Private patients	Public plus private	
1998-99	2,790	3,043	2,874	9
1999-00	2,852	2,961	2,889	4
2000-01	2,916	3,152	3,001	8
2001-02	3,057	3,337	3,163	9
2002-03	3,234	3,463	3,322	7

1. Casemix-adjusted separations as set out in Table 4.1, but with private hospital case weights standards for sectoral differences - see text for explanation. Method for determining total public patient and private patient funding figures also set out in text.

The small difference is attributable to the inclusion of separations from all public hospitals in the analysis below, including multipurpose services, hospices and

Insurance Commission data showing that 65% of total out-of-pocket expenses for MBS-funded services in 2001-02 were for inpatient services.

[86] Private Health Insurance Administration Council. 2004. See http://www.phiac.gov.au/statistics/index.htm

[87] Statistical reports on Highly Specialised Drugs Program, Department of Health and Ageing. See PBS statistics

[88] Department of Health and Ageing. 2003. *National Hospital Cost data Collection, Cost Report Round 6, 2001-02*. Table 19. See http://www.health.gov.au/casemix

[89] In many private hospitals the pharmaceuticals are supplied to patients via arrangements with community pharmacies, so although both the NHDC and ABS publish estimates of pharmacy expenditure, these estimates do not cover total pharmaceutical expenditure for patients in private hospitals.

[90] Australian Institute of Health and Welfare. 2004. *Health Expenditure Australia, 2002-03,* Appendix A

[91] See Table 4.6. *Australian Hospital* Statistics*, 2002-03, and 2001-02.*

psychiatric hospitals, many of which have very long lengths of stay figures, while the AIHW figures relate only to separations from acute hospitals.

While the average private patient funding margin over the period shown in the table is a relatively modest 7 per cent, the real margin is probably higher since the adjustments do not fully account for the likely cost advantages of private hospitals. For example, the Department of Veterans' Affairs reportedly pays private hospitals a 15 per cent premium above the public hospital price for the treatment of entitled veterans[92]. Also, if the management overheads of private health funds, which exceed 10 per cent of total funds outlays, were included in these figures, then the average private patient margin is around 16 per cent. Assuming a real margin of 15 per cent, this implies that if all private patients could be treated as efficiently as public patients, there could be an overall annual saving of around $1.8 billion.

It is not possible to ascertain the extent to which the higher funding levels represent profits, or are due to higher costs, and if higher costs, how much of that is attributable to earlier uptake of new technology. However, the example of prosthesis costs (see below) indicates that some of the margin is likely due to greater use of more expensive technologies.

Growth in unit costs

Table 4.3 converts the data in table 4.2 into constant prices in order to examine how unit costs have changed in real terms over the 5 year period. Fluctuations in the figures make it very difficult to discern underlying trends – especially when only small changes are expected. This problem is overcome by comparing the average of the first two years with the average of the final two years.

On this basis, the data indicate that real unit funding for private patients is growing faster than for public patients, (1.3 per cent versus 0.7 per cent), with average unit cost growth of 1.0 per cent.

Table 4.3. Growth in funding for public and private inpatients per case weighted separation, Australia, constant prices, 1998-99 to 2002-03[1]

	Funding per case weighted separation ($)		
	Public patients	**Private patients**	**Public and private**
1998-99	3,142	3,427	3,237
1999-00	3,155	3,275	3,196
2000-01	3,069	3,318	3,159
2001-02	3,139	3,426	3,248
2002-03	3,234	3,463	3,322
	Average annual growth rate (%)		
1998-2000 to 2001-03	0.7	1.3	1.0

1. Figures in Table 4.2, adjusted to constant 2002-03 prices using the GDP implicit price deflator (ABS CAT No. 5206.0, 1 September 2004, Table 53)

Clearly, care need to be taken in drawing conclusions from these data given the fluctuations in the figures, however some useful observations can still be made.

