Medical Technology Association of Australia

A telehealth strategy for Australia: supporting patients in the community

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MEDICAL TECHNOLOGY FOR A HEALTHIER AUSTRALIA

1. Executive summary

Over the next decade, as much as 50% of health care will shift from the hospital and clinic to the home and community. New technologies will drive in-home care, at-workplace care and in-car care – thereby improving prevention, detection, behaviour change and caregiver support.

A wide range of personal health technologies are coming into their own – something we refer to as the consumerization of medical devices and the medicalization of consumer devices.[1]

With the approaching tsunami of ageing people and people within our population with chronic diseases we need to find smarter ways to manage the health needs of Australians without the cost burden of care in hospitals or nursing facilities where that cost can be avoided. In response to the looming demand for care we see the rapid adaptation of existing medical devices, and development of new applications, that can respond to this demand. The time is right for Australia to develop policies to integrate these technologies to manage the changing cost in care delivery in a structured, innovative way.

2. About the Medical Technology Association of Australia

The Medical Technology Association of Australia (MTAA) represents the manufacturers, exporters, and suppliers of medical technology products in Australia. The medical technology industry manufactures a range of devices that can be used to monitor patients in their homes including implantable cardiac defibrillators, pacemakers, heart rate and other vital signs monitors, enuresis sensors, personal alarms and alerts, home units for measuring temperature, heart rate, blood pressure, glucose and oxygen levels and objective symptoms.

Many of the devices that can be used to monitor a patient in the home are enabled to transmit data about the patient to a monitoring site remote from the patient. Remote monitoring can be used to ensure that a patient's vital signs are in order, that the patient is complying with an agreed health plan, and that there are no adverse events which require intervention by a healthcare provider.

3. Background

A large proportion of health expenditure in Australia is spent on chronic disease management in the hospital setting. Australia has an ageing population and is facing an increase in the demand for hospital and aged care services(1), nurses(2) and doctors(3). There is a wide range of medical devices that have wireless capabilities and can be used to monitor patients in their homes. The conditions most suitable for home monitoring include many of those which are more prevalent with age, such as diabetes, cardiovascular disease, cardiac arrhythmias and chronic obstructive pulmonary disease (COPD).

[1] Eric Dishman, "The personal health technology revolution", in Ernst & Young, *The third place: health care everywhere*. Global Life Sciences Report 2012, at page 19

Telehealth is the delivery of medical services through information technology and telecommunications. It is an overarching definition that includes remote patient monitoring. Remote patient monitoring (or telemonitoring) covers the exchange of medical data between a patient who is at home and a healthcare professional based (usually) in a medical centre. Patient data are transferred using phone lines or wireless technology[2]. In some cases devices may have a diagnostic (e.g. an implantable loop recorder) or assessment (e.g. incontinence sensors) application or monitor symptoms associated with an undiagnosed condition (e.g. atrial fibrillation). A number of surgically implanted devices can be monitored remotely for clinical or device assessment (e.g. pacemakers and cardiac defibrillators). Vital signs monitoring uses equipment and medical devices installed in the patient's home to identify trends and send alerts when necessary in order to detect symptom exacerbations, intervene early and reduce hospital admissions.

Remote monitoring of physiological parameters enhances follow-up discussion between a patient and a clinician, alerts patients and providers of changes/deterioration in health and facilitates patient self-management of chronic disease. The clinical conditions that are most commonly managed using vital signs monitoring of physiological data include asthma, diabetes, COPD, heart failure, mental health and wound care(4). Vital signs monitoring (remote monitoring) allows patients to self-administer medication (e.g. insulin in the case of diabetes) and adjust medication dose (e.g. anti-hypertensive medication in the case of high blood pressure). Remote monitoring of vital signs is particularly well-suited to Australia which has approximately one-third of the population living in rural and remote areas(1).

4. Devices used for vital signs monitoring

There are a number of medical devices that can be used to monitor vital signs. The following table includes just a few of the most commonly used monitoring devices.

