



Caring for people with chronic conditions

How technology can support an evidence-based
model in order to help improve chronic care

WHITE PAPER

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- Expenditure on chronic disease in Australia accounts for nearly 70% of health expenditure on disease¹.
 - More than half of all potentially preventable hospitalisations are from selected chronic conditions².
 - 54% of adults and 25% of children are now overweight or obese and at risk of developing chronic disease such as diabetes, heart disease and cancer³.
 - More than 50% of GP consultations are for people with a chronic condition such as heart disease, cancer, neurological illness, mental disorders and diabetes⁴.

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Executive Summary

The urgent need to focus on chronic disease

The burden of chronic disease is one of the greatest challenges facing the Australian health system. Our longer lives and improved ability to treat what were previously acute, fatal conditions are two contributing factors. These are compounded by modern lifestyles with increased exposure to risk factors such as smoking, excessive alcohol consumption, lack of exercise and poor diet with more than half of Australians overweight. Chronic conditions can also be the result of genetic inheritance, injuries, major illnesses or ageing. And although the incidence of some chronic diseases, such as stroke and coronary heart disease, has declined, the overall trend is up, particularly for diabetes, heart disease and cancer. If we don't reduce the pre-disposing risks and deploy more efficient and effective care models, chronic disease will impose a substantial and increasing burden on our health system and reduce quality of life for many Australians and their families.

The current patient experience

Chronic conditions place challenging demands on patients, their family and carers as well as on health and social services. A patient with chronic illness requires a range of health services delivered by primary, community and acute care professionals. Navigating these services can be complex and difficult and all too often patients fall between the gaps in care handovers. As a commentator to the National Health and Hospitals Reform Commission wrote: "A person with a chronic illness or serious condition in Australia has a miserable existence in trying to organise their healthcare and prevent further deterioration" (Cahill Lambert, 2009).

Improving care for people with chronic conditions

Tough decisions will need to be made with regard to how Australia funds chronic care with incentives and payment models rebalanced to support long-term care planning. Improvement will also require a reshaping of the relationship between patients and their care providers through:

- A shift from hospital-based episodic care towards long-term condition management in coordinated primary care settings and in the home.
- Greater integration and coordination around the needs of the patient, bringing together multiple disciplines.
- An increased ability to identify patients at risk with early intervention programs that reduce the risk of disease onset or progression.
- Better tools to support clinical decision-making for an individual patient and for policy and management decisions at the population health level.

Supporting the Chronic Care Model with today's technology

Proven models, such as the Wagner Chronic Care Model (Wagner, 1998), featured on page 6 of this paper, focus on making interactions between active, informed patients and proactive, prepared care teams as productive as possible. This paper looks at currently available technologies that can underpin key elements of the model, specifically:

- The provision of more effective care coordination and case management.
- Easier communication and collaboration between care team members.
- Deeper insight into the care needs of populations along with better clinical decision support tools.
- Mechanisms to help patients participate and become actively involved in their own care decisions.

This paper explores currently available technologies and their benefits in chronic care, explaining how practical, immediate steps can be taken now to help improve care provider capabilities within our health system so that patients can experience better care.

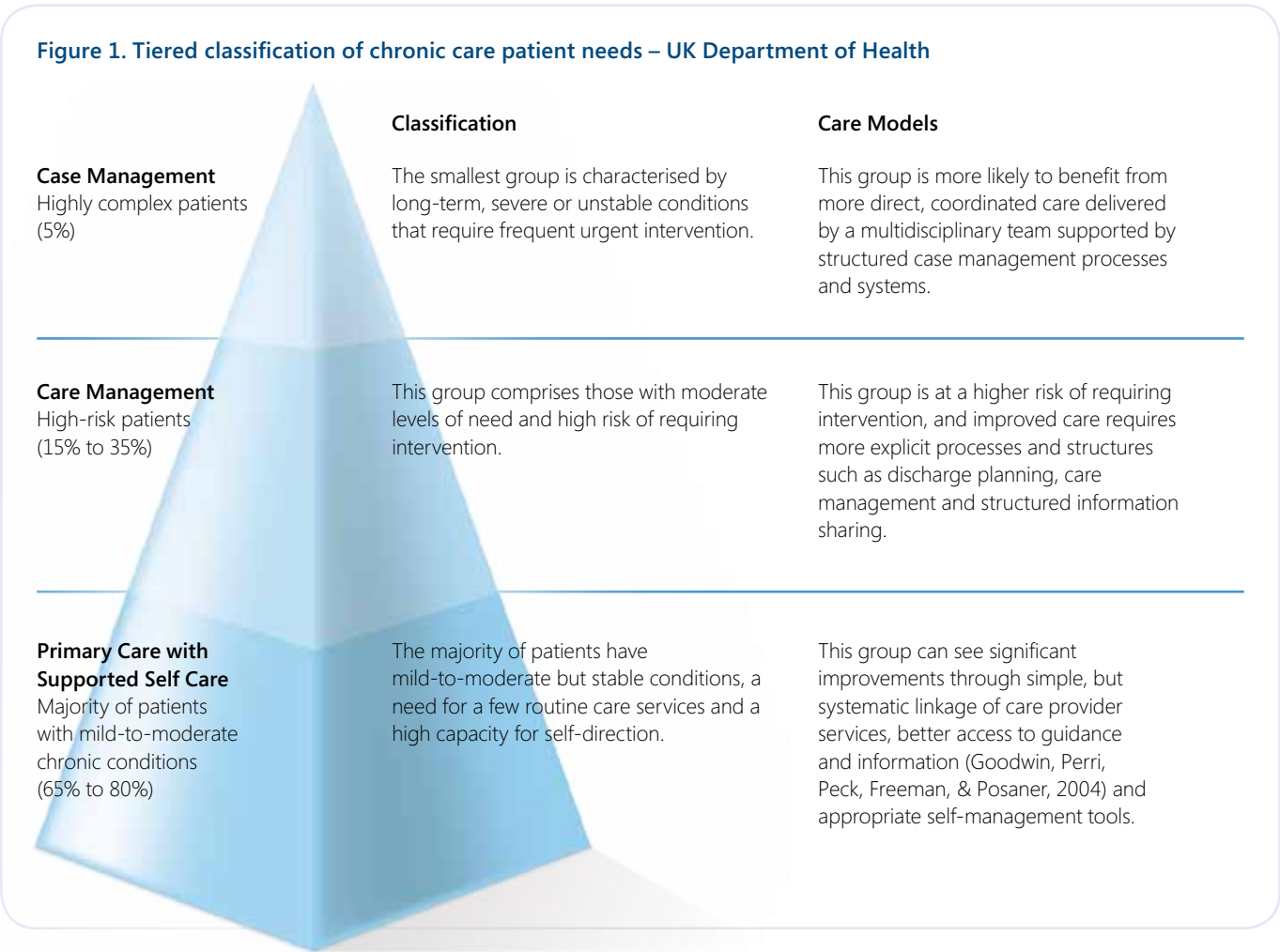
The Chronic Care Model

Chronic illness necessitates complex models of care requiring collaboration between health professionals and care providers that traditionally have been disconnected and oriented towards episodic acute care. To improve the support and outcomes for those with complex health needs, policy makers and care providers have sought to introduce structured models that overcome fragmentation of services along the continuum of care (Nolte & McKee, 2008).

Classifying the diversity of patient needs

It's important to reflect the diversity of patient needs in any endeavour to improve chronic care practices. The pyramid classification of the levels of care in a population shown below was first developed by the UK Department of Health (Leutz, 2005) and is now broadly used internationally.

Kaiser Permanente in the United States successfully applied this classification approach in a pilot study to provide the most effective and efficient care for their most complex patients through active case management and care coordination. Successful outcomes from the pilot have led to a more widespread adoption, which now encompasses their entire population of managed patients with chronic needs (Fireman, Bartlett, & Selby, 2004). Their My Health Manager personal health record enables Kaiser Permanente members to access care records and self-care tools through a pilot integration with Microsoft® HealthVault™ (Microsoft, 2008). These records can be shared with other care providers and home monitoring devices. Details of this pilot are summarised on page 7.



