eHealth Working Group (EHWG)

A National Digital Health Strategy for Australia

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- Executive summary of the document
- Length: 2 pages

2 Introduction

2.1 Purpose of the document

This document provides a digital health strategy that recognises that the health system is changing rapidly, with new models of healthcare regularly being developed in response to opportunities, challenges and demands on the health system. Many of these changes are being driven by improved use of data. Technology is also rapidly evolving, and consumer and healthcare provider expectations are increasing in the digital health space. This strategy has a five year planning horizon, with a focus on the next three years, underpinned by a three year implementation plan. The expectation is that this strategy will be reviewed and refreshed every three years, to take account of changes in the health sector and the wider digital environment. Evaluation will occur prior to the completion of the three year term, to assess if the strategic outcomes have been met and to help inform the next planning period. This strategy builds upon the activities completed under the 2008 National eHealth Strategy.

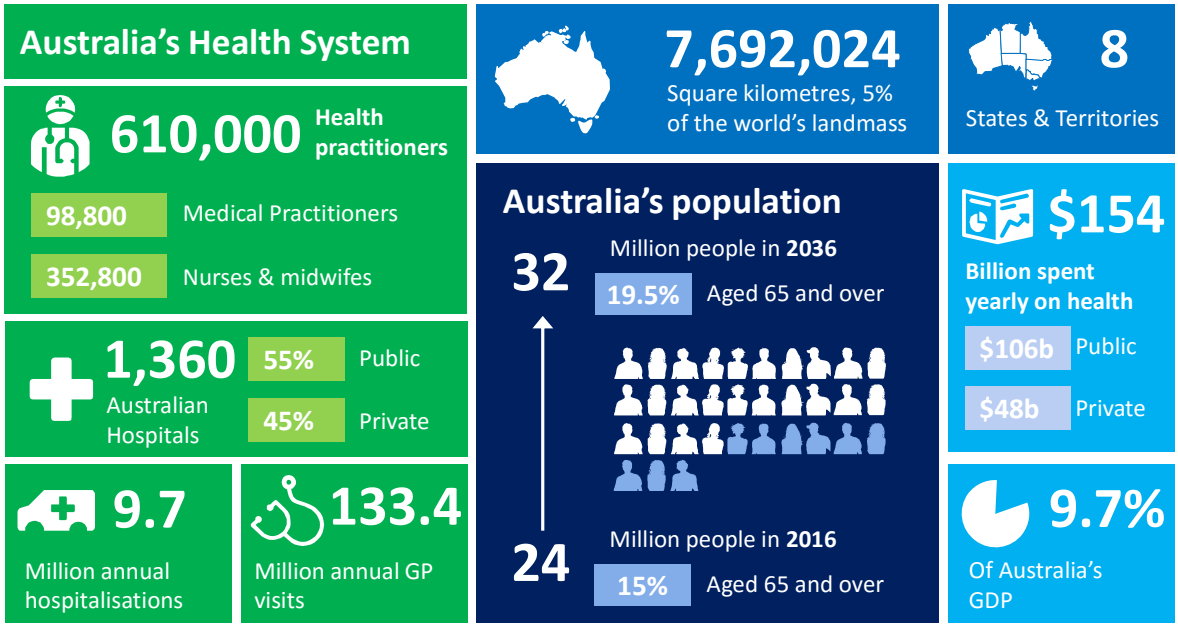
This strategy recognises that there is the need for increased collaboration across governments, the private sector and software vendors to deliver an integrated digital health system that supports healthcare provision. The aim is to supplement the governmental programme delivery by encouraging and fostering partnerships with, and innovation by, the non-government sector and software vendors.

This strategy does not propose a multi-billion dollar investment over a significant planning period; instead its focus is on the more effectual targeting and coordination of the existing investments for digital health development. All governments will continue to contribute to the costs for national digital health development and support. This strategy will outline the national digital health activities to be delivered within the existing government national investment, as reflected in the Intergovernmental Agreement on National Digital Health (1 July 2016 – 30 June 2018). Each government and the private sector is funding the development and delivery of local digital health systems and this strategy can be used as a guide for both the health and technology sectors in the planning of activities to ensure that local digital health solutions are developed to enable information interoperability at both the local and national level.

