Queensland Government
Queensland Health

Queensland Health Submission

The Productivity Commission:
Review of the Impact of the advances in medical technology on healthcare expenditure in Australia

February 2005

1. INTRODUCTION

Queensland Health welcomes the opportunity to comment on the Commission's review of the impact of advances in medical technology on healthcare expenditure in Australia.

The introduction of any new technology, regardless of whether it is devices, pharmaceuticals, diagnostic equipment, surgical techniques, or, extends to include supporting infrastructure, such as clinical informatics systems, will invariably have direct and indirect costs and effects additional to that of the unit price of the item. Therefore, it is difficult to quantify these effects with any reliability.

2. IDENTIFY THE KEY DRIVERS OF MEDICAL TECHNOLOGY DEMAND

The demand for new medical technology is driven by a number of factors which can be considered broadly under five headings:

- Improving health outcomes
- Consumers
- Workforce
- Manufacturing
- Other

2.1 Improving health outcomes

2.1.1 Research

Researchers and clinicians are continually seeking new knowledge about disease and its management. Research continually generates new knowledge which informs policy and practice. The commercialisation of research findings result in new and or improved pharmaceuticals, medical devices and equipment which are primarily designed to make clinical practice more efficient and effective, improve health outcomes, and quality of life. The development phase of research findings incurs considerable costs and, understandably, developers seek to recoup such costs by incorporating them into the price of the product. As new products are adopted and generate a return on research and development and costs tend to fall and plateau. This is particularly so with pharmaceuticals where costs reduce considerably when patens elapse. However, where technology is applicable to a small number of patients, the single unit costs may always remain high. As researchers develop specific treatments for subsets of disease which affect smaller numbers of patients the probability of producing low cost technology diminishes.

Major advances have been made in human and animal genome research in the past decade, particularly under the umbrella of the Human Genome Project (HGP). The aim of the HGP has been to complete a full structural and functional analysis of the human and selected animal genomes. This process will provide the scientific information needed to drive the development of new and innovative therapies in medicine, agriculture, biogenomics and biopharmaceuticals in the coming decade.

2.1.2 Clinical Innovation

2.1.2.1 New Surgical Techniques

It is well recognised that there have been significant deceases in mortality from cardiovascular disease due to interventions such as coronary artery bypass grafts (CABG) and percutaneous transluminal coronary angioplasty (PTCA). These highly technical and high cost complex procedures rely on resource intensive and expensive infrastructure such as intensive care units staffed by an expert and skilled workforce. These surgical improvements have been coupled with pharmacological and biomechanical advances which enable clinicians to treat sicker and older patients. Traditionally, coronary artery bypass surgery is performed on a stationary heart which enables the surgeon to expose all major vessels in a bloodless operating environment. Surgery is lengthy and potential complications include myocardial infarction, coagulation disorders and post operative haemorrhage. Therefore, surgeons must balance the risks and benefits of surgery against that of medical management when considering eligibility for CABG. Significant advances have evolved to the extent that surgery can now be performed "off pump" with a beating heart. The emerging development of heart stabilising devices enables surgeons to complete surgery in a shorter time thus reducing the likelihood of complications associated with cardiopulmonary bypass. Such advances have meant that surgeons are able to operate on those who were previously considered too challenging to undergo surgery.

Minimally invasive surgery has evolved in an attempt to reduce surgical complications and improve recovery. Clinicians are becoming more experienced and confident with these techniques and it is becoming increasingly more common in a range of surgical interventions. It reduces length of stay and, coupled with the development of light sedation, has had a significant impact on the ability to increase day only procedure rates. Day only surgery has been steadily increasing and now accounts for 49% of surgical activity in Queensland Health facilities. However, while new technology reduces the cost per episode of care, the volume of patients eligible to undergo such procedures increases.

2.1.2.2 Medical Management & Diagnostics

Significant advances have occurred in oncology. Patients who were once considered ineligible for treatment are now being treated much more aggressively and offered combined modality therapy which may include surgery, radiation and chemotherapy. Oncology treatments are resource intensive and oncology drug therapies account for a significant proportion of the health care budget.