Device	Function
Alarms/alerts	Alarms, sensors, alerts and medical pendants to monitor falls and other medical emergencies
Pulse oximeter	Medical device which provides an indirect measurement of the oxygen saturation of a patient's blood. Used to assess individuals with unstable oxygenation
Sphygmomanometer	Medical device which measures blood pressure and consists of an inflatable cuff and measuring unit. Used to diagnose and treat hypertension
Peak flow meter	Measures maximum speed of expiration with a small, hand-held device used to monitor a person's ability to breathe out air. Used to monitor obstructive lung disorders such as asthma
Continuous glucose monitoring	Determines glucose levels in insulin dependent diabetics on a continuous basis. The system consists of a glucose sensor placed under the skin, a link to a sensor and a receiver which

2 Definition adapted from the European Coordination Committee of the Radiological, Electromedical and Healthcare IT industry (COCIR).

	displays glucose levels
Drug delivery/infusion pump	A drug infusion pump with software programmed to alert the user to unsafe dose limits and programming errors according to standard concentrations and dose limits programmed into the pump library. Used for medication management in the home
Smart incontinence management system	Remote monitoring of continence events using a sensor in a disposable continence aid. Data are processed using an algorithm which enables staff to develop a personalised care plan
Heart rate monitor	Personal monitoring device which allows a person to measure their heart rate in real time or record for later study. Heart rate variability and breathing rate may also be measured. Used to assess a range of chronic conditions
Spirometer	Medical device for measuring the volume of air inspired and expired by the lungs. Used to assess and monitor pulmonary function
Electrocardiogram (ECG)	Diagnostic and assessment tool that measures and records the electrical activity of the heart in detail using electrodes attached to the skin. Used to assess and monitor a range of cardiac conditions
Home haemodialysis monitor	Monitoring systems for patients with kidney disease undergoing home haemodialysis

5. Clinical benefits associated with remote patient monitoring

Older Australians and those with chronic disease wish to remain in their homes for as long as possible with the support of medical technologies that can delay or stop the transition into hospital or residential care. Intervention in earlier stages in the trajectory of chronic disease may delay nursing home entry(5) and there are a number of predictable factors that lead to individuals being placed in residential care, the impact of which could be lessened if reimbursement for home monitoring were available.

There are many clinical benefits associated with remote patient monitoring, examples include:

- An increase in mean survival time in a sample of 387 diabetic patients who undertook daily monitoring of vital signs(6)
- Significant improvement in glycemic control in diabetic patients who transmitted blood glucose and blood pressure data to a telehealth nurse(7)
- A 71% reduction in Emergency Room (ER) admissions in respiratory patients who had oxygen saturation measured by pulse oximetry and monitored daily(8)
- A reduction in the number of hospital readmissions in patients with angina(9)
- Significant improvements in health related quality of life and a decrease in mortality in COPD patients using home monitoring(10)

- A 25% reduction in numbers of bed days of care and a 19% reduction in hospital admissions in 17,025 veterans with chronic disease who were enrolled in a home telehealth program(11)
- A telehealth program run by Silver Chair in Western Australia has reported a decrease in the number of COPD related ER admissions by almost 50%(12)
- A 43% reduction in hospitalizations and a 68% reduction in bed days of care in cardiac patients who transmitted daily ECG and blood pressure data(13)
- Reduced office visits and earlier detection of clinical anomalies such atrial arrhythmias in patients with implantable cardiac devices who were monitored remotely using automated, wireless technology(14)
- Faster detection of clinically actionable events in patients with cardiac pacemakers(15)
- A significant decrease (45%) in the need for in-patient hospital evaluation in 1,339 patients with implanted cardiac defibrillators who were remotely monitored(16)
- Reduced time to clinical decision in a large group (*n*=2,000) of patients with implantable cardiac devices who were monitored using wireless telemetry devices and alerts(15)
- Detection of a far greater number of clinical or device related events than during scheduled office visits in patients with implantable cardiac devices(16)
- Earlier detection of clinically relevant events, most of which occurred within a month of follow-up in patients with implantable cardiac devices(17)
- A 50% reduction in the risk of heart failure related readmission and 55% reduction in cardiovascular mortality in chronic heart failure patients monitored at home(18)
- A 50% reduction in mortality in a large sample (*n*=69,556) of patients with implantable cardiac devices, including cardiac defibrillators(19).

