Collaboration and Connectivity:

Integrating Care in the Primary Health Care Setting

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In Australia, the basic structures through which health care is delivered are much the same as they were in the 1970s. Over the same period, the health care burden has shifted dramatically from acute conditions requiring rescue care to long-term chronic conditions requiring preventative and longitudinal care. The sustainability of healthcare itself is under strain from an ageing population and a potentially diminishing health workforce.

The healthcare system cannot continue in this form. Greater, more effective collaboration among teams of healthcare providers and their patients is key to its survival. If managed with vision and cross-sector cooperation, digital technologies can empower this transformation, achieving better outcomes for patients, the community and the economy.

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Executive Summary

The attached Report is some 30 pages in length. To assist interested readers, we have summarised below the principal points made in the Report, together with an index reference where additional remarks and/or observations may be found.

Of all the industries whose consumers stand to benefit from the wider application of digital technologies, it is difficult to go past health, in particular in treating chronic and other long-term illnesses.

More than seven million Australians suffer from a chronic illness and nearly every one of them would be better off if the medical practitioners who treat them were more in touch with each other.

The impact of chronic illness on the individual can be devastating. The cost to the nation's healthcare system is more than $60 billion per annum. Diabetes alone accounts for nearly a quarter of avoidable hospitalisations and eight per cent of deaths.

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To address this challenge, the existing systems designed for "rescue" care by a single doctor need to be redesigned for managing patients over long periods of time in collaboration with an entire team of healthcare providers, such as dietitians, podiatrists, pharmacists, and specialists.

In designing these new systems, we need to rethink some of the old ways of working. These include inefficient referral processes that keep most of the patient's care team in the dark; continuing to concentrate all elements of care in the hands of over-worked GPs; using telephone, fax, and hand delivery as the primary means of communication and continuing to use idiosyncratic ways of treating patients rather than proven best-practice processes.

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The fundamental thesis of this Report is that to meet this challenge we need to provide far more systematic, process-driven care. However, these processes must be sufficiently flexible and adaptive to cope with the complexity of managing human wellbeing.

Digital technologies are the key to such a transformation, but only if used in the right way and of the right kind. The big failures in healthcare reform usually result from trying to drive systematic care with processes that are too rigid or technologies that are not sufficiently open and adaptive.

The central insight of process redesign is that digital technologies should be used to enable new, value-adding processes, rather than to support old, existing processes that add no value. Unfortunately, much of health care is characterised by the use of these technologies to automate existing processes rather than as an enabler for redesigning the business and making non-value-adding work obsolete.

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"How to address the challenge of chronic disease"

Process redesign and identification of non-value-adding processes are therefore the starting point for transforming health care. As explained in this Report, of all these processes, those involving collaboration and sharing of knowledge are in need of greatest reform.

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But what kind of digital technologies will drive this transformation? To understand the answer to this question, we first need to change our "way of seeing" health care from one of doctors and hospitals to that of a knowledge enterprise dealing in knowledge and communication.

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The knowledge enterprise, like Google and Amazon, is characterised by networked information and systems that are open and adaptive. Yet the business models used in health care are based predominantly on industrial enterprises with tightly regimented processes and closed and siloed systems.

There are three keys to the success of a knowledge enterprise. The first is **connectivity**. In all knowledge industries, competitive advantage accrues to those who invest in connecting power rather than large monolithic systems with limited connectivity.

The second key to success is the development of **open networks** of businesses and users. Open systems are designed to accommodate the heterogeneity and incompleteness of information, the diverse nature of information sources and the enormous variety of individuals and organisations that are part of health care.

The third key is to use the **internet model** as the foundation of system and business design. This model provides services that are accessible anywhere, anytime, via any medium; that are developed with a mix of private and public funding and where the value propositions of individual stakeholders drive investment and innovation.

Often, technology reforms in health care attempt to impose rigid computing models and standards on a system that fundamentally needs to be highly agile and adaptive. While health care can benefit from more standardisation, the complexity of the system and our level of medical understanding require that it allow for variations in practice, accommodate uncertain information and be able to adapt to new knowledge and technologies.

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"Drivers and incentives"

For this approach to work, government and other payers need to provide the right **drivers and incentives** through careful and consistent "market design". This is not an issue in a normal market but in a universal healthcare system — where beneficiaries and payers do not align — the incentive structure is key to driving adoption and process change.

Finally, effective **change management** needs to take place. The recently established Medicare Locals can play a key role here, using digital technologies and services to enable change at the patient and practice level and to provide the information necessary for identifying opportunities for system-wide process improvement.

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"Barriers to change"

If we do all this, private companies and other stakeholders will drive innovation into health care, eventually processes will be transformed either by will or by disruption and we will have a sustainable healthcare system providing better outcomes for more patients more equitably and more efficiently.

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In conclusion, this Report demonstrates by way of example that this approach can work. Through the development of a cloud-based chronic disease management service, cdmNet, a number of productivity and health gains have been achieved in a growing number of medical practices across Australia.

The need for change

In Australia, the health profession has not yet realised the potential of emerging digital technologies for decreasing the administrative burden of care delivery, reducing practice costs, improving patient outcomes, and providing more equitable access to care. Similarly, the management and prevention of chronic conditions have not been sufficiently effective in reducing the burden of these diseases and their downstream effects on our hospitals.

Although this lack of pace results partly from the inertia of large and often bureaucratic systems, to some extent it can also be attributed to a primary care sector that is strongly wedded to existing practices with tightly constrained forms of collaboration between the various health professions. There is limited connectivity among primary care providers, specialist care, hospital care, tertiary care, and the public health elements of the broader health system.

Despite this need for more effective service delivery and greater collaboration and despite the massive increase in collaborative communication and consumer engagement enabled by the Internet, mobile phones, and other electronic services, health care has found it difficult to adopt or adapt the infrastructure and processes used in other industries.

This paper attempts to explain the reasons for this difficulty and proposes a way to transform our healthcare systems using digital technologies and services. Our focus is on chronic illness. According to the Productivity Commission and Intergenerational Reports on the trends in the costs of health care, these diseases alone could overwhelm our healthcare system without a radical transformation in the way we treat and manage them.

The burden of chronic disease

The imperative for government to improve the existing models of primary care lies in the economic burden attributable to the range of health conditions that are now being labelled "chronic disease".

More than seven million Australians have a chronic disease. This costs the healthcare system more than $60b per year.[2] The losses to the economy through reduced workforce participation rates and productivity are more than $8b per year.[3,4] Diabetes alone is treated in over 500,000 hospitalisations each year and accounts for 9% of deaths.[5]

In Australia, it has been estimated that more than half a million hospital admissions could be avoided by better preventative actions or more effective primary care.[6] Almost two-thirds of these admissions are attributable to chronic conditions.