An improved range of diagnostic tools are available enabling earlier, more sensitive and specific diagnosis of disease. At a cost of $7million Queensland Health has purchased a Positron Emission Tomography scanner which will enhance diagnosis and enable more targeted medical interventions. However, this technology attracts significant recurrent costs and will create flow on costs associated with the treatment of the

Telehealth services have increased across the State with 300 sites having access to this technology. While this enables consumers to receive care locally reducing the need to travel to access specialist care significant technological infrastructure, specialist support and maintenance costs absorb the savings realised by the reduction in travel costs.

2.1.3 Health promotion

Human behaviour is a factor that influences health and disease. Health promotion aims to modify behaviour and improve health and reduce the incidence of disease. However, campaigns such as the faecal occult blood screening (FOB) initiative increase demand for colonoscopy services and surgical intervention. FOB screening is aimed at reducing mortality rates due to colorectal cancer and increasing life expectancy. Those who may have succumbed to colorectal cancer prior to this initiative and who now have greater chances of survival will in turn places greater demand on services used by the ageing population.

2.1.4 Pharmaceuticals

There have been significant breakthroughs in pharmalogical developments over the past few decades including:

- Calcium channel blockers, angiotensin converting enzyme (ACE) inhibitors and statins, for the treatment of coronary heart disease
- Fluoxetine (Prozac) for the treatment of mental health disease
- Nonsteroidal anti-inflammatory drugs for the treatment of musculoskeletal disease.

All of these medications have had a significant impact on longevity and quality of life.

Schedule 100 high cost drugs place significant demands on healthcare expenditure and absorbs the lions share of the pharmaceutical budget.

2.2 Consumers - expectations and population growth

The population of Queensland is expected to grow significantly. The Office of Economic and Statistical Research has predicted that Queensland's population will grow from 3.6 million in 2001 to 5.1million in 2026. However, in the short term an average annual increase of 77,000 or 2% is predicted and South East Queensland will continue to account for the majority of growth. As the population ages, the incidence of certain diseases rises including, cancers, degenerative musculoskeletal diseases and degenerative neurological disorders. Thus, population ageing will continue to place heavy demands on health services and support services.

Consumers have greater access to information than ever before and are better informed and more likely to take an active role in the planning of their care. Armed with information from the internet and media, consumers often have an expectation that new technology will be introduced into the public sector as soon as it becomes available. Consumers lobbying has been responsible for the introduction of technology especially where can be very forceful about lack of access to new technology and for its introduction locally, via the media or by approaching politicians and driving demand for the uptake of new technology.

2.3 Workforce

The uptake of new technology is influenced by the availability of qualified staff. Much new technology is complex and requires a specialised workforce to implement and maintain it. New technology has been an influencing factor in the development of a greater number of medical subspecialties.

Because of the complex nature of oncological disease, the treatment of cancer requires expertise and collaboration from a number of different health care professionals. These include surgeons, radiation oncologists, medical oncologists, haematological oncologists, palliative care specialists, oncology nurses, dieticians, psychologists and social workers. The type and stage of the cancer largely determine the role of the medical and haematological oncologist.

According to the AMWAC report Queensland is relatively poorly supplied with medical oncologists who work longer hours than their counterparts in other States. Queensland also has a maldistribution problem with most services located in the south-eastern corner of the State.

Similarly, the advent of endovascular devices such as coronary artery stents and neurocoils has generated a new surgical subspecialty, endovascular surgery. Therefore, as more practitioners gravitate to this subspecialty demand will grow.

2.4 Manufacturing and systems design

Efficiencies in service delivery can be gained by integration and automation such as PACS technology. However, significant outlays which may never be recouped from efficiencies are required to implement such systems. This is also the case in the field of pathology and scientific services. Queensland Health has invested heavily in pathology diagnostics expending over $20million over five years to introduce a new system to all Queensland Health facilities which replaces fifteen different systems. This system is also being made available to General Practitioners and Private Practitioners to reduce the need for repeat testing. There have been major advances in ability to do biochemistry and immunoassay on the same machine which saves time, requires only one sample and uses less consumables and less staff time to collect the sample. Clearly, efficiencies have been gained, however, the equipment is more complex and requires greater infrastructure, ongoing support and maintenance.