6. Cost savings associated with remote monitoring of vital signs

Rojas and Gagnon (2008) performed a comprehensive literature review on the cost effectiveness of telehealth. There were 23 studies that met the inclusion criteria and included both tele-consulting and vital signs monitoring(20). The study found strong evidence for the effectiveness of telehealth. The strongest evidence was reported for reduced travel (time and distance), increased patient productivity and reduction in total costs (see below).

Table 2: Indicators for effectiveness of vital signs monitoring.

Expected effectiveness indicator	**Studies supporting (%)**	**Total studies**
Health effectiveness		
Reduced emergency room visits	89%	9
Reduced hospitalisations	89%	9
Reduced readmissions	100%	3
Reduced length of hospitalisation	88%	8
Increase or no change in quality of life	100%	8
Cost savings		
Reduced outpatient visits	78%	9

Reduced home visits	50%	12
Reduced travel time (professionals)	78%	9
Reduced travel time (patients)	100%	1
Reduced distance travelled (professionals)	100%	5

Seto et al. (2008) assessed the cost effectiveness of vital signs monitoring for patients with heart failure. The authors reviewed the literature and included only articles that included home physiological measurements of vital signs and an economic analysis. All studies reported that monitoring was more cost effective than usual care. Cost savings ranged from 1.6% to 68.3%.

7. Funding considerations

There are two cost considerations. The first is the cost of the service (education, care provision, data transmission and monitoring). MTAA proposes flexible MBS telehealth item numbers that consider telemonitoring or remote consultations in the same way as a traditional face-to-face consult (see below).

Health professionals are not currently reimbursed to monitor and assess vital signs data transmitted from the patient's home. Medicare funding is available for routine, in-clinic monitoring of patients with chronic disease. Currently vital signs data can be assessed in the following ways:

- The patient may review it themselves (no reimbursement)
- The patient may share the report as part of a regular face-to-face consult
- The patient can share the report with their health care providers and the consultation with the multi-disciplinary team can take place as part of Case Conferencing, often by teleconference
- Remote data may be viewed as part of a videoconference consultation and reimbursed using MBS item numbers for telehealth.

The second is the cost of medical consumables or devices (including hardware, software and medical devices). Some items could be provided with home care packages. In some cases, an item may be listed on the Prostheses List and so be available to privately-insured patients (e.g. implantable cardiac devices, glucose monitoring devices). It is possible that components such as monitors and some peripheral devices (e.g. scales, blood pressure monitors) could be rented (whether from Local Hospital Networks, Medicare Locals, or companies) and remain the property of the supplier. Many devices will be relatively inexpensive (e.g. vital signs monitors). In any case, a patient co-payment could apply, based on capacity to pay.

8. Funding using MBS item numbers

MBS item numbers for telehealth were introduced in July 2011, with $620 million worth of funding being allocated for telehealth services over four years. Currently the definition of telehealth is restricted to videoconference consultations and reimbursement is only made in cases where there is an audiovisual link between the patient and practitioner.

Reimbursement for reviewing medical data collected remotely could be covered using MBS telehealth item numbers. Remote monitoring devices vary and in some cases a nurse, GP or allied health professional may be able to assess data, but in the case of implantable cardiac devices a specialist would need to review data. For this reason MBS item numbers need to be flexible enough to cover data monitoring by a range of health professionals (MTAA is not recommending that item numbers be extended to professionals who do not already have an MBS provider number). Reimbursement of health professionals should be aligned with current payment for traditional face-to-face consults and follow the same sets of principles outlined in the MBS. Healthcare providers will support new patient care models involving remote monitoring as long as the reimbursement covers their costs for providing the service.

Three options could be considered to achieve these outcomes:

1. MBS item numbers based on existing items could include a loading for remote monitoring
2. Capitated costing model
3. Improved capitated model (flat fee per quarter).

Option 1, whilst simple, may result in over-servicing of patients because a healthcare provider might add the monitoring cost to the traditional face-to-face consultation. Capitated models, on the other hand, ensure there is no over servicing as physicians are paid for a service regardless of the number of data transmissions or reviews.