Sub-optimal management of patients with chronic diseases leads to serious complications for those individuals, including potentially avoidable heart attack, stroke, loss of vision, kidney failure, depression, amputation of limbs, loss of mobility, loss of independence, loss of quality life years, diminution of mental wellbeing and, probably, dementia.

7m+
Australians with chronic disease

$60b+
Cost per year to the healthcare system

$8b+
Losses per year to the economy

Understanding the problem

If we are to overcome the burden of chronic disease, we need to understand the magnitude of problem and why it requires such a transformation of our existing models of care. In this section, we attempt to outline the key elements of change and the barriers that are affecting their adoption.

The Chronic Care Model

Conventional health care is not well suited for the prevention and treatment of chronic disease. According to the American College of Physicians, "meeting the complex needs of patients with chronic illness or impairment is the single greatest challenge facing organised medical practice."[7]

The structure of the health care system today remains remarkably similar to the structure in place 40 years ago, designed principally to deal with episodic care and rescue treatments for acute presentations. The majority of hospitals are "acute care" hospitals and resources are squeezed towards dealing with problems that present today and that will have consequences today or tomorrow. There are serious pressures on those managing and guiding the system to ensure that adverse outcomes are minimised with the first ones to be minimised those judged to have the greatest short-term impact.

However, unlike acute care, chronic illness requires ongoing "longitudinal" monitoring and management, usually involving an entire team of care professionals such as dietitians, podiatrists, opticians, specialists, and pharmacists, as well as the patient themselves. While acute episodes still occur and hospitalisations are required, the bulk of care is appropriately delivered in the ambulatory setting, often in primary care.

As identified in the Chronic Care Model,[8] delivery of this kind of care requires practices to be able to develop long-term care management plans that are then closely monitored and regularly reviewed.

"Improving the health of people with chronic illness requires transforming a system that is essentially reactive – responding mainly when a person is sick – to one that is proactive and focused on keeping a person as healthy as possible. That requires not only determining what care is needed, but spelling out roles and tasks for ensuring the patient gets care using structured, planned interactions. And it requires making follow-up a part of standard procedure so that patients are not on their own once they leave the doctors' surgery.[9]

"Treatment decisions need to be based on explicit, proven guidelines supported by clinical research .... To change practices, guidelines must be integrated through timely reminders, feedback, standing orders and other methods that increase their visibility at the time that clinical decisions are made."[10]

Co-ordinating long-term care with regular monitoring and reviews across a large care team can be extremely time consuming for those involved, all the more so when communications are limited to fax, phone, and hand delivery of referral letters.

The question is: how can a busy general practice, in which chronic conditions take up more than 40% of all GP visits,[10] deliver such a model of care to all chronically ill patients without compromising quality of care?

Systematic care and Business Process Management

The somewhat obvious — though rarely adopted — first step is to develop a systematic approach to the treatment of the chronically ill population. Without such an approach, it is not economically possible to manage and monitor such a large population base, particularly when the care of each patient involves collaboration with a diverse range of other care providers.

As in any other industry, systematisation requires the identification and development of business processes and workflows that effectively achieve the desired objectives of the business. For the management of chronic disease, these processes occur at three levels: system, practice, and patient.

- **System-level processes** are those that concern the overall function of the health system; that is, the business processes adopted by all the stakeholders involved in patient care and how these are networked together. The effectiveness and efficiency of health care delivery depends critically on the business processes adopted by these stakeholders, including Medicare Locals, private insurers, community services, doctors, allied health, pharmacy, hospitals, and Medicare itself.
- **Practice-level processes** are equally important and the least understood. Most practices still run in idiosyncratic ways that may work for episodic care but are not suited to managing an entire population of chronically ill people. As a result, only a few of the most complex cases are managed according to the Chronic Care Model, while most of the chronically ill population receive conventional episodic care. However, once a practice decides to systematise the management of their chronically ill patients — and the will to make this decision and carry it through is the key underlying issue in most practices — it is relatively straightforward to develop effective business processes within the practice. These practice level processes should detail the various responsibilities of the practice staff (reception, practice nurse, GPs, and others), the triaging of the patient within the practice, the manner or monitoring patient progress, the management of appointment reminders and recalls, and so on.
- **Patient–level processes** (often called care management plans) are much better understood as they result from considerable research into best-practice guidelines and are widely disseminated by various authoritative bodies such as the Royal Australian College of General Practitioners. Plans based on these guidelines can inform the implementation of recommended patient-level processes. They typically describe the goals and targets upon which both the GP and patient agree, medications, treatments, tests, referrals, and responsibilities of the different health professionals involved or potentially involved in the patient's care and tailored to their specific circumstances. The plan should also take into account the various co-morbidities that many people exhibit and consider contingencies for deterioration in condition and other complicating factors.

As in any planned activity involving multiple individuals or organisations, such plans are only likely to be effective if they are agreed upon and shared with the participating care teams and are regularly monitored and reviewed. The alternative is that the patient will receive different and sometimes conflicting advice and instruction from different professionals, requiring them to cobble together some sort of rational response based on this input.

Patient self-management

Self-management is also an important part of optimal care, principally because behaviour change is very difficult to achieve unless patients take control of their own health. Patients need considerable support to do so: educating them about their condition and its treatment; how the disease will affect their life and those around them; encouraging them to adhere to their plan of care in ways that are relevant to them and providing reminders to help them stay on track with their plan of care.

Collaboration and referral-based care

Collaboration has been an essential component of our approach to health care since the model for the health system embraced roles for surgery, anaesthesia, antibiotics and technology that required specialisation of the health workforce.

However, the paradigm of care needed for the management of chronic illness uses the terms "collaboration" and "connectivity" in ways that are subtly different to how we have understood them over much of the last century.

Within current primary care practice, a substantial amount of care involves a range of different health professionals who are connected to one another through a "referral" process. This can be viewed, metaphorically, as a hub and spoke arrangement: each patient sees the GP and is referred "outwards" to other health professionals via various "spokes" as appropriate. Sometimes the care requirements are more complex or specialised and the patient referral becomes a request to temporarily transfer management responsibility from the GP to a specialist or hospital.

However, this approach cannot scale up sufficiently to manage the increasing numbers of patients with chronic conditions. The manner of collaboration and interaction is much more complex and cannot easily be coordinated and managed through a central hub, particularly when that hub is a busy GP.

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"Why referrals are not enough"

In the new paradigm, the patient necessarily engages with a number of health care professionals across various medical and paramedical specialities, with established processes to ensure that all the requirements of ongoing chronic disease care can be maintained and connected in an efficient and reliable network of care and carers. The collaboration needs to be far more systematic and should follow best-practice care pathways such as those that have been developed for hospitals.

Moreover, unlike the conventional referral approach where the care of the patient is passed from one provider to another in sequence, the treatment of chronic illness usually involves concurrent activities by the various members of the care team. In these circumstances, the "hub and spoke" method of referral does not work well, as the members at the end of the each spoke mostly do not know what each of the other members are deciding, are doing or have done, leading to fragmented and possibly contradictory treatment.