Australia only accounts for a small portion of the world market for drugs and medical technology. Largely, American and European needs influence manufacturing processes and Australian clinicians are forced to accept technology designed for that market. Advances in sensitivity and specificity of diagnostics which can detect abnormalities earlier and identify subsets of disease increase the volume of patients eligible for treatment.

It can take many years for technology to mature and in the early stages features may be added or removed. Innovative early adopters who purchase technology in its early stages

may be leaders in their field. However, as the technology matures they can also bear the cost of replacing outdated equipment long before it reaches the end of its originally projected life span. For example, PET scanners were originally marketed as a stand alone item, however, technology is emerging so fast that combined PET CT scanners are becoming the norm. It may no longer be cost effective to manufacture stand alone PET scanners and this will force health service managers to purchase more expensive equipment which they may not be able to utilise to its full extent.

2.5 Other

2.5.1 Insurance and litigation

Insurance and litigation costs may be considered as drivers of expenditure on new technology. Increased litigation claims and payouts, such as those that almost shattered the medical indemnity insurer United Medical Protection, increases the likelihood of clinicians practicing more defensive medicine. This has the potential to lead to over servicing and drive the demand for greater access to more specific and sensitive diagnostics.

The introduction of legislation, such as workplace health and safety and radiation safety, can impose regulatory conditions on jurisdictions which add to expenditure. Equipment labs for the preparation and reconstitution of cytotoxic drugs significantly add to the infrastructure costs of delivering treatment. The use of equipment labs further generates the demand for technology to support the use of cytotoxic drugs.

2.5.2 Clinical informatics

There has been a huge investment in clinical information systems which has been driven by:

- consumer and provider expectation fostered by the uptake of new technologies in other industries,
- rapid research in health and other technologies with correspondingly rapid obsolescence of existing technologies, and
- the lateness of the health sector in embracing new technologies.

As described below Queensland Health has invested heavily in clinical information systems.

For example, the introduction of new technology, such as Magnetic Resonance Imaging (MRI), which is expensive and limited to a small number of facilities, has a direct impact on healthcare expenditure on:

- physical resources - buildings, fixtures, fittings and installation
- the workforce - training and accreditation
- infrastructure - ongoing maintenance and consumables, information systems and technical support
- costs generated for non rebatable procedures
- patient travel costs

Indirect costs may include:

- costs associated with meeting regulatory standards and ongoing monitoring and or accreditation
- administrative costs associated with changes to service delivery and scheduling.

There will also be costs from the flow on effects associated with identifying and treating disease which may not have otherwise been identified.

Further, the cost for installation and start up of each MRI machine will vary depending on:

- geographical location and associated transport costs
- need to recruit appropriately trained staff
- complexity of construction required to house the equipment
- existing technical support capability within the facility.

Consequently, the impact of new medical technology on healthcare expenditure is difficult to determine and quantify.

Other complex radiological technology, such as the Picture Archiving and Communications System (PACS), which is a method of electronically storing and retrieving radiology images without hard copy film, has been introduced in some Queensland Health facilities at a start up cost of over $20 million. The system enables images to be electronically displayed immediately to multiple users. However, the system relies on sophisticated hardware and software requiring ongoing specialist 24 hour technical support and maintenance thus increasing the overall cost of radiological imaging.

3. NET IMPACT OF ADVANCES IN MEDICAL TECHNOLOGY ON HEALTHCARE EXPENDITURE

The Commission is seeking to identify the net impact of advances in medical technology on healthcare expenditure over the past ten years. However, while it may be possible to identify the cost per unit of a particular device, it is not possible to quantify the indirect costs associated with the implementation of new technology. However, spending on supplies, services and employment may be a useful indicator when balanced against activity rates.