2.2 The Australian health system (in 2015) at a glance.

The Australian health system is a complex network of healthcare providers, organisations, and recipients. It provides services to a vast physical area, covering 5% of the world's total landmass. Setting policy and regulating the health system is the responsibility of both the Commonwealth, and the States and Territories. Healthcare services are delivered by a combination of public and private sector organisations. Public sector health accounts for 68% of the nation's total annual expenditure on healthcare, and is provided across eight States and Territories, with the remaining 32% of expenditure being spread across a wide range of private sector providers and organisations.

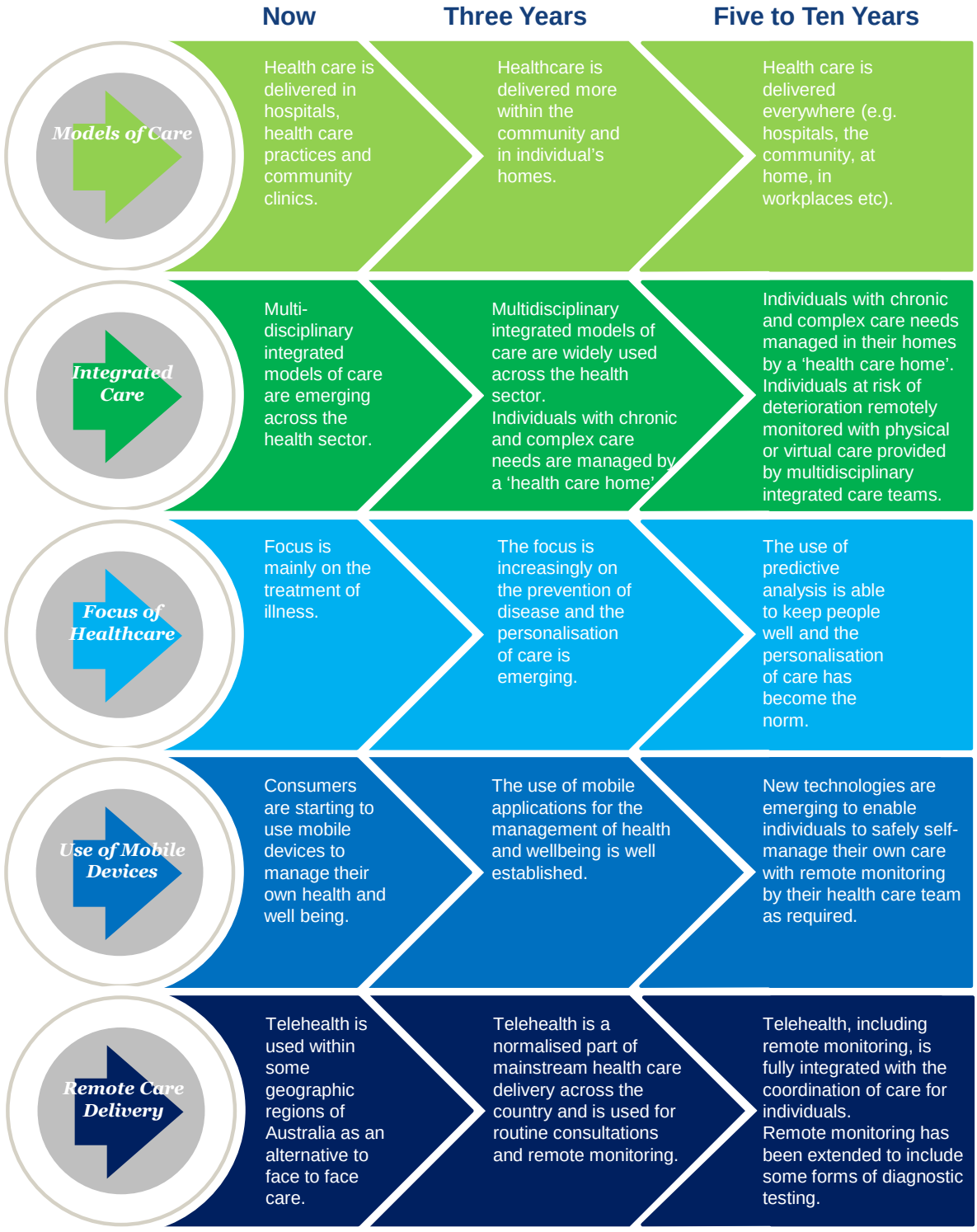
Over the next 20 years the Australian population will continue to grow rapidly (at approximately 1.3% per annum)[1], and the proportion of people aged 65 and over will continue to increase. This will increase the demand for health services, while at the same time requiring more complex and integrated services to be delivered.