This is fundamentally a different view of collaboration than is provided for by conventional referral mechanisms. It does not necessarily involve divesting control from the providers and organisations that currently hold that power. But it does involve a network of connected stakeholders sharing information and managing the patient according to agreed processes, more often than not working concurrently with one another.

Why referrals are not enough

Many healthcare practitioners think that conventional referrals are a fine way to collaborate. But they have a number of weaknesses.

The central problem is that referrals are "point-to-point" communications between two members of a care team (one of which is nearly always a single GP). Because they are point-to-point, everyone else in the care team is blind to what is happening across the team. In acute, episodic care, this is often appropriate, as the activities are more or less sequential and of limited duration. But when it comes to chronic illnesses or complex conditions, the more informed everyone on the care team is, the more likely it is that better outcomes can be achieved. While the GP may be fully appraised of what the patient is doing and has done by means of these point-to-point messages, no one else in the care team has that degree of visibility.

Second, referrals do not necessarily include all relevant patient information. While this has the advantage of summarising the data and making it simpler for the recipient, it has the disadvantage that some of the results needed are not available or the recipient is unable to rely on the completeness of the information provided in the referral. Sometimes the information provided will omit details of tests that may have been undertaken elsewhere or that the GP has not included either because not considered important or through lack of access to the information.

Third, shared progress notes on a patient can provide important indicators to their condition that could influence the care being provided by others in the care team and, conversely, aid the GP by providing information on what is happening elsewhere with their patient. This is more than just the electronic medical record debate. The electronic medical record is a place where the observations of any health intervention can be recorded. Improved collaboration requires that specific health professionals in the care team can communicate directly and easily with others in the care team—an active, rather than passive, sharing of information.

Fourth, it is expecting too much of a single person to fully track everything that is concurrently going on with the patient and mediating the communications among all the care team. How does the GP know that the physiotherapist may be interested in when the patient last visited the diabetes educator, what information about that visit to pass on, and when to do so?

Collaboration and the health workforce

Evidenced in part by the growing utilisation of the practice nurse, understanding is growing that there are many tasks that may be better done by someone other than the GP. Doctors are not necessarily suited to provide all aspects of the potential care that a patient requires, especially where the long-term management of chronic conditions is involved. The reasons are many, including time pressures, elements of training that are not covered in the medical curriculum, availability of resources, and personal strengths and weaknesses.

The logical consequence of any combination of these factors is that some functions are better delegated to other health professionals and co-workers because that person has more time, sometimes more appropriate experience, knowledge or even personality characteristics to complete the required task more effectively.

However, while this approach seems to have always been recognised in specialist practice, it is less well accepted in GP practice. GPs often adopt a "jack-of-all-trades" approach until it comes to a perceived or demonstrated need for specialist referral.

For example, GPs often continue to provide dietary advice based on the belief that they have all the knowledge and skills necessary to do a good job, or perhaps because they wish to help a patient avoid the potential cost and inconvenience of seeking additional help from others. There may also be a perception that the complexity of handover is harder and the outcome less predictable or controlled than doing the same task oneself, even if cursorily.

Even so, just as expecting a CEO to do all the tasks in a company is usually a recipe for sub-optimal performance, GP practices will have to become better at distributing tasks to others to achieve not only better health outcomes for patients but also greater work satisfaction and better commercial outcomes for themselves.

Current approaches are not working

While the treatment of chronic illness requires systematic, collaborative care, the care available from health professionals in the community setting is characterised by fragmentation and disconnectedness. As most Australians have experienced, healthcare providers largely operate in disconnected silos. Patients often have to repeat details of their disease and treatment history to each member of the care team over and over again. Collaboration across the team is difficult as doctors and other care providers try to communicate by phone and fax, usually resulting in a string of call-backs. Doctors often do not know what medications and tests have been given to patients by other doctors, even when they are members of the same care team. And while one would hope that the coordinating GP may know who is doing what, any one member of the care team is usually blind to the deliberations and actions of the other members.

It is even more difficult to bring relevant and current medical knowledge and guidance to the point of care, to monitor a patient's progress against a care plan, or to alert care providers when a patient's condition requires intervention.

These failures in systematic, collaborative care are reflected in the Medicare claim statistics for MBS Chronic Disease Management items. In Australia, despite Commonwealth financial incentives, fewer than 25% of people with chronic disease are placed on care plans. Based on overseas studies, it is likely that as many as 50% of these plans do not adhere to best practice guidelines.[11] Worse still, only one in five care plans is regularly followed up and reviewed by doctors, rendering 80% of those plans all but useless at a cost to the Commonwealth of more than $440 million in 2012 alone.[12]

Analysis of Medicare data[13] for patients with chronic disease also shows very low utilisation of allied health services even for those people on a care plan:

- Just two per cent of diabetes care plans utilised dietitian services;
- Less than a quarter used podiatry services; and
- Only four per cent utilised Home Medicines Reviews.

While there is considerable evidence that systematic collaborative care provides better outcomes for people with chronic illness,[14,15] the use in Australia of care management plans and team care arrangements to effect such systematisation is often questioned by GPs as being too complex. However, while improvements and other models are no doubt possible, any form of systematic care involving multidisciplinary care teams will necessarily be complex to manage.

This problem is further complicated by the lack of compelling evidence regarding "best practice" in the delivery of collaborative care. The research base for acute care services largely evaluates the impacts of pharmaceuticals, devices, medical and surgical procedures, and diagnostic interventions in acute situations. The research base for how to manage chronic disease over long periods of time and how to achieve better long-term outcomes in the context of a fragmented health care delivery system is far less developed. Lengthy longitudinal studies are uncommon as they are often much more expensive and also more difficult to maintain. Moreover, with chronic conditions in which the end-points are usually well into the future, ambiguity is easily introduced into the outcomes over time.

The National Primary Health Care Strategy[16] also makes observations on these unmet needs:

- About half of general practice care for chronic illness does not meet optimal standards
- Factors contributing to the gap between optimal and current practice include the availability of (or lack of access to) other disciplines to participate in team care, limited engagement with self-management education, and lack of information and decision support systems
- Australian GPs are less likely than primary health care doctors in the UK, Netherlands, Germany or NZ to use a multi-disciplinary team approach to the management of chronic conditions
- Chronically ill patients are most likely to suffer the consequences of poor care coordination.

Similar results have been observed internationally. For example, the McColl Institute reports the following key deficiencies in current practice:[17]

- Rushed practitioners not following established practice guidelines
- Lack of care coordination and follow up
- Patients inadequately trained to manage their illnesses.

The most difficult problem often concerns the behaviour of patients themselves. Much of the management of chronic disease focuses on the reduction of risk arising from lifestyle choices, such as nutrition and diet, food portion size, exercise, sedentary job and leisure time, and sleep habits. Treatment of the condition usually requires that patients change their behaviour.