Queensland Health expenditure on supplies and services has continued to rise over the last 5 years increasing by 31.5% from $700,521,000 in 2000 to $921,092,000 in 2004. During the same time employee expenditure rose by 29.6% from $2,134,180,000 to $2,765,978,000.

Between 2003 – 2004 expenditure on supplies and services increased by 8.5% ($7,2568,000) and employee expenditure increased by 6.4% ($166,702,000). However, inpatient activity only increased by 1.8% with no change in the average length of stay of

3 days. It is reasonable to suggest that a percentage of these increases can be attributed to the direct and indirect costs of new technology.

Other costs contributing to cost of new technology include:

- The impact of pharmaceutical costs on expenditure is estimated to rise by approximately 14% – 18%.
- Costs for pathology and scientific services are estimated to grow at approximately 5 – 7% per annum.
- Over the past 5 years, capital expenditure in the areas of *Clinical Enablement*; *Resource & Other Enablement*; and, *Infostructure* and *Infrastructure* have increased substantially from $16.4million in 2000 to $85 million in 2004 and is projected to increase to $99 million in 2006.
- Queensland Health has allocated $36million for replacement major capital equipment.

4. AREAS OF SIGNIFICANT POTENTIAL GROWTH

Clinicians will continue to revise and refine disease management with the assistance of new and improved diagnostics, drugs and devices. Some fields where we can expect potential growth include:

Imaging and Radiology

- Next generation computerised tomography and magnetic resonance scanning including portable equipment

Cardiovascular

- Heart disease prevention by improvements in Cholesterol lowering drugs and implantable pumps to assist heart function

Surgery including orthopaedics and neurosurgery

- Expansion of endoscopic and minimally invasive techniques
- Remote visualisation and robotics which enable surgeons to operate on geographically distant patients

Oncology

An AMWAC Working Party concluded that the following changes are likely to have an impact in the next 10 years:

- increasing use of adjuvant chemotherapy in certain women with Stage 1 breast cancer
- use of second line chemotherapy in colorectal cancer, which has recently been shown to increase survival
- use of chemotherapy in palliative treatment of metastatic non-small cell lung cancer, and also in the radical combined modality treatment of Stage III disease to improve cure rate
- second-line treatment of metastatic disease
- increasing use of combined modality therapy (chemotherapy with radiation, surgery or both) to improve the cure rate or survival

- use of combined chemotherapy and radiation in the treatment of bulky localised cancer of the cervix.

It is anticipated that in the next decade significant growth will occur in the fields of bimolecular and gene technologies. As stated above, human and animal genome research has progressed significantly in the past decade. A number of new and innovative health technologies are expected to be developed as a result. The possibilities of treating both single gene and multifactorial diseases have gained momentum due in part to the knowledge generated from genomic research but also to the advances made in information technology and biotechnology. The predicted therapeutic advances of genome research include:

- gene therapy;
- diagnostic and predictive tests;
- biopharmaceuticals and pharmagenomics and;
- vaccines

The predicted benefits of gene therapy will be in cancer treatment, selected infectious disease, some multifactorial diseases and common single gene disorders. First uses are most likely to emerge in:

- kill cancerous cells more effectively and selectively and to increase effectiveness of conventional cancer drugs
- prevent and treat cancers by boosting patients' immune systems to recognise and destroy tumour cells
- treat cardiovascular disease by generating new blood vessels and improving blood flow.

Current trends indicate that biotechnology is a growing industry that has yet to reach its full potential. The Queensland State Government commitment over 10 years of $270 million to the biotechnology industry is a clear indication of the Governments' high expectation that the industry will reap significant benefit. Rapid advances are occurring in the area of nanotechnology. This has been brought about by rapidly expanding biological knowledge at the molecular level coupled with simultaneous advances in molecular engineering. It can be expected that over the next 10 years nanotechnology based biomedical systems will begin to emerge that enable rapid real time screening and can determine individual molecular therapies. The potential effects on health care delivery are yet to emerge but it can be expected that delivery systems will change and this will have an impact on the workforce as different skill sets will be required.