Firstly, the figure of 0.7 per cent can be compared with the recommendation of CPI+0.5 per cent made in October 1999 by the former Commonwealth statistician,

[92] Department of Veterans Affairs. 2004. *Submission to Productivity Commission Inquiry into National Competition Policy*. See http://www.pc.gov.au/inquiry/ncp/subs/sublist.html

Ian Castles, sitting as an independent arbiter of an appropriate hospital price index for the AHCA in a report jointly commissioned by the Australian and all state and territory health departments.

Secondly, the observed rates for public hospitals nationally correspond to the range of rates determined in the KPMG report on Victorian public hospitals previously discussed. The KPMG report put annual cost growth due to the impact of new technology at between 1.1 per cent and 2.8 per cent, representing the sum of changes in both utilisation and unit costs, after adjusting for population growth and age. These data suggest a national rate of 1.4 per cent, with half due to price and half due to utilisation.

There are several reasons why public hospitals will continue to face adverse cost trends, despite the rise in private health insurance levels since 1999.

- As referred to earlier, the fifth of the population at the poor end of the socioeconomic spectrum has morbidity levels around 30 per cent higher than the fifth at the top end. As a rule, poorer people tend not to be able to afford private health insurance cover, and so rely more on public hospitals.
- Despite a small increase in the number of people treated in private hospital emergency departments, public hospitals will continue to be the predominant providers of emergency treatment. Most people in urgent need get admitted swiftly through a public hospital emergency department, but once admitted many insured patients may expect to receive little net benefit from using their insurance cover, or wish to avoid out-of-pocket gap payments, and so elect to be treated as public patients. Given the likelihood that population ageing will see the need for emergency admissions rise faster than the need for elective admissions, then pressure on public hospitals will escalate, notwithstanding high private insurance coverage.

Growth in prostheses costs

Prosthetics are devices that are implanted (eg internal cardiac defibrillators, pacemakers, artificial hips, stents, and bionic ears) or attached (eg artificial limbs), and represent a rapidly growing area of hospital expenditure, particularly for private patients. In 2003-04 private health insurance funds provided $648 million in benefits ($796 per prosthetic), up from $257 million ($313 per prosthetic) in 1999-00[93].

Clearly such growth is unsustainable in the long run, and indeed the rate of growth eased somewhat in 2003-04, and is expected to be subject to better long run cost control as a result of recent reforms put in place by the Australian Government[94].

Nevertheless the data show that prostheses – many of which incorporate advanced technologies – could well explain some of the higher unit costs for private patients shown in Table 4.2. For example, the chairman of the National Heart Foundation's clinical issues committee said in 2003 that drug-coated coronary artery stents, which are much more expensive than bare-metal stents, were universally available to private patients[95]. For public patients in Victorian public hospitals, drug-coated stents are only available to patients that meet specified clinical criteria.

[93] Private Health Insurance Administration Council. 2004. See http://www.phiac.gov.au/statistics/index.htm

[94] Department of Health and Ageing. 2004. *New Prostheses Arrangements*. Private Health Insurance Circular 44/04. See http://www.health.gov.au/privatehealth/providers/circulars.htm

[95] quoted in Sydney Morning Herald. 13 October 2003. *New treatment may halve heart bypass surgery*.

The data available from the latest published annual National Hospital Cost Data Collection Report (2001-02), indicate that the prosthesis costs for the DRGs with most costly prostheses are around twice those used for the same DRGs in public hospitals (Table 4.4). However, while the NHDC report indicates that attribution of private hospital costs are reliable, it seems likely (although not discussed) that prostheses in public hospitals are being under-reported since prostheses for privately insured patients, which are paid for by the health funds, may not always be recorded in hospitals' accounts. Accordingly, Table 4.4 also presents data comparing the prosthesis costs reported in the NHDC with the prosthesis funding for same DRGs in 2004-05 (which is based on data from the 2002-03 Victorian public hospital cost survey).