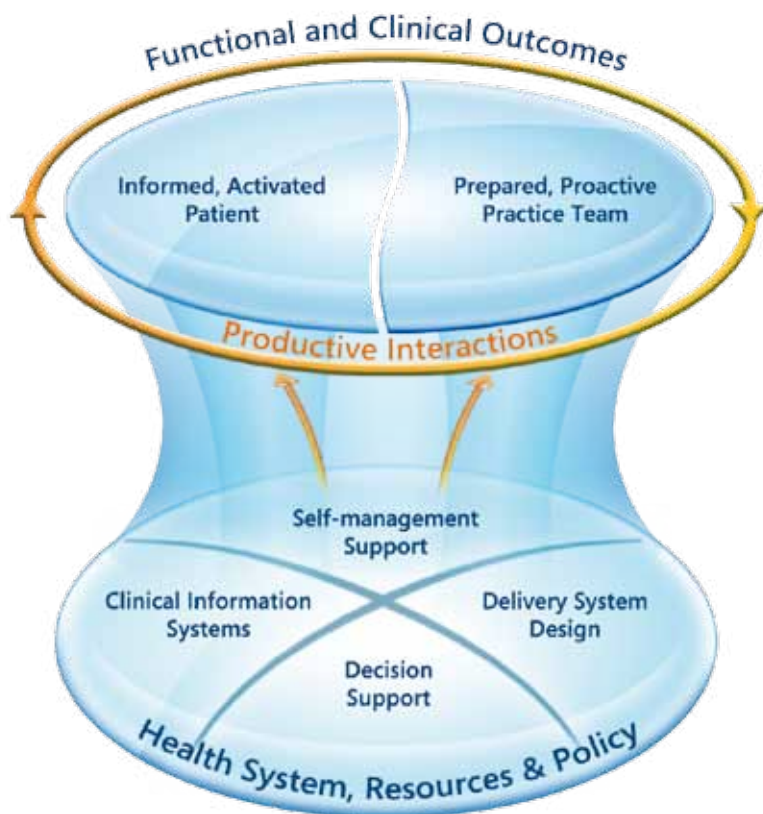
The Wagner Chronic Care Model

One of the best known models for chronic care in Australia and internationally is the Chronic Care Model (Figure 2) developed by Edward Wagner (Wagner 1998). Designed to provide a comprehensive framework for improving outcomes for patients with chronic conditions (Wagner, et al., 1999), it emphasises the integration of primary and community care. The fundamental premise is that the best quality chronic care is characterised by productive interactions between practice teams and patients, so the model focuses on strengthening these through self-management support, improved therapeutic decision-making, care team collaboration and managed follow-up. The ultimate goal is to foster the relationship between well-informed patients and a health service that is prepared to support them.

Integrated approaches like the Chronic Care Model targets clinician behaviour change, better use of non-clinician care team members, enhancement of information systems, transition to planned encounters as the norm and provision of supported self-management tools. This has demonstrated benefits such as: improved patient and care provider adherence to treatment guidelines; better patient quality of life; and improved health outcomes. (Tsai, et al., 2005).

In Australia the Chronic Care Model has provided the foundation for programs in a number of states, including the Chronic Care Collaborative in New South Wales, which has a strong focus on patients with chronic obstructive pulmonary disease and heart failure. The NSW program engaged and trained over 300 clinicians in best practice chronic care; established supporting processes, systems and resources; and improved the referral and discharge processes for patients. The net result was evaluated for 2004 to be a saving of 25,000 inpatient bed days (NSW Department of Health, 2005).

Figure 2. The Chronic Care Model



Wagner 1998

DEFINITIONS

Self-management Support

Working in collaboration with patients, their families and carers to build the skills and confidence to monitor and manage their condition. This includes ways to provide tools and guidance to enable patients to track progress, seek assistance and perform other self-management tasks.

Delivery System Design

The structure, processes and roles within healthcare provider organisations with a clear demarcation of the aspects of the organisation responsible for acute care versus chronic care, and how collaboration between multidisciplinary care teams should be supported.

Decision Support

Building evidence-based guidance into clinical processes and systems to support improved therapeutic decision making, with an emphasis on strengthening clinical leadership and providing education to health professionals.

Clinical Information Systems

The underpinning technology to support case management, chronic disease registries, population health monitoring, performance tracking, patient reminders and care planning.

Health System, Resources and Policy

The operating model of the healthcare system with emphasis on funding, incentives and relationships between funders and care provider organisations. This also encompasses connections between hospitals, community, private and voluntary groups.

However, there have been challenges in establishing the Chronic Care Model and similar approaches more broadly where health systems cannot adequately support self-management, manage the complexity of case management and care coordination, organise case-conferences or provide access to decision support tools (Zwar, et al., 2006).

The challenge of ensuring productive interactions between patients and practice teams

The Chronic Care Model focuses on patient interactions that build the productive relationship with their primary carer and care team, rather than simply on the traditional episodic visit. If interactions are to be productive, patients need the motivation, information, skills and confidence to make decisions about their own health and manage their condition. 'Activated' patients have an understanding of their central role in managing their illness and have the positive attitude needed to play that role. The perspective of 'interactions', rather than episodes or visits is important because interactions can include emails, group sessions, telephone calls or even online consultations.

Australians get very limited face-to-face time with their care team. Statistics show that Australians visit their general practitioner on average 5 times per year for a consultation lasting 14.6 minutes, so a typical patient only spends 73 minutes per year with their general practitioner (Australian Institute of Health and Welfare, 2009). This is arguably insufficient time for the patient to develop a relationship, let alone an understanding of a complex chronic condition and how best to manage it.

The Australian Institute of Health and Welfare General Practice Activity Report 2008–2009 study also highlighted that, although chronic conditions account for 36% of all problems managed, general practitioners conduct case conferences with extended teams for fewer than 1% of their patients and leverage the services of a practice nurse for only 2.2% of all encounters.

A prepared practice team should at the time of the interaction have the patient information, decision support and resources necessary to deliver quality evidence-based care (Wagner, 2004).

Some of the essential characteristics of productive interactions in chronic care would include assessment of the patient's self-management skills as well as their clinical status, tailoring of the treatment using stepped protocols, collaborative goal setting and problem solving to generate a shared care plan and active, sustained follow-up.

The challenge and opportunity for technology

While the biggest barrier to the adoption of chronic care innovation is behavioural, both on the part of the clinician and the patient, technology innovations, such as the Internet, the smartphone and social networking can drive improvements in chronic care in Australia. This paper looks at how the Chronic Care Model can be supported through familiar and currently available technology that practitioners can use to forge closer and more effective connections with their referral and care networks. It also proposes technologies to improve team communication and collaboration, generate insights for decision support, connect clinical information systems and enable self-management for patients.

Although the establishment of national ehealth standards as envisaged by the National eHealth Authority can in the future improve these systems, the availability of the standards is not a fundamental prerequisite for progress. Innovation in the use of technology to improve chronic care is pragmatically achievable now. There is no need, nor is there time to wait.

Kaiser Permanente Pilot Program using Microsoft HealthVault

The United States' largest not-for-profit health plan Kaiser Permanente undertook a pilot project to enable the transfer of medical records from its own systems to the Microsoft® HealthVault™ Website, conducted in strict adherence with federal security standards. Initially, the project was limited to volunteers selected from Kaiser Permanente's 156,000 employees but, if successful, the service could be extended to its 9 million members.

It is expected that the pilot program will help lower costs, allow patients to better understand and manage their own health information and give Kaiser Permanente a head start on the long journey to bring healthcare into the Internet Age. Vice-President of public relations at Kaiser Permanente, Holly Potter, notes, "It's clear consumers are going online for health information. We recognise that and the future of healthcare must include an interoperable system to give Americans comprehensive access and control over their own health data."

www.microsoft.com/presspass/press/2008/jun08/06-09HealthVaultConCall.mspx

Chronic Disease Prevention and Self-Management



The top seven risk factors for chronic disease are obesity, tobacco, alcohol, high blood pressure, physical inactivity, high cholesterol and poor nutrition. Together they account for some 32% of the disease burden in Australia (National Preventative Health Taskforce, 2009). The future burden of disease in Australia will be largely determined by our ability to reduce these risk factors.

The difficulty is that the social determinants of chronic disease are so broad that prevention becomes a challenge that requires cross-sector and multi-level collaboration beyond the conventional boundaries of the health system. Despite the enormity of this challenge, extensive research and experience has provided a wealth of knowledge about the most effective health promotion and disease prevention interventions. The imperative is to leverage this insight to deliver real improvements.

Technology can help chronic disease prevention by disseminating information to patients and clinicians, and enabling effective surveillance of chronic conditions to guide policy development and interventions (Public Health Agency of Canada, 2009). Technology also enables healthcare professionals to access experiential information on clinical and public health issues, epidemiological data and research, or participate in training and network with colleagues both locally and internationally.

Consumers can benefit from increased awareness of the consequences of risk factors, as well as access to resources and guidance specifically relating to their chronic condition, which can be especially beneficial in preventing disease progression towards comorbidities.

Overcoming the deluge of inaccurate health information available on the Internet

The Internet has become one of the most useful mediums to facilitate health promotion, self-care tools and decision aids. However, navigating copious sources of very disparate quality can be a barrier to online health communication interventions that lead to meaningful changes in behaviour (Perez, 2009). Studies have shown that more than 80% of the adult population in the United States use the Internet to find medical information (Pew Internet & American Life Project, 2006), but concerns are frequently expressed by clinicians and nurses about the appropriateness, safety and accuracy of the information obtained.