[1] http://www.treasury.gov.au/PublicationsAndMedia/Publications/2015/2015-Intergenerational-Report

2.3 Healthcare – where are we likely to be in five to ten years?

Healthcare delivery in Australia has changed significantly in recent decades, and the pace of change is likely to continue to accelerate over the next decade. These changes are driven by a number of factors, including: digital disruption to healthcare delivery models; changing consumer expectations and the move to person-centred care; Australia's ageing population; and the increased prevalence of chronic disease in the population. The diagram below illustrates how the Strategy anticipates that these changes will impact different aspects of healthcare delivery over the next decade. The descriptions within the five to ten year horizon are intended to be aspirational.



2.4 What is digital health?

"Digital Health is the convergence of the digital and genomic revolutions with health, healthcare, living and society. Digital health is empowering people to better track, manage and improve their own and their families' health, live better, more productive lives, and improve society. It's also helping to reduce inefficiencies in healthcare delivery, improve access, reduce costs, increase quality, and make medicine more personalised and precise."[2]

3 Health system challenges and the need for digital health

The Australian health system is straining to meet the current demand for services and will struggle to meet the forecast demand within current budgets unless new strategies such as information based innovation and digital disruption occur. Demographic and health trends such as an ageing population and increasing rates of chronic disease, compounded by system issues such as workforce shortages and persistent health outcome and access inequalities are stretching the financial, physical and human resources of the Australian healthcare system. Given the size and increasing nature of the challenges facing the Australian healthcare system, the implementation of digital health is no longer an option - the key question now for us as a nation is how quickly and effectively we can collectively deploy useful, integrated digital health solutions to meaningfully improve the quality, safety and efficiency of healthcare delivery and provide value for money back to the community.

The rising cost of healthcare

The total Australian health system expenditure increased by 91% in the decade to 2013-14 from $81.1 to $154.6 billion (8.7% to 9.7% of Gross Domestic Product (GDP)). This represents an average annual real growth of 4.8% which far exceeds average GDP growth over this time period of 3%.[3] This rise in healthcare costs and GDP growth is predicted to continue to increase for many years to come without intervention. This level of net growth is not sustainable and as a nation there is a need to address how healthcare can be delivered more effectively and efficiently to contain this increasing financial liability. Digital health solutions can assist in the reduction of the unit cost of delivering healthcare by providing key information to healthcare providers at the time of care that will enable improved treatment decisions and to reduce the incidence of adverse events and unnecessary or duplicated services. Digital health solutions have the potential to assist in moderating the demand for services by giving consumers the tools and the quality of information required to enable them to better manage their own health and wellbeing, and exercise their choice about how and where care is provided when they need it.

Ageing of the population

The number of people aged 65 and over, in Australia, has more than tripled over fifty years, rising to 3.4 million in 2014.[4] The ageing of the population (a phenomenon not unique to Australia), has had and will continue to have a direct impact on the overall demand for healthcare services as well as the nature and complexity of service delivery, as the older the population gets, the greater the

[2] https://www.en.wikipedia.org>wiki>digital-health

[3] http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129554396 (Tables A1, A2 and A3)

[4] www.aihw.gov.au/ageing/

likelihood the use of healthcare services will be required including increased usage of multi-disciplinary care teams. Changes are required to the health system in order to meet this increasing demand, including the continued development and support of new and expanded models for the management of the coordination of care for the elderly and the development of strategies to enable healthy and active ageing. Digital health solutions will be a key enabler to the implementation of these new and expanded models of care.