Option 2, the capitated costing model, is budget neutral proposing an annual fee based on current utilisation. Calculations for an annual fee could be made based on the number of online consultations expected per year (the annual fee could also cover in-office visits with the healthcare provider determining if a face-to-face consultation is needed).

Option 3, improves on option 2 by using MBS item numbers to track the extent of remote monitoring as well as unscheduled in-office checks that may occur for remotely monitored patients.

9. Funding as part of Home Care Packages

Patients who wish to remain in the community and be monitored with appropriate medical technology are not funded to do so. Rather there is a perverse incentive for patients to enter residential care in order to receive accommodation and care subsidies. The majority of aged care in Australia is community based and elderly people receive aged care services in their homes or in aged-care accommodation.

Under the Aged Care Reform plan[3] *Living longer living better* announced by the Federal Government in April 2012, $3.7 billion will be provided over the next five years to deliver more choice, easier access and better care for older Australians and their families. The government will spend $955.4 million to help people to stay at home through an integrated

[3] http://www.health.gov.au/internet/publications/publishing.nsf/Content/ageing-aged-care-reform-measures-toc~ageing-aged-care-reform-measures-chapter1-htm

Home Support program, more Home Care Support packages with new levels of packages, greater choice through Consumer Direct Care available across all new Home Care packages and fairer means-testing arrangements for Home Care packages.

Over the next five years the government is significantly expending the number and level of Home Care packages from 59,876 to 99,669. The Department of Health and Ageing will work with community service providers to develop a new Commonwealth Home Support program which will be more streamlined and will allow better coordination of appropriate and timely care of Australians in their own home. The new program will consolidate the existing programs with the Commonwealth Home and Community Care (HACC) program.

The government will continue to be the major funder of home care packages. Currently the government pays around 84 per cent of total costs but with proposed means testing arrangements the Government can reduce share to around 76 per cent. Under the new means-testing arrangements for Home Care packages a consistent income test will be introduced to establish fairness in the payment system. Individual's care fee will depend upon assessable income.

Over five years $80.2 million will be provided to enable better links between aged care and health systems. A further $58.5 million will be available for projects with a focus on prevention of hospitalisation and improvements of multidisciplinary care models for older Australians. Projects such as better evidence-based practice across the Home Care, innovations in service delivery and integrated care models will be targeted. This includes telehealth trials and the removal of barriers to accessing primary care for people in rural and remote areas.

MTAA strongly urges inclusion of appropriate telehealth technologies as an element in the government's strategies to better support Australians to remain in their homes, and to prevent avoidable hospitalisation.

10. Cost Savings

Remote patient monitoring can achieve considerable cost savings in a number of areas:

- **Reducing visits to specialists:** in-hospital follow-up visits of patients with pacemakers or implantable cardiac devices, typically take 15 minutes for each patient, twice a year. These can be safely replaced with remote follow-ups which take 1-2 minutes(16).
- **Avoiding symptom exacerbations that lead to hospitalizations:** remote monitoring can be used to detect dangerous trends such as weight gain due to fluid retention or lung dysfunction in cardiac and COPD patients.
- **Reducing potentially preventable hospitalizations (PPHs):** 8.1% of all hospitalizations in Australia are PPHs, which are often associated with chronic ailments, which could be prevented or managed through effective, timely care (usually non-hospital).