However, only a few healthcare professions have been trained in behavioural change management. There are also gaps between the advice to patients to change behaviour and actually ensuring that the patient receives the appropriate assistance to facilitate that change.

The National Primary Care Reform Agenda, Medicare Locals, and Super Clinics

The Commonwealth Government has put in place a number of healthcare reforms to address these problems.

The first set of reforms aimed to focus primary care on:

- Improving access and reducing inequity
- Better management of chronic conditions
- Increasing the focus on prevention
- Improving quality, safety, performance and accountability

The second set of reforms focused on improving the delivery of healthcare locally with the establishment of Medicare Locals. These organisations have been charged with implementing a shift in the Commonwealth focus — once almost exclusively on General Practitioners — to include allied health professionals and to promote links with local public health goals and hospital activity.

The government also committed funding to the provision of a large number of "Super Clinics" across Australia with the aim of encouraging collaboration through a local physical concentration of services from multiple disciplines (possibly a somewhat strange thing to do in an increasingly Internet-connected world).

Despite these reforms, changes in the delivery of health care, in strategies to reduce adverse outcomes and in prevention have been mostly incremental. The existing system and the model have remained firmly entrenched. Although there is often considerable activity at the edges to experiment with and pilot technical advances, these rarely find their way into mainstream care.

While the government reforms all point in the right direction, they say very little about what is really needed to make the integration of evidence-based best practice care possible, efficient, and equitable. In the context of the slow movement towards use of allied health professional services, as noted above, it would seem that without some dramatic change in thinking, much of the value of the reform agenda may be nothing more than "rearranging the deck chairs".

How to address the challenge of chronic disease

It is too simplistic to look at the enormous burden of poor health and to think that change and improvement will be automatic outcomes of the good intentions or imperatives of any of the stakeholder groups. The self-interests of individuals, the ethics and inherent motivation of health professionals to do their jobs well, and even the less direct, but pressing economic impact on Australian business and the economy have not arisen overnight. Our current system has evolved in the presence of all these factors.

Relying on these motivators for change, on the innate desire of health professionals to achieve optimal care for their patients, or for people to seek the best health outcomes for themselves, simply is not enough.

But what should we do instead? Below, we outline an approach that we believe will enable us to overcome this challenge.

The key elements of the approach are to:

- Focus on the business processes — not the data — at system, practice, and patient levels
- Adopt the model of process change as used in other industries, where digital technologies and information enable process reform, rather than being used to support existing processes
- Use information models suited to the knowledge economy, involving greater connectivity, open inter-operable services, and digital services networked together
- Direct government support to provide the digital infrastructure and networks necessary to support this model
- Design a consistent set of market drivers and incentives to foster a mix of public and private enterprises to use this infrastructure to innovate and add value to the network
- Evaluate the effects of process change to drive continuous evidence-based process reform

Business processes

Connectivity and the sharing of knowledge are fundamental to having a team of health professionals delivering optimal health outcomes and so to improving the health system. However none of this will be effective without fundamental redesign of the business processes and workflows at all levels of healthcare delivery so that the connectedness becomes a routine feature of care. These processes can involve teams of providers and patients in shared decision making, planning and coordination, monitoring health parameters, review and follow up, administration, and so on.

In almost every industry, business process change has been fundamental to gains in productivity and quality of service. Healthcare has largely been unsuccessful in this area, particularly in primary care. Often we see GP practices where, with the aim of improving quality and safety, processes are put in place that lock in minimum times for patient reviews, focus on needless and inefficient patient recalls, or individualise care plans to a level of detail unsupported by any evidence of improved outcomes.

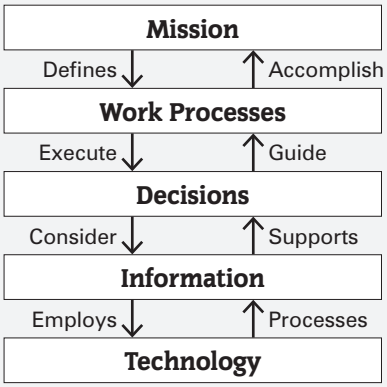
These processes tend to obstruct any technological improvement in efficiency and quality and can lead to perverse and inequitable outcomes. Care becomes high cost, in dollars and time, and therefore either unsustainable for the clinical practice or out of reach for many patients. This in the long run works to undermine the sustainability of universal health care and the equity of access to it by all patients.

Why "eHealth" alone will not drive change

In 1990, seminal articles by Hammer [Hammer, M. (1990). *Re-engineering work: Don't automate, obliterate, Harvard Business Review, 68, 4,104-122*] and Davenport & Short [Davenport, T.H. and Short, J.E. (1990). *The new industrial engineering, Sloan Management Review, 31, 4-16*] claimed that the key challenge for organisations is to remove business processes that do not add value, rather than use information technology for automating these processes. They argued that information technology was being used primarily for automating existing processes rather than as an enabler for redesigning the business processes and making non-value-adding work obsolete.

eHealth is usually defined as "healthcare practice supported by electronic processes and communication". Unfortunately, this definition fails to capture the importance of Hammer's and Davenport's insight. Implementations of eHealth initiatives too often fall into the former way of thinking—that is, the automation of existing healthcare activities—rather than focusing on process change in which information technology is an enabler of new organizational forms and patterns of collaboration within and between organizations.

It is, in this context, relevant to keep in mind the standard model of business process re-engineering, which shows how processes drive change, with data (information) and technology simply the enablers.



Practice-level and patient-level processes

A lot has been written about process change in health care, usually under the title of "change management." Various techniques have been employed in an attempt to bring about this change, such as the Australian Primary Care Collaboratives initiative.[18]

However, most of these approaches to date — unlike major process re-engineering efforts in other industries — lack effective IT support for fostering process change. Where IT has been introduced, it is piecemeal, locked into silos and is mostly applied to measure and support existing processes rather than as an enabler of change. As much as there is a temptation to do so, trying to fit new technologies into existing, perhaps century-old health care processes, is unlikely to be successful. We will come back to this issue later, when we consider the right kind of digital technologies and services needed for primary health care reform.

At the practice level, there need to be efficiencies in processes that enable things to be done faster or differently, achieving equal or better outcomes without sacrificing quality of care. Eliminating non-value-adding work such as unnecessary patient recalls, determining the roles of practice staff, and efficiently triaging patients are all key elements in such a re-design. Above all else, the practice as a whole needs to be convinced of, and committed to, a population-based approach to their chronically ill patients. This in turn creates its own virtuous cycle of quality improvement as care providers working more efficiently have more time to spend with patients or see more patients and thereby gain greater experience and skills.

At the patient level, practices need to look for digital technologies and services that enable these processes to be easily implemented and followed. Such approaches should have as objectives bringing these best practice guidelines to the point of care, assisting in collaboration and communication, simplifying review and follow up, supporting patient self-management, and eliminating paperwork and administrative overheads.