The table shows that for the 18 DRGs represented, prosthesis costs in public hospitals reported in the NHDC would have been almost doubled ($250 million compared with $129 million) if private hospital prosthesis costs had applied. When allowance is made for the potential under-reporting of public hospital costs in the NHDC by using the actual Victorian hospital prosthesis funding, the margin is still a hefty 25 per cent ($250 million versus $202 million).

Table 4.4. Prostheses costs, DRGs with highest prostheses costs in 2001-02

DRG	prosthesis cost (or funding) per separation ($)			separations		public national volume x cost ($m)		
	national cost 2001-02[1]		Vic funding 2004-05[2]	national 2001-02[3]		at national		at Vic
	private hospitals	public hospitals	public hospitals	private hospitals	public hospitals	2001-02 private unit cost	2001-02 public unit cost	2004-05 public unit price
F01Z Implntn/Replcmnt Aicd, Ttl Sys	36,003	15,160	26,583	875	856	30.8	13.0	22.8
D01Z Cochlear Implant	28,098	14,541	25,000	159	213	6.0	3.1	5.3
I01Z Bil/Mlti Mjr Jt Pr Lwr Extrmty	15,599	8,805	8,860	1,219	381	5.9	3.4	3.4
I06Z Spinal Fusion + Deformity	13,709	5,702	14,500	149	277	3.8	1.6	4.0
F04A Crd Vlv Pr+Pmp-In Inve Pr+Cscc	11,703	3,899	3,584	1,322	1,938	22.7	7.6	6.9
I03A Hip Revision + Cscc	11,286	6,294	8,701	471	461	5.2	2.9	4.0
F04B Crd Vlv Pr+Pmp-In Inve Pr-Cscc	9,053	4,012	3,062	365	377	3.4	1.5	1.2
I05Z Oth Mjr Jnt Replace&Limb Reatt	8,395	3,250	3,918	1,345	770	6.5	2.5	3.0
F03Z Crdc Valv Pr+Pump+Inva Inve Pr	7,866	4,761	5,826	523	311	2.4	1.5	1.8
I04A Knee Replacemt & Reattach+Ccc	7,000	4,474	5,483	1,116	800	5.6	3.6	4.4
F12Z Cardiac Pacemaker Implantation	6,439	3,050	7,001	4,397	4,426	28.5	13.5	31.0
I09A Spinal Fusion + Cscc	6,151	3,201	5,052	583	415	2.6	1.3	2.1
I04B Knee Replacemt & Reattach-Ccc	6,136	3,880	5,483	15,267	7,803	47.9	30.3	42.8
I03B Hip Replac+Cscc/Hip Revsn-Cscc	6,022	3,072	4,700	3,652	4,880	29.4	15.0	22.9
I03C Hip Replacement - Cscc	5,498	3,350	4,700	10,458	6,573	36.1	22.0	30.9
F17Z Cardiac Pacemaker Replacement	5,290	2,234	7,004	1,138	1,489	7.9	3.3	10.4
I09B Spinal Fusion - Cscc	3,830	2,143	3,654	2,960	1,003	3.8	2.1	3.7
F07Z Other Cardthorac/Vasc Pr+Pump	1,609	1,258	1,780	236	945	1.5	1.2	1.7
Total cost						**250.0**	**129.3**	**202.3**

1. Department of Health and Ageing. 2003. *National Hospital Cost Data Collection, Cost Report Round 6, 2001-02*. See http://www.health.gov.au/casemix
2. Prosthesis allowance in 2004-05 WIES price, based on 2002-03 cost weights (Department of Human Services unpublished)
3. Australian Institute of Health and Welfare. 2004. *Australian Hospital Statistics, 2002-03,* Appendix 11

A full analysis of these differentials is beyond the scope of this submission and would require consideration of the possibility that the private sector is treating relatively healthier patients, where more expensive devices may be indicated as a result of their better health outlook, these factors are unlikely to explain the magnitude of the

cost difference. Part of the difference may also be due to a relaxing of price discipline since 2000 with health funds being obliged to reimburse the full cost of whatever listed device was used, plus a handling charge of up to 10 per cent[96]. While these arrangements have recently been tightened, a privately insured patient will still presumably expect, and get, access to the latest or more expensive prostheses more readily than a public patient.