- **Reducing age related PPHs:** increasing age is a predictor of PPHs(21). Significant cost savings can be achieved if elderly patients are able to be monitored at home.
- **Reducing emergency room visits:** category 5 patients are considered non-urgent and usually have minor illnesses or stable chronic conditions such as diabetes with relatively minor complicating symptoms. In 2009-10 they accounted for 13% of ER presentations(22). Of 5.2 million presentations during this time period, 674,481 (13%) people may have avoided admission had they been targeted using home monitoring.
- **Reducing nursing home admissions:** remote monitoring has been found to reduce nursing home admissions by 7.7%(23). The hazard of nursing home placement increases significantly with age, incontinence, impaired peak expiratory flow, heart disease and physical disability(24). These factors are all amenable to home monitoring interventions.
- **Keeping low-care residential patients in their homes:** dependency levels for residential aged care are determined by the Resident Classification Scale which determines subsidy levels. In 2012, approximately 80% of residents were in high-care categories and 20% in low-care categories, the latter of whom would most likely benefit from appropriate home monitoring.
- **Decreasing the burden on health care professionals:** remote patient monitoring increases staff efficiency(25) and decreases home visits and travel time(26). When technology can take over routine monitoring, staff can spend more time on direct patient care.
- **Reducing patient transport costs:** remote monitoring can reduce the use of patient transport services. These services (largely made up of ambulance services) had the second highest percentage growth in expenditure in Australia in 2008–09(27).
- **Reduced hospitalizations:** a 7% reduction in hospitalization was reported in a meta-analysis of remote monitoring of heart failure patients that included a total of 8,612 patients(28).

Cost savings will vary depending on the technology selected and the patient group. A recent report, Smart Technology for Healthy Longevity, by the Australian Academy of Technological Sciences and Engineering (ATSE) covers the need for 'ageing-in-place' policies and outlines the potential for smart technology to deliver substantial cost savings in Australia. The report estimates potential costs savings to the Australian Government of up to $526m per year(29). This was based on the assumption that 10% of individuals currently in residential care (at a cost of $36,100 per annum) could be maintained in their homes on community care packages (at a cost of $2,600 per year for CACP clients). The review does not take into account the costs of peripheral devices and monitoring, or any cost savings associated with reduced ER visits, doctor visits or hospitalizations. MTAA has outlined cost savings to the Commonwealth Government of $3.4 billion (see Attachment A). Reduced need for residential care and residential care packages, reduced costs of ER admissions, potentially preventable hospitalizations, Flying Doctor services in rural areas, patient transport, travel and unnecessary tests and a reduction in the costs associated with associated with chronic disease management. This fits with estimates by Access Economics(30) of cost savings of $2-4 billion per year.

11. International Comparisons

One of the major barriers to the wide spread adoption of remote patient monitoring in Australia is lack of reimbursement. The United States has overcome this barrier and remote monitoring has been approved by the Centers for Medicare and Medicaid (CMS) for reimbursement. Most telemedicine providers bill as usual and do not use modifiers or specialized CPT codes. In the US, home monitoring has been adopted by a number of health insurance providers. In a trial using at-home blood pressure monitors and automated web-based reporting tools, Kaiser Permanente found that patients using home monitoring were 58% more likely to have their blood pressure controlled to healthy levels compared to those receiving usual care(1). A recent analysis of 37 clinical trials (including 9,446 individuals) found that those using home blood pressure monitors were able to decrease their blood pressure and were twice as likely to reduce the numbers of medications needed to treat their blood pressure. Those patients whose data were automatically sent to a doctor's office had the best outcomes(31). It has been these types of results that have led to an increase in the number of health insurers who cover remote patient monitoring.

A large scale trial by the Veterans Health Administration in the United States, the National Care Co-ordination/Home Telehealth Program (CCHT), found that remote monitoring reduces hospitalisations and bed days of care. CCHT costs $1,600 per patient per annum compared with the direct cost of VHA's home-based primary care services ($13,121 per annum) and nursing home care rates ($77,745 per annum).

12. Conclusion

The aim of community care is to aid elderly people and those with disabilities and chronic illnesses to remain either in their own homes or in assisted living arrangements. When care needs can not be met in the community, individuals are transitioned to residential care settings.

MTAA argues that in many cases care needs can be met in the community and strongly supports the establishment of schemes that enable equitable patient access to medical products and technologies. The provision of appropriate home monitoring will decrease ER visits, decrease unnecessary hospitalisations, avoid inappropriate transition to residential care and achieve cost savings through maintaining people in their own homes.

MTAA strongly argues that the provision of care that enables individuals to be treated in the home environment is far more cost effective than *all* other alternatives. A range of technologies exist to assist and support patients who wish to remain in their own homes. The challenge currently faced is determining how to best fund a range of assistive technologies and devices for independent living and home monitoring of medical conditions that will maintain the independence of older Australians. In the future, the provision of home healthcare is likely to be the only economically viable option.