System-level processes

At the health system level, especially with the establishment of Medicare Locals, the same attention to process design around emerging digital technologies is key to meeting the challenge of inevitable change, irrespective of a formal reform agenda. With the vastly increased connectivity between businesses and services enabled by mobile and Internet communications, there are key roles for Medicare Locals, community health services, private insurers and other stakeholders in these processes.

These technologies are essential to enabling effective collaboration and sharing of information across the whole system, with care centred on the patient. The potential to deliver information and to support health services at a distance and in the home setting is huge, creating further opportunities for process change.

To achieve the health system reforms and the government's objectives more broadly, there needs to be the connectivity to collect data and the tools and resources to analyse it. Analysis should be used to direct the change and inform policy and to do so within the constraints of limited budget and workforce pressures.

Sometimes the change enabled by emerging digital technologies is so great that entire new industries build on the opportunities created while others fail to adapt. One does not need to look far: the difficulties faced by the music and film industries in the wake of digital media; the gust of change in the newspaper industry where news will continue to remain a commodity but in which the newspaper is becoming a dwindling medium; and Kodak's failure to accommodate the emerging digital photography technologies.

The reason we have so far seen so little impact of these technologies on health care probably reflects in part the disempowerment of the patient. Unlike the industries mentioned above, the healthcare consumer is rarely the payer (and therefore the cost of service is not important)[19] and typically relinquishes control of their health to the "supplier", in particular, the GP and specialist. But the changes seen in other industries will, at some time, also sweep through health care.

Bottom-up forces

Mobile health applications, decision support aids, self-monitoring, and remote treatment technology are already entering the healthcare space. Initiatives in mHealth (mobile health) and Connected Health[20,21] are helping to drive new models of care. Yet the current processes used in primary care are not suited to accessing these digital technologies in ways that could lead to more efficiency and effectiveness.

Then there is a broader societal and technological context to be considered. Since the Internet became available in 1991, the ways in which society connects and communicates have dramatically altered. While health care is commonly accused of having a "silo" or fragmented structure, communication more generally is seen to be undergoing trends of "defragmentation", increasing connectedness of systems, devices and sources. New models of service integration, patient engagement, decision support and treatment delivery are not only possible, but consumers expect to benefit from the advances in these technologies.

The right technology

So far in this article we have tried to shift the emphasis from eHealth to business process change as the key to overcoming the challenges of chronic disease. But IT is the key enabler of this process change, and it is to that we now turn.

What is eHealth?

eHealth has become a source of some confusion in the health industry, at least in Australia.

Conceptually, eHealth simply comprises healthcare practices (or processes) that are supported by digital technologies, systems, services and applications. There is nothing particularly new or mysterious here: the technologies and capabilities are largely the same as those used in the rest of the economy today.

Eventually these technologies will come to health care as in other industries. The key to winning from this change is to focus on the emerging models of care rather than the technologies themselves. By doing so, stakeholders should be able to leverage their value and protect against the negative effects of disruptive change.

Underlying all this is what the government is doing to help or hinder this progression. This is currently difficult territory. We have not yet got in place the foundation digital systems and services that will facilitate adoption of these new technologies and models of care. We know what the National Broadband Network will bring. We know what Individual Healthcare Identifiers and Healthcare Provider Identifiers are, but what will they allow us to do, who can use them, and how? And similarly for the National Authentication Service for Health (NASH), the Personally Controlled Electronic Health Record (PCEHR), and the other initiatives that are being pursued by the National eHealth Transition Authority (NeHTA), the Department of Health and Ageing, and Medicare itself: how will they help, and who will be helped?

SEE PAGE 16
"Why "eHealth" alone will not drive change"

While it is important that the government gets this right, for most stakeholders in health care the details of these government initiatives are not critical at this point in time. What matters are the emerging models of care, how the government incentivises the transition to these models, and how individual businesses use digital technologies to help enable this change.

It is early days and we have to wait a while for the digital roadways and railways to make life easier. But it is the businesses that sit on these foundations that will make the difference and they can be started now.

We now turn to a more fundamental issue with the introduction of IT into health care: are we going about it the right way?

The Knowledge Enterprise

As discussed in a previous paper,[22] the predominant paradigm of IT used in health care cannot achieve the level of transformation we need. On the whole, this paradigm has focused on the "industrialisation" of health care, leading to adoption of large monolithic systems, highly planned and standardised, fixed and non-adaptive.

Changing this paradigm requires a change in the way we view health care. Instead of seeing health care as an industrial enterprise where the main task is managing physical entities such as hospitals, healthcare providers and patients, we need to view health care as predominantly a "knowledge enterprise", where the main task is managing knowledge, much more typical of Google and eBay than the Ford Motor Company.

Unlike the industrial enterprise, the knowledge enterprise is characterised by highly connected networks, autonomy and personalisation, and the use of systems that are open and adaptive. We explain each of these ideas below

Connectivity

One of the key elements of the knowledge enterprise is connectivity. In the knowledge economy, competitive advantage accrues to those who invest in connecting power, i.e. connecting to more people and more systems to share knowledge faster and farther. The prevailing law in this industry is "Metcalf's Law": the value of a network is proportional to the square of the number of connections it makes.[23]

The more connections the better: think of Google, YouTube, Skype, and the plethora of social media sites. The key message: don't spend time getting agreement on the data, don't spend time ensuring all the systems conform — get connected!

Once connected, individual value propositions will drive stakeholders towards agreements and standards, continuously increasing the value of the data in an evolutionary way. Further, the need to understand the flow of information will drive faster adoption of improved standards, in a virtuous cycle of increased information flow, increasing value.

These capabilities are not fanciful or idealistic. They exist everywhere in the non-healthcare world and many exist in health care also. We will give an example of that later in this article.

Open systems

The other key element of the knowledge enterprise is openness. Open systems are designed to accommodate the heterogeneity and incompleteness of information, the distributed and diverse nature of the information sources and users, and the various forms of autonomous and governed institutions and businesses that are part of health care.

In contrast, the conventional approach in health care can largely be characterised as an attempt to demand conformity and lock down standards and processes. While health care can benefit from more standardisation, the complexity of the system and our level of medical understanding requires that it:

- allows for individualisation and variation,
- accommodates incomplete information, and
- be able to adapt to new knowledge and technologies.

For example, with the enormous range of healthcare providers, it is more realistic and quicker in the short term to accept that shared health records will be created in the best way currently possible, rather than to require perfection and completeness. The perceived clinical risk of incomplete records or non-standard content should be balanced against the clinical risk of not having any information at all.

The Internet Model

The primary example of a system built to accommodate heterogeneity and autonomy is the Internet. There are two keys to its success: (1) connecting anybody , anywhere, anytime, by any device; and (2) divesting investment and control of the network and its services from a central authority to suppliers and users.

The way in which the Internet evolved has allowed a mix of government and private investment, new applications and services to "plug in" and add value and new and innovative technologies and business models to evolve rapidly. There is every reason to believe that a similar evolution can occur with health services and health service delivery models.