Systematic investments in building clinical informatics skills in the health workforce are in their infancy. A recent US survey identified electronic health records, point-of-care technology and wireless computing as having the greatest potential to maximizing clinical efficiency. However, there is a need to build the capacity in the health informatics workforce to meet these challenging developments.

5 MECHANISMS AND PROCESSES FOR ENSURING COST-EFFECTIVENESS IN THE USE OF MEDICAL TECHNOLOGY.

Queensland Health has introduced a number of initiatives to improve cost effectiveness in the use of technology, several of which are listed below.

Queensland Health supported twenty-three quality and safety programs from 2000 onwards under the Quality Improvement and Enhancement Program and continues to build on best practice and efficiencies gained through these programs. One such program, the Clinical Collaborative for Healthcare Improvement, will be progressed as the Clinical Improvement Centre, which aims to identify and implement strategies to address inefficiencies and problems associated with standardisation of clinical practice, the use of evidence based best practice and improvements in service delivery. These proposed practice improvements will built on the work of international agencies, such as the NHS Modernisation Agency in the UK, who have demonstrated successful and sustainable service improvement. More specifically, by analysis of routinely collected data, the Centre intends to identify procedures and diagnostic related groups where significant variances in clinical outcomes and resource usage exist and to implement evidence based strategies to reduce the variances. The implementation of these strategies will be supported by clinical leaders with expertise in change management and by the application of evidence based guidelines. Approximately $5 million has been allocated to progress this initiative.

In an attempt to standardise orthopaedic practices across the State, Queensland Health has undertaken a prosthetic audit to determine the range of prostheses available and to limit to five the number of different prosthesis. This initiative will standardise practice and enable Queensland Health to negotiate bulk buying contracts and reduce unit price.

The Queensland Hospitals Drug Advisory Committee (QHDAC)monitors drug usage and initiates strategies to correct over usage. QHDAC also determines which drugs are made available on the Standard Drug List and imposes conditions on the prescription and supply of high costs drugs.

Queensland Health has a dedicated Health Technology Assessment Team of two officers who assess new and emerging medical technology to inform purchasing and utilisation decisions. Assessments are carried out in accordance with international standards developed by such agencies as the Canadian Coordinating Office of Health Technology Assessment and other HTA agencies. The impact on decision making gained from the expertise of this team is evidenced by the management of the introduction of drug eluting stents into the public health system as described below.

Bare metal coronary artery stents have proved to be an effective device for revascularisation of the coronary arteries. However, advances in technology have seen the development of the more expensive drug eluting coronary artery stent. Evidence does not indicate that all patients will benefit from the application of drug eluting stents and

that the same health outcomes can be achieved for many patients with bare metal stents. To ensure controlled and effective use of this technology, the Health Technology Assessment Team in collaboration with expert clinicians developed clinical protocols to identify the appropriate patient group to benefit from this technology. Similarly, clinical protocols are being developed for the application of other cardiac procedures as well as neurocoils, which are used in the treatment of cerebral aneurysms and subarachnoid haemorrhage.

The Chief Health Officer and the Team Leader, Health Technology Assessment Team also participate in the national Health Policy Advisory Committee on Technology (HealthPACT) which undertakes horizon activity. This information is disseminated throughout Queensland Health via a quarterly bulletin produced by the Health Technology Assessment Team.

A capital equipment disposal and replacement program has been introduced so that capital equipment over $5,000 is replaced in a controlled manner. Capital Works and Asset Management Branch maintain an electronic history and service record of all capital equipment which enables relocation of equipment as it is replaced. For example, where service demands the implementation of more complex technology older equipment can be transferred to facilities that do not require complex new models or alternatively it can be sold to an external buyer.

Pathology and Scientific Services have initiated the Retest Project. Processes has been activated that alert technicians when a duplicate test for an individual patient has been ordered. This initiative enables intervention so that duplicating tests can be prevented.