One survey in Australia conducted with oncology health professionals found that clinicians and nurses generally supported Internet searching because it helped patients become more informed (58% of surveyed), cope with their condition (49%) and did not damage patient trust in and relationship with their doctor (69%). However, the majority of clinicians and nurses surveyed were concerned about the accuracy of the information available. The results showed 64% believed it was accurate only sometimes, 23% rarely and 91% believed information from the Internet had the potential to cause harm to patients (Newnam, et al., 2005). In this context, it is not surprising that health

provider organisations throughout the world are striving to guide their patients to the most appropriate sources of online health information and provide assistance in interpreting it.

To address the issues of information quality and accuracy, large health provider organisations, such as the UK National Health Service and health management organisations like Aetna and Kaiser Permanente in the United States, use consumer portals that only derive content from validated sources and present that content to the consumer in a way that is consistent with the goal of their search. In Australia, VirtualMedicalCentre.com and MyDr.com.au are two of the top Websites used by consumers to obtain healthcare advice. A popular site in the United States is the HealthVault Search service, launched by Microsoft in 2007 and now incorporated into the Microsoft® Bing search service which provides an Internet-scale search engine that lets patients search for peer-reviewed health articles and validated guidance in a familiar way.

With an increasingly crowded Internet health space, it is difficult for healthcare providers and public health authorities to communicate a health promotion message, so some organisations have turned to more creative 'viral' marketing. In Canada, a health promotion campaign, encapsulated within a game called 'The Crazy Race', was developed with a very small budget and sent to 215 people. Over the following 15 days with no other media promotion, these initial recipients generated a cascade of invitations that reached more than 439,000 people and resulted in 110,000 visits to the health promotion Website (Gosselin & Poitras, 2008).

Forging better connections with patients at home

The Internet offers far more than a one-way channel for dissemination of information. As outlined by the Chronic Care Model (Fig. 2), the effective management of chronic conditions requires a partnership between patients and their care providers. Inevitably, patients with chronic disease become personally responsible for their own day-to-day care and are often in the best position to gauge the severity of their symptoms, the effectiveness of their treatment and make adjustments to their behaviour to ameliorate risk factors. Despite this, compliance with self-management guidance and treatment regimens is frequently poor (Battersby, et al., 2000), which is driving health professionals towards innovative information and communications technology that can support self-monitoring, compliance tracking, remote care and communications. This includes two similarly named but significantly different approaches:

- *Telemedicine*, which essentially provides specialist consultation to remote communities.
- Home *telecare*, which provides the technology needed for a direct care connection into the home.

Telecare is the approach that is most relevant to self-management of chronic care conditions because it offers self-support systems for patients with conditions like diabetes, heart failure, asthma and hypertension.

Studies already show that home telecare can help reduce costs. For example, Kaiser Permanente reported a cost saving of 37% when home telecare was used to support video visits alongside in-person home visits (Johnston, et al., 2000). A second study that focused specifically on patients with chronic heart failure demonstrated significantly reduced readmission rates for patients with home telecare support, leading to an 86% reduction in patient care costs (Jerant, et al., 2001).

Australia is home to some of the leading innovations in home telecare with demonstrated efficacy in chronic condition management. One example is the TeleMedCare Health Monitor (see right), a device developed from research conducted at the University of NSW. Despite innovations like this, telecare has not yet been sufficiently adopted locally to deliver the promise it offers (Celler, et al., 2003).



Designed for home use or in residential care environments by the elderly and chronically ill, the TeleMedCare Health Monitor has integrated devices to measure weight, body temperature, blood pressure, blood oximetry, blood glucose, spirometry and electrocardiogram function as well as display of questionnaires, reminders and guidance to patients.

All of the information gathered by the device is securely transmitted to patient's doctor or practice nurse for review. The device can also be used to set up direct communications and videoconferences between the patient and the doctor or nurse (TeleMedCare, 2010).

Innovative approaches to supported self-management

There are three broad classifications for solutions that support people living with chronic conditions: self-care; self-management; and self-management support (Nolte & McKee, 2008).

- *Self-care* relates to the behaviour and lifestyles of people who are healthy, at risk of ill health, experiencing symptoms or receiving treatment and generally does not require health professional involvement.
- *Self-management* is focused on minimising the impact of chronic disease on a patient's health and assisting them in coping with the psychological effects of their illness. Self-management activities are generally undertaken by the patient between scheduled care professional visits.
- *Self-management Support* involves a patient-centred collaborative approach to care with the aim of patient activation, education and empowerment (Goldstein, 2004).

Self-management Support is a key component of the Chronic Care Model, with successful approaches incorporating behavioural change techniques, goal setting, problem solving and collaborative care planning. By emphasising the behavioural changes required to accommodate a new lifestyle with a chronic condition, Self-management Support goes beyond standard medical environments and into the home of the patient. The ultimate goal is to prepare patients with the knowledge and skills to manage their condition; maintain employment, education or home roles; work in partnership with their care providers; and cope with the long-term emotional and mental stress that comes with chronic disease (Goldberg, et al., 2004).

Care providers are increasingly able to provide Self-management Support options, thanks to innovative approaches that combine the Internet with personal electronic health records. The Mayo Clinic recently launched a free service called the Family Health Manager, developed in collaboration with Microsoft, based on the Microsoft® HealthVault™ personal health record platform (Mayo Clinic Family Health Manager, 2008). This application provides personalised, specific guidance to patients and their families by combining data within the patient's personal health record with evidence-based algorithms developed by the Mayo Clinic.

Although the concept of self-controlled electronic health records is very new, early studies indicate that interoperable self-controlled electronic health records show significant promise in supporting people with chronic conditions. (Nolte & McKee, 2008)

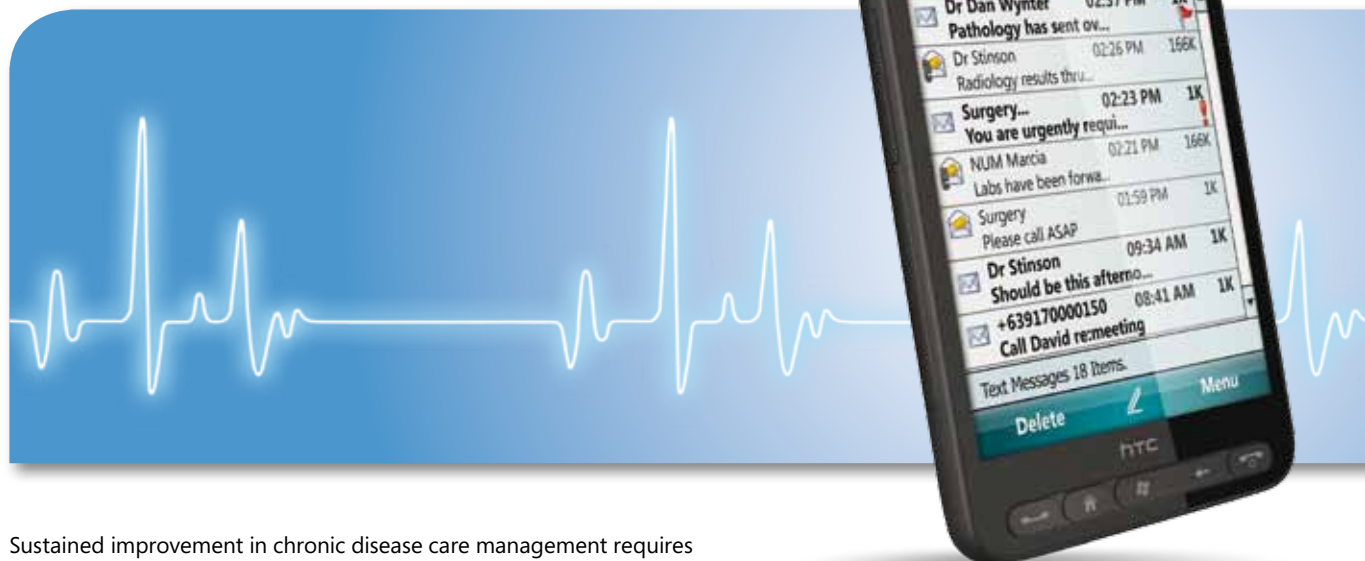


The Mayo Clinic Family Health Manager provides a single gateway for setting goals, receiving reminders, reviewing test results and seeking assistance. Based on information stored in a person's HealthVault record, the application provides suggestions on appropriate self-care steps.

Key Actions for Progress in Australia

- Deliver health promotion and disease information through trusted Internet portals that are specifically designed to address the needs of patients and clinicians.
- Leverage the social Web and innovative 'viral' marketing approaches to deliver health promotion messages that cut through the crowded space of the Internet.
- Extend the use of home telecare technology to provide direct support for patients with chronic conditions in their own home, while strengthening the relationship with their professional care providers.
- Build applications that connect with a personal health record platform to provide self-management support and personalised guidance to patients with chronic conditions.