The missing roadways and railways

For all this to work, the basic infrastructure — the roadways and railways of digital healthcare technologies — needs to be in place.

This is where the government can and should play a major role. The framework mapped out by the National eHealth Strategy[24] and subsequent work by NeHTA on developing these foundational services provides a good starting base. There is still much to do, for example, on electronic provider directories, authentication services and basic standards for pathology and medications. But it is moving in the right direction.

Nevertheless, there is the temptation to do too much. Government departments and agencies should ensure that the infrastructure supports a network of inter-operable services through standardised communications protocols and that this infrastructure provides the right core services. But it should not go too far in regulating and standardising as this overreach will hinder the innovation and transformation that the private sector and other agencies can bring through an open network of health services.

SEE PAGE 16
"The National eHealth strategy and PCEHR"

Government also needs to play the central role in establishing regulations and standards regarding privacy and security. These are critical issues in health care. The provision of an appropriate level of privacy and security is not a difficult technical problem. It is the processes involved that are potentially difficult. Too great an emphasis on levels of privacy and consent that go well beyond what currently exists in the paper world of health care can lead to inefficient and impractical electronic processes that leave things as they are, the worst of both worlds.

The National eHealth strategy and PCEHR

The National eHealth Strategy developed by Deloitte in 2008 [*The National eHealth Strategy. Deloitte Touche Tohmatsu, September, 2008*] laid out an approach to the implementation of a more digitally-enabled healthcare system. Three steams of activity were key to that strategy:

- Build the basic infrastructure: connectivity, Individual Healthcare Identifiers, provider directories—the digital roadways and railways
- Focus on high priority solutions: complete solutions that support chronic disease management, telehealth, and medications management
- Invest in change management: assist stakeholders to manage the transformation to the digital world

However, somewhere along that path, the shared health record took centre stage under the name of a Personally Controlled Electronic Health Record (PCEHR).

A shared information repository is a key part of the basic infrastructure that governments need to provide. But a data repository—such as the PCEHR—is just infrastructure. As we have tried to emphasise in this report, it is the "apps" that count, not the data! It is the business processes and solutions that sit on top of the PCEHR and the rest of the national infrastructure that will make the difference to health care.

The key issue, in that case, is to focus on making the PCEHR as easy to connect to as possible through an expanding network of digital services and systems, while providing appropriate privacy and security protections.

To date, the PCEHR has largely taken the old route: a restrictive, highly standardised system not suited to the kind of adaptive, networked world of today. The problem with this approach is that it provides very limited access to other digital service providers. Second, and most important, it is highly restrictive on what can be stored: everything has to be standardised in form and content, limiting the information to a tiny fraction of all the health-related knowledge that a patient and their providers need. As a result, the PCEHR is not what doctors really need, as it is far too restrictive. For example, its current form does not include measurements, test results, care plans, progress notes, and so on. Third, because of the huge effort required for standardizing content, the cost to government and to those who wish to use the system is substantial.

Think of what it could be if the designers "take the Internet road". The PCEHR could be the store for all the health information on all Australians, subject to their consent. It could allow any properly tagged information provided by a properly authenticated service or user to be stored within a self-organising and self-describing structure. The patient, together with their doctor and other members of the care team, could decide what to store in the record and who could see what. Existing documents, or links to them elsewhere in the network, could be easily placed in the repository without the massive effort needed to standardise and transform the information.

And guess what? The standards the government is aiming for at considerable expense to everyone would emerge naturally, driven by market and health needs.

The short story: getting connected and getting the information flowing is key to innovation; demanding that everyone meet strict content standards is its nemesis.

Drivers and incentives

Unlike typical businesses in which process re-engineering is focused on improved business outcomes in a market-driven environment, health care is usually required to be universal and equitable. This means that the drivers and incentives for change need to be carefully designed and implemented, not piecemeal, but in a consistent and global way.

Unfortunately, despite the relative ease of getting everyone connected and despite the value of this to the healthcare system, it is often difficult to establish a sustainable business model for investing in the infrastructure and systems necessary to realise the vision. One of the primary causes of this is a misalignment of beneficiaries and payers in health care, combined with the goal of providing universal access to care.

For example, the cost of building and operating the systems to distribute discharge summaries electronically to GPs and other members of the care team lies with the hospital. However, the benefit primary accrues to the patients and then their GPs for whom ongoing care becomes simpler (although the hospital may benefit in part from reduced readmissions). Similarly, with referrals into the hospital, the cost is with the GP but the benefit goes to the hospital.

In addition, without direct incentives, neither the GP nor the hospital gets any financial reward from electronic messaging. Indeed, their task is made somewhat easier with some administrative cost savings but the real beneficiaries are the patient (who might avoid an adverse event) and the system (which avoids paying for the response to the adverse event).

The big question is how to break through this market barrier. One avenue is direct government funding and support for both public and private initiatives, such as the development of broadband connectivity and managed health networks and services. This type of government support is critical for developing the open network infrastructure that is essential to sharing information and health services.

However, the most effective way of encouraging change is through the design of the incentive structures that in turn determine the market. To effect the changes needed in health care, governments, private insurers and employers can provide incentives for the adoption of best practice processes and use of effective digital services and broadband health networks. The Commonwealth has successfully adopted this approach to drive the uptake of clinical desktops among GPs. The Commonwealth also provides targeted Medicare Chronic Disease Management Items that encourage the creation and monitoring of care plans for those with chronic disease.

In short, while it is difficult to provide incentives based on health outcomes (given the difficulty of measurement and variability of outcome), it is relatively easy to measure and therefore provide incentives for the use of best practice processes and the electronic services that enable them.

Such incentive structures need to be designed as a whole, not piecemeal, if they are to be effective. The resulting economic and health outcomes also need to be monitored to ensure that funds are being directed towards productive models and not at the expense of more effective alternatives.

In the end, patients and the profession will also help drive adoption, as GPs who do not provide the full range of electronically-enabled health services will simply not be meeting consumer demand or minimal clinical standards.

By creating an open infrastructure that allows multiple businesses to connect to health information and to the healthcare market and by using financial incentives to drive users to adopt best practice care and wellness management processes, we will be able to drive private business, investment, and innovation into health care. And in the same way that the Internet has transformed the retail, music and other industries, so will such an electronically connected system transform the health industry.

Barriers to change

Business process re-design is difficult to effect in any industry. In health care, the challenges are huge.