Access to advanced medical equipment

If public hospitals are to remain the cornerstone of the Australian hospital system, and to continue to be able to attract (and train) the highly-qualified clinicians needed to operate in an increasingly technological environment, access to modern equipment is essential. However capital funding for public hospitals, including equipment, is subject to different constraints from recurrent (growth) funding.

For example, while the Australian Government is contributing around half of the recurrent Government funding of Australian public hospitals[97], it makes very little contribution to the cost of building public hospitals and purchasing medical equipment. Unlike private hospitals, public hospitals in Victoria are generally not permitted to borrow, but they are expected to make a substantial contribution to the funding of medical equipment from internal sources, including surpluses from commercial activities, sponsorships, bequests, and fund-raising.

Thus, in an environment where the acquisition of major equipment items can be governed more by budget constraints than by cost-benefit tests, simply replacing equipment at the end of its useful life, much less acquiring equipment incorporating the latest technological advances, is a challenge. Equipment budgets are also under pressure from a range of other reasons, including safety and quality.

A recent report by the Victorian Auditor-General drew attention to the age and condition of medical equipment in Victorian public hospitals. It found that, at August 2002, 20 per cent of major equipment items had passed their life expectancy benchmark and 16 per cent were rated as being in 'poor' or 'fair' condition[98].

The evidence thus suggests that equipment in public hospitals is likely to be older than would be expected in the private sector[99] and that private hospitals are in a better position to acquire the latest equipment.

The da Vinci surgical system (see Box below) is an example of a surgical process that has clear benefits for patients, although due to the cost of the equipment it may be slightly more costly than the same procedures performed using open surgery. If assumptions about more rapid technological uptake in private hospitals are correct, its penetration would be expected to occur more rapidly in the private sector than the public sector. At this stage it is installed in two Australian hospitals. Of these hospitals, one is private (Epworth), and the purchase of the system for Royal Adelaide hospital is wholly from a philanthropic source (Pickard Foundation). However, it is understood that several public hospitals, including Monash Medical Centre in Victoria, have indicated a desire to install a da Vinci system.

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[96] Department of Health and Ageing. 1999. *New arrangements for Schedule 5 of the Default Table – Surgically Implanted Prostheses and Homograft Items List*. Private Health Industry Circular HBF 589 / PH 345. See http://www.health.gov.au/privatehealth/providers/circulars.htm

[97] Australian Institute of Health and Welfare. 2004. *Health Expenditure Australia, 2002-03,* Appendix A

[98] Auditor-General. 2003. *Managing Medical Equipment in Public Hospitals*. Government of Victoria. See www.audit.vic.gov.au

[99] Although some aggregate figures are published on capital investment in both public and private hospitals, the differing ways medical equipment is financed, means that only an equipment audit would be able to reveal such differences.

The da Vinci™ system of robotic-assisted Surgery

Robotic-assisted surgery is a new way of performing minimally invasive surgery incorporating techniques that allow surgeons to operate through several small incisions. The major difference from normal laparoscopic surgery is the intuitive nature of the surgeon's hand movements compared with the counter-intuitive movements required with normal laparoscopic surgery i.e. the surgeon's hands move in the same way as they would in open surgery.

Benefits claimed by the manufacturer for the da Vinci™ system include[100]:

- Shorter hospital stays
- Reduced blood loss and transfusion rates
- Less risk of infection

Faster recovery and return to normal daily activities

- Less post-operative pain and discomfort
- Reduced pain and trauma to the body
- Less scarring

Apart from the price of the equipment, which is around $3 million, a disadvantage of robotic-assisted surgery is that it takes longer, which means that the patient is under anaesthesia for longer and nurses and other staff must work longer hours. However, these costs may be offset by reduced length of stay[101].