Coordinating and Integrating Care



Sustained improvement in chronic disease care management requires coordination and integration across teams, professions and organisations. In episodic acute care, treatment is generally a discrete event in a single location with a single care provider. Chronic care is different as it generally relates to permanent, irreversible conditions that may progress or change gradually over a long period, frequently requiring support in various settings from different providers (Nodhturft, et al., 2000).

For example, clinical best practice guidelines for Type 2 diabetes in Australia recommend that, on initial diagnosis, the general practitioner should establish a care plan that may involve: quarterly reviews with the GP; self-management education from a diabetes educator; diet assessment and guidance from a dietician; assessment by a podiatrist to prevent neuropathy; assessment by an ophthalmologist due to the risk of retinopathy; and possibly the services of an endocrinologist, dentist and exercise trainer (Diabetes Australia, 2009).

Some people with diabetes may have problems with their medications and require the services of a pharmacist who can conduct a medication review to improve the effectiveness, safety and adherence of the patient to their medication. Others find diabetes a difficult psychological burden and can benefit from the support of a psychologist, social worker or counsellor.

Coordinating this array of services is complex and generally relies on a strong relationship between a proactive primary care provider and an actively involved patient. Some of the mechanisms advised by the Royal Australian College of GPs to coordinate this extended team include: the establishment of a disease register to track patients with diabetes in the practice; the implementation of an automated recall system that reminds patients of review appointments; and procedures to include flow charts and review charts in the patient's notes. (Diabetes Australia, 2009).

The need for an integrated team approach

A significant body of evidence shows that care guidelines and integrated team approaches like the one proposed by Diabetes Australia provide the highest-quality outcomes for people with chronic conditions (Nolte & McKee, 2008). The real challenge is how to enable the workforce engaged in chronic care to safely and effectively coordinate and manage the transitions of their patients between and within services.

Although the classification pyramid of people with chronic conditions (Fig1 1) illustrates that only the top 5% of patients require complex ongoing case management (Leutz, 2005), all patients with chronic conditions require some level of individual management and coordination. Assessing, planning, arranging and monitoring each patient's needs is too burdensome a task to perform consistently without some level of computer automation. Unfortunately, it often falls to the patient or their family to perform this coordination role. Chronically ill people, as more

frequent users of health services, have more frequent interactions with the health system and therefore have a higher risk of encountering failures in the system or medical errors (Corcoran, 1997). If they are in a poor state, have multiple comorbid conditions or have multiple functional or physical limitations, then they often cannot protect themselves from risks and have less capacity to overcome adverse effects. Effective integration and care coordination is thus an essential determinant of the safety of care (Lynn & Schuster, 2000).

Supporting and enabling multidisciplinary care teams

Some clinical systems in Australia already support multidisciplinary care team coordination across different care providers. For example, the award-winning iCare Healthpoint solution provides direct integration to HCN's Medical Director Software to build an integrated care record that can be accessed by both the residential and community care providers as well as the patient's general practitioner. This enables extended team care planning, medication compliance, scheduled reviews and tracking of interventions.

Care coordination and case management also rely upon effective inter-professional and inter-agency communication to orchestrate services around the needs of the patient. Enhanced communications and coordination between different groups can help to establish better care and referral pathways, as well as more efficient care, with each care provider contributing their individual capabilities towards the best patient outcomes. The key challenge is to establish the organisational and practice culture to sustain this inter-professional and inter-organisational collaboration.

A number of countries have established organisations with the role of planning, funding and purchasing the health services of a defined population. For example, chronic care services in Sweden are managed by county-level health centres that employ or contract doctors, nurses, social workers and other members of extended care teams to provide the spectrum of health services orchestrated in multidisciplinary teams around the needs of patients (Karlberg, 2008). Health management organisations like Kaiser Permanente and Aetna in the United States similarly assemble and coordinate the services provided by multidisciplinary teams.

The evidence for the effectiveness of this approach has strengthened and the National Health and Hospitals Reform Commission has endorsed this model for Australia through recommendations for the further adoption of Primary Care Centres and the establishment of Primary Care Organisations (National Health & Hospitals Reform Commission, 2009).

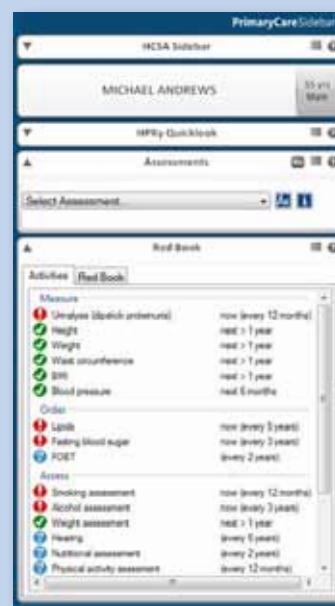
Information systems designed to support case management and care coordination

The Chronic Care Model identifies the need for information systems to specifically support case management and care coordination activities (Goodwin, et al., 2004) which include capabilities to:

- Track and collate communications like emails, electronic referral documents, phone calls and faxes both with other care providers and directly with the patient.
- Enable the scheduling of appointments across care providers.
- Automate follow-up appointment requests and reminders.
- Manage programmatic care services, such as drug and alcohol rehabilitation programs.
- Identify patients at risk in a population as candidates for chronic disease prevention or management programs.
- Provide summary care records and care plans with completion of activities on the care plan monitored and tracked.



iCare HealthPoint is an example of a clinical system that supports multidisciplinary care team coordination across different care providers.



PEN Computing's Sidebar technology is an Australian innovation for integrating and extending existing primary care applications with decision support tools and clinical guidelines. Built on the Microsoft platform, it leverages the emerging NEHTA (National E-Health Transition Authority) and international standards for semantic interoperability.

These capabilities mirror those of traditional Customer Relationship Management (CRM) systems that are commonly deployed in other industry sectors, but have been only infrequently deployed for the care of people with chronic conditions. Microsoft provides a starter solution that tailors the Microsoft CRM solution to the specific needs typical of health provider organisations for case management and care coordination.

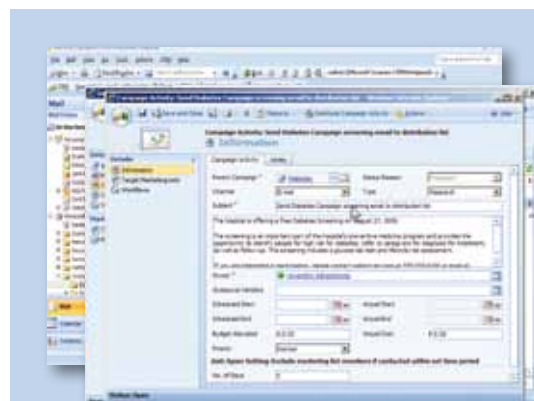
Sharing information between care providers

The ability to share information between care providers is an important enabler of improved chronic care. Secure electronic messaging has been established for some years, but a higher level of interconnection that provides not just for the integration of clinical data, but also for assurance of its integrity for clinical use, is also required. Data sent from one provider must have the same meaning when interpreted through another provider's clinical system – a characteristic called semantic interoperability. In Australia, the National E-Health Transition Authority (NEHTA) is developing and publishing specifications with the goal of progressing towards semantic interoperability between systems.

The benefits of this level of system interconnection become apparent when considered in the context of specific scenarios relevant to the care of people with chronic conditions. For example, in an Australian study of patients with cardiovascular disease, individuals with self-reported poor adherence to medications showed a significantly higher probability of experiencing a cardiovascular event (Nelson, et al., 2006).

Currently most studies rely solely on self-reported information. Medication adherence reviews are conducted manually because clinical systems for tracking do not exist in Australia, nor is there the ability to automatically detect poor adherence via a medication review and intervene. With the goal of supporting progress in this area, Microsoft partnered with the eRx Script Exchange to implement an electronic prescription exchange that could be used by all Australian primary care practices and pharmacists (eRx Script Exchange, 2009). This prescription exchange currently transports millions of prescription and dispense events each month between general practitioners and pharmacists and forms the foundation for medication management and adherence monitoring mechanisms that can significantly improve outcomes for patients with chronic conditions.

The challenge in Australia is to enable innovative, need-driven approaches to the interconnection of information systems that can leverage broad industry standards while still being flexible to innovate around the individual needs of people with chronic conditions.



Microsoft Dynamics® CRM provides a case management solution that is tailored to the specific needs of the health provider. It allows care providers to maintain a registry of patients with chronic conditions, supports the management of their care activities and even enables proactive outreach and health promotion activities.

Key Actions for Progress in Australia

- Extend existing clinical information systems to support care coordination, with a focus on enabling the creation of care plans, monitoring of care plan compliance and coordination of handovers between care team members.
- Borrow successful approaches from other sectors to enable patient and provider relationship management for the coordination of care and management of complex cases, designed with the patient at the centre.
- Integrate systems across providers using secure messaging for clinical data exchange while leveraging clinical document repositories to support storage and retrieval of shared records by all members of the care team.
- Ensure that investments in information systems focus on both their ability to support communication and collaboration through an extended team as well as the traditional ability to store and process clinical data.