MTAA proposes that appropriate policies for the integration of remote monitoring be introduced into the health system, using funding models that are cost effective based on current evidence, supplemented by additional pilot programs where needed.

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Appendix A. Home Care Potential Cost Savings

Area of cost saving	Assumption	Cost saving
Residential Care	10% of current residential population (*n*=18,300) could be supported in the community on a HACC package ($2,258) versus residential care ($38,830)(29) (1)	**$669,267,600**
Community care packages	HACC assists 930,087 clients per year at a cost per year of $2,258 p.p. (sum $2.1 b)(32), CACP assists 46,126 clients each year at a cost of $11,527 p.p. (sum $531.7 m), EACH and EACH-D packages assist 5,584 and 2,583 people(33) per year at a cost of $112 per day p.p. ($333.8 m). Assume 5% of ($2.9 b) no longer need packages (2)	**$148,275,000**
Emergency room admissions	Category 5 patients are non-urgent with minor illnesses or stable chronic conditions with complicating symptoms and account for 13% of ER presentations(22). In 2009-10 674,481 (13%) admissions may have been avoided with appropriate medical home care/monitoring. The average cost for a visit to an ER is $396(34). Assume 20% of patients can avoid an ER visit (at a cost of $267 m) (3)	**$53,418,895**
Potentially preventable hospitalizations (PPHs)	The average cost of an admission to a public hospital in 2009-10 was $4,133 (4); PPHs represent 8.1% of separations(35). A total of 371,126 separations were for chronic conditions such as COPD, congestive heart failure and diabetes complications (cost $1.5 b). Assume 20% of patients can avoid a PPH (5)	**$306,772,752**
Flying Doctors services in rural areas	In 2009-10 the RFDS undertook 38,852 aeromedical evacuations(36) at an approximate cost of $5,500 per evacuation (total cost = $213 m). Assume 20% of evacuations can be avoided (6)	**$42,737,200**
High level residential care	In 2010 there were 182,850 individuals who were permanent residents in rest homes at a cost of $38,830 per person(37) (total cost $7.1 b). 21% of residents were low care(33) (i.e. the per cent you would hope to target with home monitoring interventions). Assume that 20% could remain in the community (7)	**$298,202,751**
Chronic disease management	2009-10 health expenditure in Australia was $121.4 billion. In Australia more than two thirds of all health expenditure is associated with chronic disease management(38) ($81 b). Assume that home care will detect symptoms earlier and enable better provision of care to patients with chronic diseases and that at a minimum 2% of costs will be saved (8)	**$1,620,000,000**

Patient transports, travel and unnecessary tests	Access Economics(30) assessed US cost savings data for patient transports and transfers and unnecessary tests with telehealth. Using a simple population relativity, they estimate savings of around $296 m per year in Australia	**$296,000,000**
Veterans Home Care (VHC)	The VHC program, provided through the DVA, provides a range of low-level home care services to enable independent living. In 2010/11, expenditure on the VHC program was approximately $102 m. Approximately 71,000 people in 2010/11 were approved for services(39). Assume a 10% reduction in the need for services (9)	**$10,200,000**
DVA Community nursing services	The DVA community nursing program assists veterans, war widows and widowers to continue living in their own home to avoid early hospital admissions or residential care. In 2010-11 the DVA spent $117.5 m to deliver community nursing services to 31,122 people. Assume a 10% reduction in the need for services (10)	**$11,750,000**
Patient Assisted Travel Schemes (PATS)	Approximately $81 m is spent on various state and territory government PATS per year. This sum includes: NSW (15.9 m), ACT ($625,000), NT ($6 m), SA ($6.95 m), TAS ($1.6 m), VIC ($6 m), WA ($13.9 m) and QLD ($30 m)(40). Assume a 20% reduction in travel costs	**$16,195,000**
		$3,461,069,198

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7 Australian Institute of Health and Welfare. Residential aged care in Australia 2009-2010. 2011.
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