Worldwide, 243 da Vinci surgical systems are now reportedly in use, of which 171 are in the US, 51 are in Europe, and the rest are spread through the rest of the world[102], including 2 in Australia - Epworth in Melbourne (acquired in 2003) and Royal Adelaide (acquired in 2004). At Epworth and Royal Adelaide the equipment is initially to be used for prostate and cardiac surgery, although there is a wide range of procedures for which it may be used.

An overview of the system conducted under the auspices of the Australian Safety and Efficacy Register of New Interventional Procedures concluded that:

- Robotic surgery offers benefits over normal laparoscopic or open surgery;
- There is a significant learning curve and substantial costs involved both in the initial purchase (at least $3 million) and ongoing servicing and maintenance;
- Frequent hardware and software updates can be expected;
- Insufficient evidence is usefully compare robotic surgery with open or laparoscopic surgery in terms of safety or efficacy; and
- Those contemplating the purchase of a da Vinci surgical robotic system should consider whether sufficient procedures can be done to overcome the learning/volume effect and offset the start-up and fixed costs associated with the system.

[100] See www.intusurg.com/patients/index

[101] Epworth Hospital Melbourne. 2003. *Da Vinci Robot Surgery*, Media Release 11 December 2003. See epworth.org.au

[102] Washington Times*, Prostate surgery progress*, October 15, 2004. See www.washtimes.com

PART 5: ISSUES FOR THE PRODUCTIVITY COMMISSION TO CONSIDER

Valuation of benefits and costs

The valuation of costs and benefits in considering the adoption of new technology is far from straightforward, and is an area that would benefit from consideration by the Commission.

This submission suggests that the aggregate community benefit as a result of the increased medical expenditure over the past decade may be around double the amount that has been spent. This estimate is, of course, problematic, but as demand for publicly provided health services continues to rise, and as the technology frontier gets pushed further outwards, the issue of how to weigh up the benefits to health relative to costs and how to attain community consensus on the appropriate level of government funding for healthcare will become increasingly important.

A recently released report by AIHW includes a discussion of some of these issues, including a detailed consideration of the difficulty of ascribing weights to different states of disability in order to derive a summary health measure[103]. These issues are also considered in both the national and Victorian burden of disease reports. The burden of disease reports also discuss the issue of discounting in the determination of DALYs (and this also applies to QALYs). While there are sound economic arguments why discounting should be applied, the effect of this is to give less weight to changes in health states that endure for a long time (such as improved neonatal care, or public health interventions for children) compared to those that will only last a decade or so (such as cardiac stents in older patients).

Other considerations include how wide the scope of costs and benefits should be – should cost-effectiveness be evaluated only in terms of health service usage, or in terms of broader benefits that might accrue, and distributive equity – who should get treatment when resources are limited and rationing occurs – is an important issue since it has implications for how monetary figures may be derived. The balance between public and private (but publicly subsidised) care is important here also, as is argued elsewhere in this submission.

Introduction of a new technology-specific component in indexing public hospital funding via the Australian Health Care Agreement (AHCA)

The 1998-2003 AHCA included an annual 2.1 per cent growth factor (applied to 83 per cent of the base grant) to account for expenditure growth in excess of the age-weighted population. However due to a price indexation factor around 1 per cent below general price inflation, the allowance for technology driven cost growth was effectively only 0.7 per cent.

Under the current AHCA, the continuation of the same inadequate price index, in combination with an additional indexation allowance that is only 1.3 percentage points above the allowance for population growth and ageing, means an effective real growth of only 0.3 per cent.

The Commission should consider investigating what an appropriate allowance for technology growth in the health care grant would be.

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[103] Australian Institute of Health and Welfare. 2004. *National Report on Health Sector Performance Indicators 2003,* Appendix 5

Distinguishing innovations in treatment from other cost growth drivers

As the Commission's Issues paper acknowledges, medical technology is a broad yet ill-defined concept. In the popular mind it is clearly associated with headline-grabbing initiatives that relate to possible new treatments and devices. However, the introduction to this submission points out that many of the cost growth pressures relate to changing community standards of safety and quality, including medico-legal considerations. The effect of policies that encourage increased private health insurance is also discussed.