Increased prevalence of chronic disease.

Chronic diseases are the leading cause of illness, disability and death in Australia, accounting for 90% of deaths in Australia in 2011[5]. The prevalence of chronic disease and the risk factors leading to chronic disease are both on the rise. The increase in the number of people with chronic disease, as well as the increase in complexity of the health care needs of these people, will place a significant demand on the healthcare system. Innovative methods to both prevent and treat these conditions are required, supported by well-designed systems enabling multi-disciplinary teams to more easily communicate and exchange quality information to provide better coordinated services across the continuum of care, especially for those in areas of need.

Health care workforce shortages and increasing specialisation

Without reform, it is predicted that by 2025 there will be a significant shortage of healthcare workers in Australia.[6] The concentration of the health care workforce in urban centres, increasing demand for services, current work practices and the decrease in size and ageing of the workforce population will all have an effect on the availability of health care professionals to deliver healthcare services, particularly in rural and regional areas. These shortages are further complicated by increasing subspecialisation within clinical practice which makes it more difficult to geographically co-locate the appropriate specialist and consumers.

Reform has commenced and will need to be extended to increase the overall productivity of the future healthcare workforce and enable remote delivery of health care to rural and regional areas, taking into consideration these limitations. Digital health solutions will provide a vehicle by which healthcare workers may be able to be utilised more efficiently by enabling work to be redistributed, reduced or provided by a different mode (e.g. using telehealth), thus creating much needed capacity within the health system.

Equality and accessibility

Health inequalities continue to persist for Australians living in rural and remote areas and other areas of need, particularly Aboriginal and Torres Strait Islander communities. Workforce shortages are placing increasing pressure on the delivery of health care services to these communities but also increasingly on communities in regional and metropolitan areas. Increasing access to healthcare services, particularly for disadvantaged communities, is therefore an important focus area. Digital health solutions can provide the means to improve the accessibility of healthcare services for these communities, through improved access to electronic information and service delivery.

[5] http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129547726 Australian Institute of Health and Welfare 2014 Australia's health 2014.Australia's health series no. 14. Cat. no. AUS 178. Canberra: AIHW.

[6] http://hwa.gov.au/our-work/health-workforce-planning/health-workforce-2025-doctors-nurses-and-midwives

Changing consumer requirements

Australians are becoming increasingly more aware of their own health, and are motivated now more than ever to take control of their own personal wellbeing, health care and health information. Technologies for consumers to monitor their health or manage their known chronic conditions are also becoming more accessible. Many consumers reasonably expect to have their healthcare managed in respect to their own individual preferences, needs, values and cultural differences.

There are others that find the health care system complicated to follow and feel overloaded with too much information and would like to see their interactions with the health care system simplified so that it is easier for them to navigate through the system. Digital health solutions can help facilitate the changes expected by consumers by introducing new ways in which more personalised care can be provided or by improving the communication of information to reduce the complexity for other consumers.

4 Progress since the 2008 National e-Health Strategy

Australian governments along with the private sector have been working collaboratively towards the delivery of a coordinated and aligned digital health ecosystem for some time now. There is recognition that all parties are at a different level of implementation of digital health solutions. Whilst there are shared outcomes committed to at the national level, different pathways have been taken to achieve these outcomes and there are different contributions that the various stakeholders have made and will continue to make to the digital health ecosystem.

A considerable amount has been achieved under the 2008 National e-Health Strategy and through the National e-Health Transition Authority to progress the meaningful use of digital health within Australia.

Australia is well placed to capitalise on the current and planned digital health investments and developments at the national, State and Territory levels, as well as within the private healthcare sector. All States and Territories have made considerable progress in the implementation of ICT infrastructure, as well as clinical and corporate information systems across their health services. This includes electronic medical record systems, diagnostic imaging and pathology systems, community health systems, adoption of telehealth solutions and workforce management to name just a few.