Enabling Care Team Collaboration and Communication



The formal structure and organisational processes of care providers, including financial and non-financial incentives, supporting systems and policies, have a significant impact on the ability of health services to cater for the needs of people with chronic conditions. Traditionally, structures for providing health and social services are focused either on a single organisation or single practitioner as the care provider. But people with chronic conditions may require a complex array of services which depend upon the knowledge and capabilities of multidisciplinary teams.

Challenges in communication

Significant research has demonstrated how care processes and clinical outcomes can be improved by extending the care team to incorporate the services of nurses, social workers, psychologists and pharmacists (Wells, et al., 2000). Establishing the organisational environment to support multidisciplinary care however, can be undermined by gaps in clinical information systems, unreasonable administrative burdens and inadequate technology foundations for collaboration and communication (Nolte & McKee, 2008).

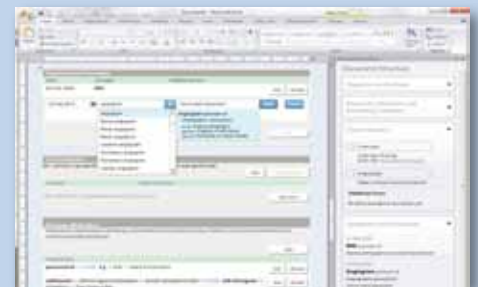
A key challenge for the care teams involved in chronic care is to manage the transition of their patients between different care contexts. The process of systematically assessing, planning, arranging and monitoring the numerous services required to support the needs of a patient with a complex, chronic condition demands a very high level of coordination and communication across professional and organisational boundaries (Kodner, 1993).

In Australia, care planning and case conferencing incentives were introduced in the 1999 Enhanced Primary Care Medicare package with the aim of improving the frequency of general practitioners engaging other professionals in the care of people with chronic conditions. To qualify for this benefit, a care plan must bring in two or more other specialists. These incentives were further expanded with the introduction of the 'General Practitioner Management Plan' and 'Team Care Arrangement' in 2005. However, general practitioners in particular have highlighted difficulties in the execution of these programs, citing problems in organisation, case coordination and the complexity of case conferencing (Blakeman, et al., 2002).

Clinical portals for chronic care coordination

In chronic care, information technologies can provide powerful tools to facilitate transfer of information, eliminate redundant paperwork and monitor progress (Kruger, et al., 2003).

Multidisciplinary teams need fast and easy ways to access the most up-to-date patient information from the many places they work. And they need to be able to efficiently and effectively communicate and collaborate with each other regarding patient care.



The Microsoft Clinical Document Solution Accelerator is an extension to Microsoft Office that enables the creation and sharing of standards-based clinical documents such as referrals, discharge summaries and care plans.

The primary role of clinical portals in the context of chronic care is to reduce the administrative burden and streamline the working arrangements of care teams. They do this by providing a centralised hub from where health professionals, nurses, and specialists can access the most recent and consolidated clinical documents, such as test results, medication reviews, images, progress notes and care plans. They can also enable teams to work together more efficiently via team services, discussion groups and other portal features that facilitate better communication and information sharing. And finally, they also provide a valuable mechanism to link multidisciplinary teams across different organisations, or link acute care providers with primary and community care professionals. This cross-organisation collaboration is essential for effective coordination of care for people with chronic conditions.

The Tasmanian Department of Health and Human Services uses a Microsoft clinical portal to provide access to information and resources tailored to the role of the user. These include policies and procedures, treatment guidance, care pathways, clinical documents and workspaces where multidisciplinary teams can share information and communicate (DHHS Tasmania, 2007).

Transitioning from paper to electronic clinical documents

In the United Kingdom, Microsoft has been collaborating with the National Health Service since 2003 to develop guidelines and components for a standardised visual interface to clinical systems, called the NHS Common User Interface (Disse, 2008).

One of the projects within that collaboration has been the development of a software component called the Clinical Document Solution Accelerator to integrate clinical documents within Microsoft® Office. This component enables clinicians to enter clinical notes and observations, validate the data within the notes with regard to a standard terminology or medication data set, and then store the data in the standard format recommended by HL7, an international organisation creating standards for e-health. It provides a mechanism for the use of commonly available toolsets to enter, validate, transmit, store and retrieve clinical documents such as referrals, discharge summaries and care plans.

Challenges in communication between care teams

Increasingly, parents, carers and patients also need tools to participate in communication around the needs of the patient with a chronic condition. A study of the parents of 47 children with severe chronic conditions assessed their expectation of communication between care providers and with them found that sustained, open, facilitated communication was perceived as the essential factor in effective, quality care. When this communication failed, parents reported how they had to assume the necessary, but tough and uncomfortable coordinating role (Miller, et al., 2009).

Research is showing that the form and types of communication in use and necessary to support effective care coordination are changing. A study of 121 healthcare workers comprising family doctors, nurse practitioners, nurses, pharmacists, dietitians, social workers, office managers, health promoters, and receptionists revealed that communication occurs in a variety of formal and informal means. The formal mechanisms include regular team meetings, memoranda, videoconferences, emails and communication logs (such as handover notes). Informal communication included telephone calls and frequent opportunistic face-to-face discussions. Technology was seen as a key enabler of this communication with mechanisms such as the telephone, email and videoconference used extensively (Brown, et al., 2009). Unfortunately, the complexity of technology and difficulty using many different channels of technology-enabled communication also presented challenges.

The Tasmanian Department of Health and Human Services Clinical Portal



The DHHS Clinical Portal incorporates search technology to help clinicians rapidly find the information they need and in the background supports record-keeping and compliance requirements by versioning and tracking all information entered.

When procedures or guidelines are updated, alerts are automatically sent to team members advising them of the change while permission and security controls ensure confidentiality and prevent inappropriate disclosure of information. Although initially focused on acute care scenarios, the collaborative portal concept can be extended to the care of chronically ill patients.

Simplifying Paper and Electronic Health Information Management with Surity

Australia's leading solution provider for 'paperless' pathology is now delivering a complete solution for automated handling of all health documents, whether paper or electronic.

Built on a Microsoft® Office SharePoint® Server technology and leveraging the Microsoft Common User Interface, the Surity Health Information Management System enables paper-based records to be scanned and retained alongside electronic records, ensuring that all the relevant documentation pertaining to a patient can be accessed, amended and annotated by authorised users.

Unifying communication channels to streamline communications

Healthcare workers can benefit from solutions that deliver a more unified approach to the seemingly disparate channels of voice, voicemail, instant messaging, video, email, text messaging and fax when they are all linked to a single identity.

Unified communications solutions provide this simplification to integrate and control all aspects of communications, leading to more efficient and effective ways of working, and to improved levels of care.

Videoconferencing is an essential component for many forms of telemedicine. It can facilitate examination, diagnosis and treatment of a chronically ill patient by a specialist connected to a caregiver present with the patient in a remote location. Videoconferencing combines the live video with other media, such as patient medical record data.



Eastern Health Unified Communications

Eastern Health, the second-largest healthcare provider in Victoria, has deployed a Microsoft-based unified communications solution across their acute, sub-acute, mental health and community services organisations to support direct patient care, administrative communications and professional development (Eastern Health, 2007). They identified the need to integrate voicemail capabilities with users' mailboxes to allow for additional messaging options, and to streamline the users' experience by providing multiple ways of accessing their inbox.

The solution allows practitioners to see the presence or availability of other staff, identify the most effective way to contact them, and make automatic call re-directing if the person changes location. This is an important issue for patient care if a practitioner is on the road and needs to answer an emergency call. With a significant number of staff committed to care of patients in the community with chronic mental health conditions, the unified communication solution deployed by Eastern Health enables them to always maintain contact with the extended care team.

Key Actions for Progress in Australia

- Invest in clinical collaborative portals that provide Web-based access to clinical resources, educational material, guidelines and documents. These portals can incorporate capabilities to manage documents, automate workflows, display dashboards and search across repositories of information.
- Integrate clinical collaborative portals with existing and new clinical systems to improve access to data by the extended care team both within an organisation and across multiple care provider organisations.
- Provide unified communications capabilities to support the clinical workforce incorporating video, instant messaging, email, SMS and telephone capabilities with a specific goal of improving clinical handovers and multidisciplinary team work.

Chronic Care Decision Support



In the context of chronic care, decision support aims to facilitate clinical care that is consistent with scientific evidence and patient preferences (Association of American Medical Colleges, 2007). This includes strategies to incorporate evidence-based guidelines into daily clinical practice, to share evidence-based guidelines with patients and encourage their participation, to expand care provider education and to integrate specialist expertise. Clinical decision support tools and guidelines help standardise care processes and pathways, thereby reducing variation in care and medical errors while increasing quality outcomes (Nolte & McKee, 2008).