There are other factors as well. One of the principles of Medicare that underpin the Australian Health Care Agreements is that access to public hospital services 'is to be on the basis of clinical need and within a clinically appropriate period'. In some cases clinical need can be defined, as in the case of access to coated stents, or through criteria for classification on elective surgery waiting lists. However, 'clinical need' and 'clinically-appropriate period' are not fixed through time. Nor is clinical need the same as health or social need. A requirement based on a utilitarian approach – that given limited resources the treatment should go to the person with the most health to gain – could lead to quite a different outcome over the longer term, especially as the technology frontier advances.

The issue of these other important determinants of demand and cost growth rates certainly need consideration in this study.

A national funding scheme for advanced medical equipment

Access to advanced medical equipment arguably needs to be considered separately from the range of advanced pharmaceutical and devices since it generally spans many conditions and treatments, rather than a particular treatment or condition.

This submission has argued that the current approach to funding MRI services is inadequate, and that in other areas – such as advanced machines for laparoscopic surgery – we may see a widening gap between the private and public sectors.

The Commission may wish to consider whether a national medical equipment funding scheme may be an appropriate way of improving equity and efficiency in the provision of capital funding in the health sector.

Telehealth and telemedicine

Advances in telehealth and telemedicine have the capacity to dramatically reduce the cost disadvantages faced by Queensland and Western Australia in delivering health services to far-flung communities. Victoria has argued to the Commonwealth Grants Commission that developments in telehealth and telemedicine should significantly cut the cost disadvantage that these States face in providing accessible health care services[104].

However, the Commonwealth Grants Commission does not adequately allow for these developments in calculation of relativities. If the Productivity Commission is able to better quantify the expected cost-saving benefits of telehealth and telemedicine, then this should assist the Grants Commission to implement a more equitable distribution formula.

[104] Victorian Submission to Commonwealth Grants Commission 2004 review

Workforce implications

Effective adoption of advances in medical technology depends critically on a skilled, flexible and adaptable workforce. As has been occurring for a long period, the nature of the work undertaken by all segments of the health workforce will continue to evolve, but the pace of change is likely to accelerate. Intelligent point of care systems, new devices, computer-assisted decision making, rapidly evolving clinical pathways will call for new ways of working, and changes in the make-up of the health workforce.

Changes in (and uptake of) technology are also of considerable interest to workforce planners, as this has the potential to result in productivity gains and reduced workforce requirements in some areas of the health system but increased and/or different requirements in others.

The kinds of changes that will emerge make it necessary to ensure the existing workforce is supported to be able to change work practices and skills, as well as support the introduction of new kinds of health care professionals and health system technicians to make best use of both the technology.

These changes could be at a service specific level, apply to a particular occupational group or impact the overall composition of the workforce. For example:

- automated diagnostic systems may see a reduced need for some kinds of medical scientists, at the same time as increasing needs for others
- the widespread application of devices such as the 'da Vinci' robotic (assistive) device may alter the role of a surgeon, or affect the number of surgeons needed.

There is already a considerable national focus on health workforce needs through AHWOC, and through the establishment by AHMAC of the national nursing and nurse education taskforce, and these bodies may be able to inform analysis of this issue. This is an area that the Commission could investigate.

Preventive health

A potential concern is that the cost of meeting technology-driven demand increases – particularly in the private sector - will lead to a squeeze not just in public hospital services, but also in investments in what should be very cost-effective public health and primary care interventions.