Barriers to change at the practice level

At the practice level, the key question is how to introduce business process change (or "routines") into relatively small-scale enterprises. This is a difficult job: small businesses, no matter the industry, often have difficulty implementing process change. However, primary health care has a number of additional challenges:

- **Reluctance to take a population approach to health care.** Many GPs believe that care planning and sharing of information are needed only for complex cases. The evidence shows that best practice guidelines, involving care planning, collaboration, and regular review, provide better outcomes if applied to all patients with chronic disease, not only the complex cases.[25] Although it is appropriate that the more complex care arrangements are delivered to those who need them most, the starting point should be to systematise the processes that have been shown to improve outcomes across the whole population.
- **The view that standardisation equals poorer quality of care.** While care needs to be individualised, it can be done according to best practice guidelines. Care does not have to be entirely or even primarily subjective to be of high quality. All the literature on evidence-based practice points to the contrary.
- **Relatively poor evidence base and training.** Not only is the evidence to support particular approaches often ambiguous, but there is often inadequate understanding of issues and poor education and training in collaborative care. There is very limited and sometimes no understanding of process improvement methods.
- **Time poor.** In a business that is already operating near or often over the limit, there is no time and little inclination to spend it on process change or learning new systems.
- **Doctors are often set in their ways.** Even when evidence is presented as to the best way to manage certain problems, doctors often find it difficult to alter routines, practice and habits that have been built up over years of education and many more years of practice. Even simple things such as washing hands between seeing patients in a hospital have taken decades to implement, even partially. Altering treatment techniques, referral processes, communication styles, and work practices is a far greater challenge.
- **Poor IT support.** Because much of the IT infrastructure and interoperability standards are not yet in place, IT systems and services are hard to use and do not compare well with users' experience of these technologies in day-to-day life.

One of the fundamental barriers to systematic care and process change is a belief by many healthcare professionals that systematisation leads to impersonal care and does not take sufficient account of the individual learnings and experiences of the practitioner. With the right processes in place, this need not and should not be the case.[26] Moreover, in terms of patient outcomes, the evidence does not support this view.

Finally, there has been little research effort placed into how new processes could be developed to make use of these technologies to create new models of patient support, monitoring and care that can replace more expensive alternatives.

Barriers to change at the system level

At the health system level, there is much greater awareness of the need for effective processes and data exchange. For example, in 2009, a study reported in the New England Journal of Medicine demonstrated that the effective transfer of information in the context of surgery had the potential to halve mortality, this being one of the pillars upon which the WHO Surgical Safety Checklist was established.[27]

Nevertheless, current approaches to improve service integration and coordination at the system level are limited because there is little population data that links service use to individual patient outcomes across the full spectrum of primary care. In particular, there is no comprehensive data set that:

- links service use to health outcomes,
- includes service use data across both the private and public sector, or
- compares planned service use to actual service use at the individual patient level.

As a consequence, Medicare Locals and other health providers have only limited information for identifying service delivery gaps and effecting process improvement at a system level.

Overcoming the barriers

The primary claim we make in this article is no different to what has been written about extensively in the literature on business process management; that is, re-engineering the organisation's business processes is key and that the primary enabler of process change is effective information technology.

We have proposed above a particular way of introducing the right kind of information technology in health care in a way that is relatively inexpensive to the public purse and that will foster innovation, quality of care, effectiveness, efficiency, and accessibility.

While it will take time to overcome all the barriers to these changes, we believe that we are close to the tipping point in health care where Internet and mobile technologies will drive radical transformation of the healthcare system as we know it.

Making it happen

As an example of this approach, we describe here the development of an online chronic disease management service called cdmNet ("Chronic Disease Management Network"). This service was developed by the first author and his team at Precedence Health Care.*

How was it done?

The aim was to design a long-term sustainable solution providing improved quality of care and economic benefits to the health system, focused on chronic illness. This involved considering the following questions:

- What was the business case? Could we make a difference to healthcare in terms of quality of care and the economics of care?
- Was there a sustainable business model? Although the health system and patients may benefit, what would drive individual stakeholders to participate and engage?
- How would the solution align with and potentially leverage other government and private sector initiatives?
- What design philosophy would guide the type of solution we developed?
- How would we encourage process change in primary care practice?

Business Case: The business case was compelling at the health system level. The cost to government of chronic illness is massive, existing approaches are not working effectively and large amounts of healthcare funding is being expended on services that are unlikely to improve health outcomes.

Drivers and incentives: While there were no direct incentives for the enabling technology, Medicare incentives for best practice care of chronically ill people already exist. A software service delivering increased productivity could therefore be a win-win: no additional cost to the healthcare system, more services and revenues for the providers involved through increased Medicare payments and sufficient gains in productivity to enable the service to be paid for by GP practices.

Government and private sector engagement: On the government side, a number of forces came together at the right time: the National Broadband Network driving innovation and broadband-based initiatives in health care; the National eHealth Transition Authority identifying chronic disease as a high priority for eHealth solutions; and the various national and state reform agendas in health care and workforce focusing on chronic disease and prevention. In addition, the open services philosophy we were advocating generated a large number of partnership opportunities in the private sector.

Technology: To provide the level of collaboration and sharing required, a cloud-based service was chosen as the appropriate technology model with best of breed components, easy to use by GPs, integrated with their existing systems where possible and via Internet browser where not. Open and connected, the system would allow a wide range of other value-adding systems and broadband and mobile-based services to be linked together, with independent business models each leveraging one another.

Change Management: Evaluation would be based on university trials, with emphasis on convincing practices of the value of collaborative care and the importance of routine, systematic processes based on best-practice guidelines. Divisions of General Practice, later to become Medicare Locals, were viewed as key to the success of any change management initiative.

* The first author is Founder and Chief Executive Officer of Precedence Health Care

While the solution called out for the national healthcare infrastructure being developed by the Commonwealth, we decided we could not afford to wait for this to be implemented. Indeed, we believed our solution would serve well to inform that implementation. We also made a clear choice to start with whatever was possible: we would be ultimately pragmatic, focused on short-term needs and avoid trying to "boil the ocean".

What is cdmNet?

cdmNet is an online "cloud" service that assists healthcare providers to optimise treatments for chronically ill patients. Unlike other software support for chronic disease management, cdmNet automates the whole process of care from end to end.

cdmNet utilises guidelines for world's best practice for the treatment of chronic disease as the basis for care and establishes a multidisciplinary network of health professionals specific to the individual patient. It allows a provider to take a systematic, evidence-based approach to the management of their entire population of chronically ill patients without the heavy overheads this usually involves.

cdmNet supports many of the key elements of the Chronic Care Model as recommended by the RACGP.[28] These elements include:

- A registry of patients with chronic disease
- A shared health record for these patients
- Best practice, personalised care plans and distributing these to the patient's care team and to the patient
- Continuously monitoring the care plan, medication renewals, and appointments
- Ensuring timely follow up and simplifying review of the care plan
- Facilitating collaboration by sharing the health record, care plan, and progress against the care plan among the care team and with the patient
- Supporting patient self-management by sending alerts, reminders, and notifications to assist with adherence to care plans and the achievement of wellness goals,
- Seamlessly navigating through the complex processes of the Chronic Care Model, and
- Removing the administrative burden associated with care planning and management by automating the administrative processes and documentation necessary to meet Medicare and best-practice guidelines.