The Chronic Care Model (Fig. 2 p. 6) describes how clinical decisions should be based on a set of proven guidelines that have been developed out of clinical research. This requires care provider education that goes beyond traditional medical education to support team-based learning, mentoring and collaboration so that clinicians can stay up-to-date with the knowledge, skills and experience to deliver the best care.

To encourage active patient participation in their own self-management, the Chronic Care Model also recommends that guidelines be discussed with and provided to patients so that they understand the principles underlying their care. Information systems are an essential part of this because they help to drive and support the adoption of care guidelines through reminders, feedback, shared electronic health records, care plan tracking and patient monitoring.

The roles and requirements of decision makers in chronic care decision support

Although a conventional focus of clinical decision support has been on providing therapeutic guidelines to health professionals at the point of care (Coeira, 2003), a chronic care context must take a broader view that encompasses the role of other decision-makers such as care provider organisations, government policy makers, carers and patients themselves. The needs and characteristics of chronic care decision support systems vary significantly between these groups:

- **Health professionals**, such as primary care doctors, nurses, pharmacists and allied health professionals mainly require tools that help them to be more prepared and proactive when addressing the care needs of individual patients. They tend to focus on treatment efficacy (e.g., choosing appropriate medications) care process (e.g., quarterly reviews) and quality outcomes (e.g., HbA1C tests for diabetes patients).
- **Healthcare provider organisations** such as primary care, community health services and out-patient services need tools to facilitate patient registration, care provider registries, coordinated care planning, population health monitoring and disease registers. These organisations use decision support tools to improve service planning and quality of care.
- **Policy makers** such as government, professional bodies and chronic disease

associations require decision-support tools to enable top-down planning, as well as policy making in relation to financial and service delivery measures.

- **Patients** with single or multiple chronic conditions look for tools to support them in their own self-management so that they can be more informed, seek additional social or therapeutic support and express their own preferences for care.

Typical computer-based decision support tools and their impact on patient outcomes

Computer-based decision support tools have evolved to incorporate flowcharts, checklists, care pathways, educational materials, on-screen reminders, dosage calculators, drug interaction support and even simulations and probabilistic models (Liu, et al., 2006).

Some decision support capabilities have very broad reach and scope, combining multiple elements to improve care of a specific condition or cohort of patients. For example, Microsoft partnered with Diabetes Australia to develop the Australian Diabetes Map (Diabetes Australia, 2009) that paints a picture of the diabetes landscape across the country, providing a national resource for policy makers, politicians, health professionals and local communities. This map combines extensive data from the National Diabetes Services Scheme with the Microsoft® Virtual Earth® map application to show the location of services, including hospitals and pharmacies. It will be extended to include diabetes educators, general practitioners and specialist diabetes centres. Diabetes Australia also produces documented clinical guidelines with the Royal Australian College of General Practitioners. However, the need to integrate the workflow and user experience of existing clinical systems remains a significant barrier to bringing these guidelines into complete and widespread adoption with the aid of electronic systems.

Systematic reviews have evaluated the benefits of decision support tools on practitioner performance as well as patient outcomes (Garg, et al., 2005) and found that the introduction of electronic tools uniformly increased compliance with treatment guidelines and had moderate effects on improving patient outcomes. The clinical decision support tools that were observed to be valuable were: alerts and reminders for patient recall; care plans, drug dosing and interaction aids; and assessments of physician performance.

In the United Kingdom, the National Health Service has undertaken a number of initiatives to provide clinical decision support tools directly to primary care physicians and patients. For example, the NHS Choices Website (UK National Health Service, 2009) provides a set of reference clinical pathways for primary care describing the care processes, risk assessment measures and treatment protocols for a range of chronic conditions such as chronic obstructive pulmonary disorder, diabetes, asthma and mental health conditions such as depression. This Website leverages clinically validated pathways generated by a Microsoft partner, Map-of-Medicine.

Another example from the United Kingdom is the use of Microsoft business intelligence technology by the Wandsworth Primary Care Trust to establish a population health decision support toolset (Wandsworth Primary Care Trust, 2008). This solution was initially established to support monitoring of immunisation in the community but, by providing a patient register, condition register and linkage to primary care practices, it enables Wandsworth to more effectively manage and monitor public health interventions at the trust level and also enables individual clinicians to manage their local-level patient population.

The Electronic Health Records debate

There has been significant focus over the past few years on a shared electronic health record and its potential role in supporting more coordinated care and better informed decision making. Despite the perceived value of a shared record, progress has been slow and debate has been divided as to whether a person-controlled electronic health record or a provider-controlled electronic health record is most appropriate for Australia (National Health & Hospitals Reform Commission, 2009).



The Australian Diabetes map paints a picture of the incidence of diabetes across the whole country by overlaying diabetes research data on top of Microsoft Virtual Earth technology.



The UK National Health Service Choices Website provides a set of reference clinical pathways for primary and secondary care, built from a Microsoft partner solution called Map-of-Medicine.

However, to enable therapeutic decision-making by health professionals and behavioural decision making by individuals, an electronic health record platform would need to support both groups.

Health professionals above all need accurate, reliable data of known provenance to support their decision making in a way that integrates with their clinical workflows and existing systems. Rather than data, patients require tools that help them adapt to and manage their conditions and the ability to record their own goals, measurements and status.

Although technical interoperability between computer systems is a significant hurdle that government and the IT industry are striving to overcome, the real barrier to electronic health records will more likely be the significant questions that arise in relation to privacy, consumer and physician trust, liability and compatibility with working practices and culture. A sustained focus on how electronic health records specifically support clinical decision support for patients with chronic conditions helps to cut through the quagmire of issues surrounding electronic health records.

Typical computer-based decision support tools and their impact on patient outcomes

One Microsoft partner based in Australia with a world-leading solution for an electronic health record platform is Ocean Informatics. Their product, OceanEHR, is designed as a 'universal receiver' which can accept information from clinical systems as either structured system messages or unstructured data, such as documents and faxes. This technology can receive data from any source, maintain its meaning and integrity and present that data to any other system on request. This enables true longitudinal health records that can provide the foundation for building decision support, workflow or clinical pathway applications.

Clinical decision support tools can have a pivotal role in providing effective care for people with chronic conditions in Australia, because providing the best care requires the application of evidence-based interventions in a coordinated fashion by a team over an extended period of time.

Providing the necessary level of coordinated care in a quality, repeatable fashion can only be achieved with the assistance of decision support tools.



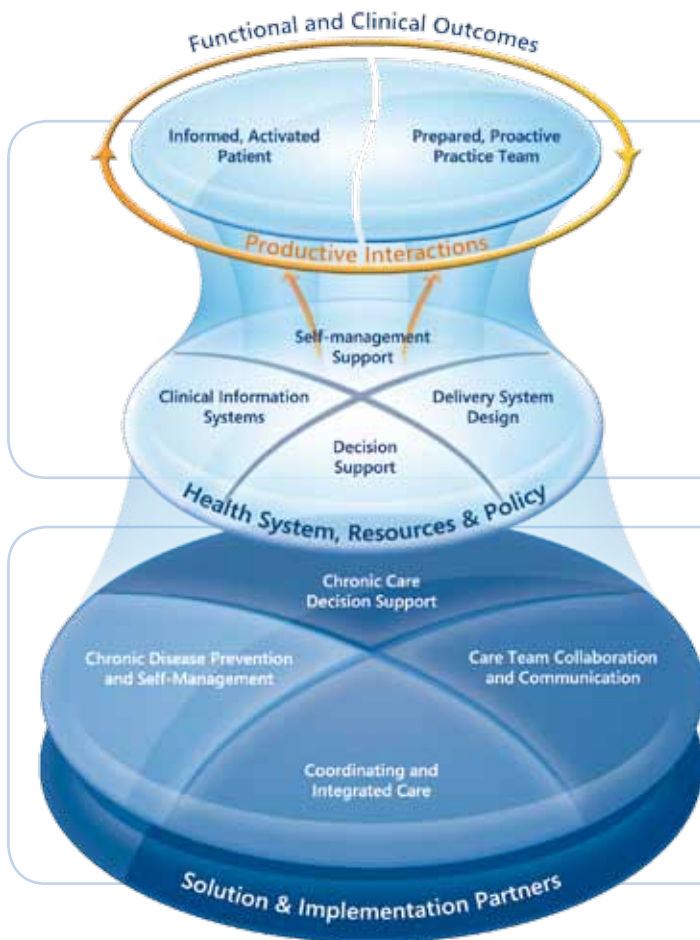
OceanEHR can accept information from any source, leveraging a concept called archetypes to maintain the context, meaning and integrity of the data. This is the essential foundation of a shared electronic health record.



Key Actions for Progress in Australia

- Recognise that all information systems must eventually support decision making either by clinicians, patients, managers or policy makers. This recognition focuses policy, design and implementation of electronic health solutions on scenarios that have meaningful outcomes.
- Leverage business intelligence technologies to establish population health and chronic disease monitoring solutions that draw from existing and new clinical data sources.
- Integrate decision support tools to augment existing clinical systems that are already in use, rather than seek to implement whole new clinical systems.