In the case of diabetes, a recent Finnish study demonstrated that sustained changes in lifestyle can substantially reduce the development of type 2 diabetes in middle-aged adults at risk. The lifestyle intervention included better diet, increased physical activity, and modest weight loss. After only four years, the incidence of diabetes in the lifestyle intervention group had more than halved although the average weight loss was less than 5 per cent of body weight. The study confirms the potential effectiveness of public health programs to encourage healthy lifestyles, especially weight control and increased physical activity, in those individuals at high risk for diabetes. Given the rapid growth of obesity in Australia, accompanied by almost a doubling of diabetes incidence over the past decade – far outstripping 1995 projections - new public health strategies are needed. The Victorian Government is tackling this growing health problem, and this month launched a community-based pilot program that aims to more than halve expected cases[105].

[105] Bronwyn Pike, Minister for Health. 2004. *$2.5 Million Pilot to Cut Diabetes in Half*. Media Release 19 December, 2004. See www.dpc.vic.gov.au/pressrel

The recent awarding of a major NHMRC grant to look at the cost effectiveness of primary health intervention is to be welcomed[106], as is the development by the Australian Government of a national research program for *Preventive Healthcare* and *Strengthening Australia's Social and Economic Fabric*[107]. Also welcome is continuing work on preventative within the CSIRO that will develop new tests to identify disease in its earliest stages and begin treatment before it takes hold.

However, it also needs to be recognised that environmental factors - such as the dominance of television, computer games and the motor car in everyday life, and whether a person has a job or supportive social network - all play crucial roles in fostering or hindering the adoption of healthy lifestyles.

Establishing a national health technology research and development agenda

A national health technology research program should help reveal whether we have suboptimal levels of technology investment in various areas of the health system, including in public health and disease prevention, which are areas where the absence of specific consumer products may make commercial R&D less attractive.

Such a program could form part of developing a national program of research to address the priority goals of *Preventive Healthcare* and *Strengthening Australia's Social and Economic Fabric*, recently commenced by the NHMRC, in line with the Commonwealth Government's national research priorities.

This would need to take into account the national research agenda and programs such as the collaborative research infrastructure strategy being sponsored by the Australian Department of Education, Science and Training as well as similar initiatives in state jurisdictions.

Strengthening structures and processes for undertaking and utilising technology assessment

At the national level there are a range processes for evaluating the costs and benefits of introducing new health technologies. At the federal level, these include the Medical Services Advisory Committee, the Pharmaceutical Advisory Committee, the Australian Technical Advisory Group on Immunisation and the Prostheses and Devices Committee. HealthPACT has been established with one of its key roles to oversight horizon scanning.

At the Victorian level they include the Victorian Medicines Advisory Council and the Victorian Policy and Advisory Committee on Clinical Practice and Technology, and the range of local evaluation practices that occur at hospitals.

HTA in Australia primarily informs funding decisions for the pharmaceutical and medical benefits schemes. Australia is recognised as a leader in using HTA to inform funding decisions. This is a reactive approach as HTA is undertaken when someone wants funding. The use and effectiveness of the recently established horizon scanning process is yet to be realised.

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[106] NHMRC recently awarded $3.2 million to a consortium lead by a team at the University of Queensland for a project for Guiding intervention choices to reduce health costs, health inequalities, and improve the health of Australians: avoidable disease burden and cost-effectiveness of prevention.

[107] National Health and Medical Research Council. 2004. *Preventive Healthcare* and *Strengthening Australia's Social and Economic Fabric - Call for Stakeholder Submissions*. See www.health.gov.au/nhmrc

The gap in the Australian system is lack of a systematic process/agency to translate information from technology assessment into practice guidance. This is the work undertaken by the National Institute for Clinical Excellence in the United Kingdom.

Although there are potential risks as well as benefits for states in the adoption of a national approach to HTA paper, as set out in a paper presented to the Australian Health Think Tank[108], it is considered that development of a national approach clearly warrants examination.

This would not necessarily entail changing existing structures and processes. However, there is a need to ascertain how existing activities could be optimised and what additional activities need to be established. This process would need to align with the technology research and development agenda. A key underpinning principle should be the adoption of a strategic forward-looking approach compared to the more reactive approach that currently prevails.

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[108] Pearse, J. 2004. Financing Reform for the Australian Health System. See www.aushealthcare.com.au/publications