What was achieved?

Outcomes

Independent university trials have indicated that users of cdmNet achieve higher quality care, enhanced productivity of the GP practice, increased practice revenues and expanded participation of allied health and other care providers.[13]

Health outcomes

The trials demonstrated that regular use of cdmNet led to statistically significant improvements in key clinical outcomes for patients with chronic illness. For diabetes patients using the cdmNet services for 13 months or more, on average:

- HbA1c was reduced from a mean of 7.2% to 6.9% ($p<.001$);
- total cholesterol from 4.5 to 4.2 mmol/L ($p<.001$);
- LDL from 2.5 to 2.2 mmol/L ($p<.001$); and
- systolic blood pressure from 139 to 136 mm/Hg ($p<.01$).[29]

Quality of care also improved dramatically. For example, follow up and review of care plans increased from a national average of less than 20% to more than 80%, helping to solve one of the major deficits in the current approach to chronic care. Moreover, compliance with best-practice care increased from less than 50% to more than 90%.[30] Service use, such as Home Medicines Reviews, podiatry and dietitian services, increased by between 150% and more than 1500%.[13]

Productivity outcomes

The uptake of MBS items imply increased efficiencies in delivering health care, helping to address the current and predicted chronic shortage of skilled health care professionals. Compared with national data, GPs and practice nurses who regularly used cdmNet services more than tripled their productivity, as indicated by an average increase in GP revenues from MBS CDM Items from $15,000 per annum to over $60,000 per annum. The efficiency of delivering Allied Health services and pharmacy services also increased substantially.

Social outcomes

Based on international evidence, substantial societal benefits are likely to result from the health benefits indicated above. These include fewer hospital admissions and shorter waiting lists, increased access to health services, fewer adverse events, increased workforce participation, and improved morbidity and mortality. These improvements in care potentially have large financial impact on the health system and on the economic activity of chronically ill people.

Uptake

While still in the early stages, the cdmNet service has now been taken up nationally by 1,500 GPs, more than 3,000 allied health professionals and 20,000 patients. The Commonwealth Department of Broadband, Communications and the Digital Economy is supporting the rollout of cdmNet in regional, rural and remote areas of Australia because of its potential to leverage the benefits of the National Broadband Network. cdmNet has also been selected as the core technology infrastructure for the Commonwealth's landmark Diabetes Care Project, which is testing the use of digital technologies and flexible funding models to provide more equitable, more effective, and less costly health delivery.

The beginnings of a network of open services

cdmNet has been designed as an open service able to participate in a growing network of digitally-enabled services and systems. To date, this network includes:

- Integration with Cisco's Webex telehealth services, providing cdmNet users with the ability to communicate easily via video with other care team members and patients. The service also mediates the scheduling and reminders of case conferences that are essential for busy healthcare providers. It is the first known example in Australia of a telehealth capability fully integrated into a patient's plan of care and shared health record.
- Integration with low cost mobile applications for monitoring a patient's clinical parameters remotely and tracking these as part of the patient's shared health record and progress notes. This provides the basis for more home-focused care, with the potential to allow the elderly to stay in their homes longer.
- Integration with Fred Health's pharmacy dispensing systems, covering 60% of Australian pharmacies. This allows pharmacies to view a patient's care plan at the point of dispensing medications, enabling them to participate fully in the patient's care team and thereby take a more active role in their care. This is the first time in Australia that a patient's health record and care plan have been available to pharmacists online.
- Integration with the National PCEHR Infrastructure, when available allowing patient data to be extracted from the PCEHR and be posted back to the PCEHR, thus further extending the collaborative network.

An enabler for value-driven change

Finding the means to achieve buy-in from key stakeholders has been a major deficiency of most approaches to collaborative care and the reason such approaches are difficult to scale. In this case, the productivity improvements of cdmNet lead not only to higher quality of care but significantly increased revenues for the GP and the care team, both helping to drive uptake.

The re-engineering and change management approach used in the rollout of cdmNet is based on the benefits derived by each participating stakeholder:

- **For allied health providers**, cdmNet provides access to a clear and comprehensive chronic disease management record, care plans, progress notes, and an efficient online collaborative environment with support for workflows including referral, appointments management, reporting and collaborative review;
- **For patients** it provides online access to the record and the same online collaborative environment used by the care team, including all documents and the ability to record and share notes and the results of self-monitoring activities;
- **For GPs** it provides automatically generated, comprehensive management plans based on guidelines and automates key workflows relating to the collaborative management of chronic disease, including review and referral to other care team members, while managing the documentation and administrative requirements.
- F**or hospital-based staff, including specialists**, it provides access to a comprehensive health record, care plan and progress notes from the GP and allied health and will allow selective sharing of summaries, notifications and other important information with the non-hospital based care team.

What remains to be done?

Despite the achievements to date, research undertaken by Monash University shows that unless practices commit to re-engineering their internal processes to provide systematic care across their entire population of chronically ill patients, the potential benefits and continued use of cdmNet are unlikely to be realised.

For that reason, the focus of effort is now shifting to developing new means of practice and system-level change in close collaboration with Medicare Locals. The approach is to provide Medicare Locals with the means to drive collaborative care models into practice, monitor collaborative activities and use the resulting information to improve service integration and coordination responsive to local needs.

This is being achieved by:

- Using cdmNet as the technology enabler for process change at the patient, practice, and system levels
- Through the participating Medicare Locals, developing and deploying education and training resources to support process re-engineering at the practice level;
- Using cdmNet to collect patient-level data across the spectrum of primary care relating actual service use to patient outcomes and to individual planned levels of service use;
- Using this information to enable the participating Medicare Locals to improve the provision, integration, and coordination of services responsive to the local needs of the chronically ill population; and
- Evaluating and refining the business processes, incorporating lessons learned in the initial implementation to enable the processes and associated infrastructure to be scaled nationally to all Medicare Locals.

Of course, cdmNet is not a magic bullet. It is simply one part of a much bigger picture. However, it provides a compelling demonstration of what can be done by following the path suggested in this paper.

Summary

This article has attempted to outline the most important challenges in the treatment of chronic illness and what needs to be done to overcome these challenges. The key idea is simple: we need to re-engineer health care processes at system, practice, and patient levels. To enable this transformation, we need to create a network of open digital services, highly connected across the continuum of care.

All that the government needs to do is provide the digital railways and roadways. The rest can be done by mix of private and public investment incentivised to achieve best practice care through appropriate market design.

We demonstrated, through a specific example, how re-engineering processes within primary care can result in reductions of administrative costs and time wasted on administrative activities, a positive income stream for GPs and allied health and improved patient outcomes. No government eHealth infrastructure or changes to funding arrangements were required.

This example represents the tip of an iceberg. It is inevitable that such changes will occur across the primary care system, but the timing will depend on individual practitioners, Medicare Locals and the will to embrace innovations that create better outcomes for patients and win-win scenarios for payers and providers.

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