Microsoft Technologies



The Chronic Care Model: Wagner

Microsoft technologies that underpin the Chronic Care Model

Chronic Disease Prevention and Self-Management

Technology that provides access to public health information and resources for supported self-management of patients with chronic conditions.

- Microsoft® SharePoint® Server-based patient portals provide a way to deliver personalised information and resources securely to patients.
- Microsoft® HealthVault™ provides a person-controlled electronic health record platform that enables self-management tools, personal health devices and connectivity between clinical systems.

Microsoft Solution Partners

TeleMedCare
www.telemedcare.com.au
HealthVault
www.healthvault.com
Telstra
www.telstraenterprise.com

Coordinating and Integrating Care

Technology that enables multidisciplinary care teams to integrate information sources and coordinate care around the needs of patients.

- Microsoft® BizTalk® Server connects clinical information systems consistent with secure messaging specifications and international standards.
- Microsoft SharePoint Server enables secure, effective information sharing between providers and a mechanism to expose data from existing systems.
- Microsoft Dynamics® CRM provides an out-of-the-box solution for case management and care coordination.

HP
www.hp.com.au
iCare
www.icare.com.au
SIMPL
www.simplgroup.com

Care Team Collaboration and Communication

Technology that makes it easy for care teams to collaborate and communicate effectively.

- Microsoft SharePoint Server clinical portals provide fast easy ways to share patient information, clinical documents, test results medication reviews, images and care plans.
- Microsoft unified communications powered by Microsoft® Exchange Server and Microsoft® Office Communications Server bring together voice, video, email, text messaging and fax.
- Clinical documents such as referrals, discharge summaries and care plans can be created and exchanged using Microsoft® Office and the Microsoft Clinical Document Solution Accelerator.

Surity
www.surity.com.au
OBS
www.obs.com.au
Oakton
www.oakton.com.au

Chronic Care Decision Support

Computer-based decision support tools that enable patients, clinicians and policy-makers to make informed evidence-based decisions.

- Microsoft SharePoint Server enables clinicians to share knowledge and resources, research findings, guidelines, epidemiologic data and training.
- Microsoft SQL Server® aggregates data from diverse healthcare systems to provide health analytics. These can be linked to patient data, financial and operational data, decision support tools and geographic information and then displayed in relevant, role-based dashboards.
- Microsoft® Visual Studio® enables developers to extend and adapt clinical information systems with improved integration and display of data.

PEN Computing
www.pencs.com.au
Alcidion
www.alcidion.com.au
Ocean Informatics
www.oceaninformatics.com

To search for an accredited partner or solution for your specific needs, go to: <http://www.microsoft.com/australia/findapartner/solutionfinder/Marketplace/default.aspx>

How today's technologies can transform a patient's care

This chart maps the experiences of a diabetic patient across a network of care providers to show how current technologies can support effective care team collaboration, cost-efficient case conferencing and accessible patient self-care.

Chronic Care Journey	Technologies
Care Team Collaboration and Communication	
1 A patient presents at the GP with increased thirst, hunger and tiredness. Suspecting diabetes, the GP performs a blood glucose test which reveals elevated levels. The GP sends patient to pathologist for confirmatory tests.	The GP uses his desktop clinical system to create the pathology request which is transmitted electronically to a pathology provider using Microsoft® BizTalk® secure messaging.
2 The patient undergoes blood tests at the pathology provider. The test results are sent back to the GP, who confirms the diagnosis.	The pathology provider uses their own clinical system and the results are sent back to the GP over the same BizTalk secure messaging service.
3 The patient is recalled and the GP explains that they have Type 2 diabetes and need to start actively managing the condition. The GP works with the patient to set goals and generate a care plan.	The GP accesses a secure Web portal created using Microsoft® SharePoint® Server. There he can add more details to a form that has been prepopulated with some patient details. He enters action plans, management goals and a list of specialist and allied health services required. Based on the fact that the patient has diabetes, the plan is prepopulated with: • One month review by GP • quarterly GP reviews • consultation with podiatrist • consultation with ophthalmologist • referral to diabetic educator
Chronic Disease Prevention and Self-Management	
4 The GP approves the care plan and shares a copy with the patient. The patient's copy has an access code they can use to see their care plan electronically and access educational resources related to their condition.	After filling in the SharePoint form, the GP prints the care plan which has a Microsoft® HealthVault™ access code. Referral documents generated using the Microsoft Clinical Document Solution Accelerator are sent to each of the providers on the care team. A reference number gives each team member access to the care plan either through the SharePoint Server or indirectly through their own clinical systems.
5 The patient uses their code to access the Website to create a new HealthVault account or link their existing account to the care planning application.	The patient accesses the care plan through a SharePoint Server extranet site using a Windows Live® ID for secure authentication. The same ID authenticates access to their HealthVault account.
6 The diabetic educator calls the patient and walks them through the care planning application, showing them the goals they agreed with their GP. Together, they set some short-term goals for exercise and diet. They also explain how to view appointments and videos and how to use educational resources. They use this opportunity to confirm the privacy settings for their account so that the hospital can gain emergency access, if required.	Care team members can accept the referral through SharePoint Server or by opening an Office Word clinical document. They then contact the patient to arrange an appointment which is uploaded into the patient's HealthVault account. The patient can see all their appointments across multiple care providers in one place.
Coordinating and Integrating Care	
7 Over time, the patient exercises and improves their diet, while tracking their progress against the goals in the care plan. During fortnightly video conferences with their diabetic educator they talk through problems or challenges. The diabetic educator motivates them and adjusts their plan. However, their blood glucose levels remain erratic.	The diabetic educator and patient use SharePoint Server to access the care plan. The video-conference is convened through Office Communications Server. The patient's blood glucose levels are measured on a device connected to HealthVault that uploads their readings to their care plan.
8 The GP can track the progress of the care plan and a quarterly review shows that the patient's blood glucose levels have been very erratic. The GP asks the patient to get a HbA1C pathology test before the review. This test confirms that the diabetes is not under control, so the GP considers progressing to medication.	All consultation results are uploaded into the care plan through SharePoint Server. The GP can see a population view and an individual patient view through SharePoint Server Business Intelligence. This enables the GP to identify individual patients within their population base that need proactive intervention, reminders or follow-up. Through SharePoint Server Documents and Search on a clinical education and decision support site, the GP can access electronic guidelines alongside patient data. These recommend a step up to medication for short-term control, but getting the patient off medication in the medium term.
9 Before the patient attends the GP consultation they suffer an acute hypoglycemic event and faint. Their family gives the patient dissolved sugar but after 15 minutes the patient is still not lucid, so they call an ambulance. The patient is treated by paramedics and taken to hospital. The triage nurse accesses the patient's record to view their diabetes treatment. The attending doctor has a quick case conference with the patient's GP. They discuss the appropriate medication which is then prescribed. When the patient is discharged, a discharge planner coordinates the transition back into primary care and schedules a home visit by a community nurse.	Through the SharePoint Server site the triage nurse accesses the patient's HealthVault account to view their health record with primary GP and care plan details. This case conference is facilitated by Office Communications Server. A discharge summary is prepared in Office Word and sent back to the GP.

Chronic Care Journey

Technologies

Chronic Care Decision Support

<p>10 The patient returns home. The GP reviews the discharge summary and schedules an appointment with the patient.</p>	<p>The GP views the discharge summary through Microsoft® SharePoint™. It can be uploaded into their clinical system.</p>
<p>11 A population health manager (which may be the GP) can review all of the patients in a population, including groups with specific conditions to see who is adhering to treatment plans and analyse outcomes on a population basis. The population health manager is planning a group program for recently diagnosed diabetics struggling with glycemic control who have recently stepped up to active management with medication. They run a report which generates 30 or so candidates. They invite these candidates to a face-to-face group session which will progress to an online forum.</p>	<p>The GP can view population data through SharePoint PerformancePoint Services, which allows them to drill down to patient level. The Website and online forum uses Microsoft® Office WebApps and Office LiveMeeting.</p>

Chronic Disease Prevention and Self-Management

<p>12 Having lost weight and improved their exercise levels, the patient gets their glucose levels under control. They return to their GP for a six monthly review. The GP decides to step-down the medication, so they update the agreed care plan and revise it.</p>	<p>The care plan on the Microsoft® SharePoint™ site is revised to show that the patient is no longer medicated.</p>
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Referenced Works

- 1 Australian Institute of Health and Welfare (2009), *Australian Hospital Statistics 2007-2008*, (AIHW: Canberra)
 - 2 National Preventative Health Taskforce (2008), *Australia: The Healthiest Country by 2020*. A Discussion Paper, Canberra
 - 3 Australian Institute of Health and Welfare (2006), *Chronic Diseases and Associated Risk Factors in Australia*, 2006, (AIHW: Canberra)
- Mayo Clinic Family Health Manager*. (2008). Retrieved January 2009, from <http://healthmanager.mayoclinic.com>
- Association of American Medical Colleges. (2007). *The Chronic Care Model: Decision Support*. Retrieved 1 2010, from Improving Chronic Illness Care: http://www.improvingchroniccare.org/index.php?p=Decision_Support&s=24
- Battersby, M., Reece, M., & Collins, J. (2000). *Chronic disease self-management education – an Australian experience*. Proceedings of the 1st Chronic Disease Self-Management Conference. Sydney, Australia.
- 4 Blakeman, T., Zwar, N., & Harris, M. (2002). *Evaluating general practitioners' views on the Enhanced Primary Care items for care planning and case conferencing*. Australian Family Physician, 31, 582-585.
- Britt H, Miller GC, Charles J, Henderson J, Bayram C, Pan Y, Valenti L, Harrison C, Fahridin S & O'Halloran J. (2009). *AIHW: General Practice Activity Report 2008-2009*
- Brown, J., Lewis, L., Ellis, K., Stewart, M., Freeman, T., & Kasperski, M. (2009). *Mechanisms for communicating within primary healthcare teams*. Canadian Family Physician, 55(12), 1216-1222.