At a start up cost of over $7million, Queensland Health has established the Skills Development Centre which is a state of the art facility that all Queensland Health staff are able to access. It provides virtual training so that staff can gain proficiency in techniques and maintain professional standards before treating patients. It also enables standardised training which will encourage standardises approaches to care delivery and technology application

There is a range of issues regarding the capacity of the health and IM/ICT workforces to support advances in clinical information systems. The number of clinicians who use these systems can be expected to grow dramatically as the hardware and software become more user-friendly. However, this in turn will require increased investment in the abilities of the health workforce to access, analyse, interpret and apply more sophisticated information, to transform information into knowledge and to diffuse the application of knowledge throughout the health sector.

It has been recognised at a National level that there are significant opportunities to improve productivity and effectiveness of investment of clinical information systems. Efficiencies can be realised by putting the building blocks in place through a

collaborative work program rather than each jurisdiction continuing down a similar path alone.

The National E-Health Transition Authority (NEHTA) has recently been established to oversee a 12 month work program to develop a range of building blocks to support the improved flow and management of health information both within and across jurisdictions. The $9.5M work program has been funded collaboratively by the Commonwealth Government, States and Territories.

The building blocks include clinical data standards, clinical terminologies, patient / provider / product identification standards, National Provider Index, National Health Identifier, technical integration standards, supply chain procurement benefits, secure messaging standards.

It is anticipated that early in 2005, Health Ministers will endorse establishment of a National Health IM&ICT Entity for 3 years to continue the work initiated by the interim NEHTA arrangement. Base funding for three years is estimated at $21.1M with a further $91.2M estimated for funding the various projects.

These projects will contribute significantly to implementation of the National Health*Connect* initiative, to establish a health information network of event summaries. NEHTA and Health*Connect* (along with others such as Medi*Connect*) have all evolved from the *National Health Online*[1] *Action Plan* published in July 1999. The Health Online initiative sponsored a number of task forces to investigate opportunities for national collaboration.

While the National collaborative approach is intended to reduce investment overall by putting "infostructure" in place for use by all jurisdictions, the actual cost savings or productivity benefits at a State or National level cannot be quantified at this stage.

6. REDUCED COSTS RESULTING FROM ADVANCES IN MEDICAL TECHNOLOGY

Reductions in costs due to advances in medical technology are most obvious where disease is prevented as a result of public health campaigns and immunisation. Minimally invasive surgery has the potential to reduce costs due to reduced lengths of hospital stay. However, the reduction in costs per episode of care must be balanced against the increased volume of patients that can be treated.

Advances in blood and chemical analysing technology have enabled the production of less expensive point of care testing. However, due to the portability and ease of use the technology has diffused quickly and the volume of users has dramatically increased.

Certainly, reductions in expenditure per episode of care have been achieved as a direct result of advances in medical technology. However, systems, infrastructure, staff training, and increased activity have absorbed these reductions.

6. OVERALL IMPACT ON ECONOMIC, SOCIAL AND HEALTH OUTCOMES

Life expectancy has continued to rise and is generally considered to be a good indicator of population health. Advances in medical technology have played a very important role in decreasing mortality rates and improving health outcomes. Improved health outcomes enabling patients to return to work and continue to make a contribution to the economy are evident across the health care spectrum. Significant social and economic benefits are clearly evident by the early detection and treatment of disease, reduced length of hospital stay and speedy recovery which enable patients to have less time off work for treatment of disease. The ability to treat previously debilitating medical conditions, that would have otherwise forced people into early retirement, has significant social and economic benefits that reduce reliance on social welfare. Organ transplant is an obvious example of such benefits. Additionally, advances in technology to treat less complex medical conditions, such as sleep apnoea, have also improved health outcomes and have a positive impact on the social and economic wellbeing of individuals.

On the other hand, however, advances in medical technology which enable clinicians to treat more complex conditions in older people, have contributed to increases in the volume of older, frail and infirm people requiring higher levels of support and care.