- Cahill Lambert, A. (2009). *Submission 258 to the National Health and Hospitals Reform Commission*.
- Celler, B., Lovell, N., & Basilakis, J. (2003). *Using information technology to improve the management of chronic disease*. Medical Journal of Australia, 179, 242-246.
- Coeira, E. (2003). *Guide to Health Informatics (2nd ed.)*. London.
- Corcoran, M. (1997). *Polypharmacy in the older patient with cancer*. Cancer Control, 4, 419-28.
- DHHS Tasmania. (2007). *Tasmanian Department of Health and Human Services, Clinical Portal Case Study*. Retrieved 1 2010, from Microsoft: http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?CaseStudyID=4000000683
- Diabetes Australia. (2009). *Australian Diabetes Map*. Retrieved 1 2010, from Diabetes Australia NDSS: <http://www.ndss.com.au/Australian-Diabetes-Map/Map/>
- Diabetes Australia. (2009). *Diabetes Management in General Practice*. Canberra: Diabetes Australia; RACGP.
- Disse, K. (2008). *Microsoft health patient journey demonstrator*. Informatics in Primary Care, 16(4), 297-302.
- Eastern Health. (2007). *Eastern Health Case Study: Healthcare Provider Improves Patient Outreach with Unified Messaging Solution*. Retrieved 1 2010, from Microsoft: http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?CaseStudyID=4000000852
- eRx Script Exchange. (2009). *eRx Script Exchange*. Retrieved 1 2010, from <http://www.erp.com.au>
- Fireman, B., Bartlett, J., & Selby, J. (2004). *Can disease management reduce healthcare costs by improving quality?* Health Aff, 23, 63-75.
- Garg, A., Adhikari, N., & McDonald, H. (2005). *Effects of computerized clinical decision support systems on practitioner performance and patient outcomes: a systematic review*. Journal of the American Medical Association, 293, 1223-38.

Referenced Works *(continued)*

- Goldberg, H., Lessler, D., Mertens, K., Eytan, T., & Cheadle, A. (2004). *Self-management support in a web-based medical record: a pilot randomized controlled trial*. Joint Commission Journal on Quality and Safety, 30, 629-635.
- Goldstein, M. (2004). *The persistence and resurgence of medical pluralism*. J Health Polit Policy Law, 29, 925-45.
- Goodwin, N., Perri, G., Peck, E., Freeman, T., & Posaner, R. (2004). *Managing Across Diverse Networks of Care: Lessons from Other Sectors*. London: National Coordinating Centre for NHS Service Delivery and Organisation R&D.
- Gosselin, P., & Poitras, P. (2008, Nov). *Use of an internet "viral" marketing software platform in health promotion*. Journal of Medical Internet Research, 10(4).
- Hospital of St Raphael. (2008, 9). *Hospital of St. Raphael: Case Study of Clinical Portal for Primary & Community Care Integration*. Retrieved 1 2010, from Microsoft: http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?CaseStudyID=4000002691
- Jerant, A., Azari, R., & Nesbitt, T. (2001). Reducing the cost of frequent hospital admissions for congestive heart failure. Med Care, 39, 1234-1245.
- Johnston, B., Wheeler, L., & Deuser, J. (2000). *Outcomes of the Kaiser Permanente Tele-Home Health Research Project*. Arch Fam Med 2000, 9, 40-45.
- Karlberg, I., Nolte E., Knai C. and McKee M. (2008) *Managing Chronic Conditions: Experience in Eight Countries*. Copenhagen: European Observatory on Health Systems and Policies.
- Kodner, D. (1993). *Case Management: Principles, Practice and Performance*. New York: Institute for Applied Gerontology.
- Kruger, D., White, K., & Galpern, A. (2003). *Effect of modern transmission of blood glucose data on telephone consultation time, clinic work flow and patient satisfaction for patients with gestational diabetes mellitus*. J Am Acad Nurse Pract, 15, 371-375.
- Leutz, W. (2005). *Reflections on integrating medical and social care: five laws revisited*. Journal of Integrated Care, 13, 3-11.
- Liu, J., Wyatt, J., & Altman, D. (2006). *Decision tools in healthcare: Focus on the problem, not the solution*. BMC Medical Informatics and Decision Making.
- Lynn, J., & Schuster, J. (2000). *Improving Care for the End of Life: A Sourcebook for Clinicians and Managers*. New York: The Institute for Healthcare Improvement.
- Microsoft. (June 2008). *Kaiser Permanente and Microsoft Empower Consumers to Take Charge of Their Health*. Retrieved January 2010, from Microsoft: <http://www.microsoft.com/presspass/press/2008/jun08/06-09KaiserPR.aspx>
- Miller, A., Condin, C., McKellin, W., Shaw, N., Klassen, A., & Sheps, S. (2009). *Continuity of care for children with complex chronic health conditions: parents' perspectives*. BMC Health Services Research, 9(1), 242.
- National Health & Hospitals Reform Commission. (2009). *A Healthier Future for All Australians, Final Report*. Canberra: Commonwealth of Australia.
- National Preventative Health Taskforce. (2009). *National Preventative Health Strategy – the roadmap for action*. Canberra: Commonwealth of Australia.
- Nelson, M., Reid C, & Ryan, P. (2006). *Self-reported adherence with medication and cardiovascular disease outcomes in the second Australian National Blood Pressure Study*. Medical Journal of Australia, 185, 487-489.
- Newnham, G., Burns, W., Snyder, R., Dowling, A., Ranieri, N., Gray, E., et al., (2005). *Attitudes of oncology health professionals to information from the Internet and other media*. Medical Journal of Australia, 183, 197-200.
- Nodturtur, V., Schneider, J., & Herbert, P. (2000). *Chronic disease self management: improving health outcomes*. Nurs Clin North Am, 35, 507-18.
- Nolte, E., & McKee, M. (2008). *Caring for People with Chronic Conditions*. London: European Observatory on Health Systems and Policies Series.
- NSW Department of Health. (2005). *Evaluation: NSW Chronic Care Collaborative (February – November 2004)*. Sydney: NSW Department of Health.
- Perez, E. (2009). *E-Health: How to Make the Right Choice*. Nursing Forum, 44(4), 277-282.
- Pew Internet & American Life Project. (2006). Online health search 2006. Retrieved 12 2009, from http://www.pewinternet.org/~media/Files/Reports/2006/PIP_Online_Health_2006.pdf
- Public Health Agency of Canada. (2009). Retrieved 6 January 2009, from Centre for Chronic Disease Prevention and Control: http://www.phac-aspc.gc.ca/ccdpc-cpcmc/index_e.html
- TeleMedCare. (January 2010). *TeleMedCare Device*. Retrieved January 2010, from <http://telemedcare.com.au/index.php/equipment>
- UK National Health Service. (2009). *NHS Choices*. Retrieved January 2010, from HealthGuides: <http://healthguides.mapofmedicine.com>
- Wagner, E. (1998). *Chronic disease management: what will it take to improve care for chronic illness?* Eff Clin Pract, 1, 2-4.
- Wagner, E., Austin, B., Schaefer, J., Von Korff, M., & Austin, B. (1999). *A survey of leading chronic disease management programs: are they consistent with the literature?* Manage Care Q, 7, 56-66.
- Wandsworth Primary Care Trust. (July 2008). Microsoft. Retrieved January 2010, from http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?CaseStudyID=4000002422
- Wells, K., Sherbourne, C., & Schoenbaum, M. (2000). *Impact of disseminating quality improvement programs for depression management in managed primary care: a randomized controlled trial*. Journal of the American Medical Association, 283, 212-220.
- Zwar, N., Harris, M., Griffiths, R., Roland, M., Dennis, S., Powell Davies, G., et al., (2006). *A Systematic Review of Chronic Disease Management*. Sydney: University of NSW.

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