The core components of the national infrastructure and services are now in place including a:

- National healthcare identifier service;
- National clinical terminology and information service;
- National electronic health record system – My Health Record;
- National health services directory;
- National authentication service for health;
- National product catalogue; and
- Digital health reference and testing platform service.

A comprehensive policy and legislative framework has been delivered to underpin theses technical achievements.

National specifications and standards to support the implementation of digital health solutions have been developed.

The Australian Digital Health Agency has been established commencing operation from 1 July 2016 as the single accountable organisation for the coordination of all digital health at the national level within Australia.

All jurisdictions have shown a commitment to the use of national digital health foundational capabilities within their digital health environments through initiatives such as:

- Utilising the National Health Service Directory to make publicly available information about their health services;
- Implementing national individual healthcare identifiers for submission of information, including electronic discharge summaries, to the My Health Record system;
- Utilising the national product catalogue to exchange health related product and price information between suppliers and buyers.
- Submitting electronic discharge summaries to the national My Health Record system; and
- Enabling access to view the My Health Record system from within jurisdictional systems.

Private healthcare organisations have demonstrated a commitment to the implementation of digital health where private healthcare organisations across Australia have incorporated or are looking to implement digital hospitals within their health services, and are utilising the national product catalogue to exchange health related product and price information between suppliers and buyers. Private hospitals are submitting electronic discharge summaries to the national My Health Record system.

General practitioners have been early adopters of the use of technologies. A significant number of general practitioners manage the clinical care of their patients using fully computerised electronic medical records and have the capacity to connect to the national My Health Record system.

The software industry that supports the health care sector has been instrumental in the development and implementation of the digital health solutions to realise these achievements across the healthcare sector.

5 The need for a National Digital Health Strategy

The “information age” is already upon us and influences all aspects of our lives. Technology advances have over a number of years revolutionised how we interact with each other and with most other industries. In December 2014, 89% of Australian adults owned a smart phone and in July 2015 there were 1.6 million apps available for use in Google Play, and 1.5 million apps available in the Apple apps store. The use of digital technologies in most aspects of our lives is now the norm. The Internet of Things offers real potential to have a major influence on revolutionising healthcare delivery. Overseas, digital disruption and digital transformation within the healthcare sector is occurring and health and wellbeing is being integrated into the broader digital community scope. Whilst significant achievement has been made within Australia, in the establishment of the national

digital health foundational capabilities and the increased use of digital health solutions at the State and Territory or more local levels, there is still a long way to go before digital health is fully integrated into the way that healthcare is delivered within this country. We are only part way through the journey to deliver consistent meaningful use of digital health across the Australian healthcare sector.

Realising the full potential that digital health solutions can provide to the healthcare sector requires the engagement of all of the key health stakeholders. The governance arrangements for the digital health initiatives reflected within this strategy will recognise this. The Australian health system is such a broad ecosystem, this involvement will cover representation from a broad range of stakeholders including governments, private sector, consumers, healthcare providers, professional bodies, peak bodies and software vendors. Ensuring digital health solutions enable a safe, high quality, innovative and adaptable Australian health system will require a constant focus and collaboration within and between all of the stakeholder groups.

Equally, it is recognised that if digital health solutions are to have a genuine impact on changing or supporting healthcare delivery, there must be a real and consistent engagement of key stakeholders, (particularly healthcare providers and consumers), in the design of new digital health solutions.

Whilst it is important that ownership for the delivery of many of the digital health initiatives that are reflected within this strategy are held at the health service delivery level. National coordination for driving the adoption of these initiatives, at this point in time, will accelerate the benefits that can be derived from their implementation. During the term of this strategy, change and adoption will be specifically targeted and accelerated. Through the engagement with all stakeholders, the uptake and meaningful use of digital health solutions will be driven in the areas that are seen to be of the most value to the healthcare sector as a whole.

At this point in our digital health journey, there is still a need for a nationally coordinated and government led approach to digital health solutions in this country. International experience shows that across the diversity of market environments from the free market of the US to the tightly regulated markets of Singapore, strong government leadership and involvement has been necessary to drive the adoption and use of digital health. This reflects that many of these services (for example, national standards) are in the nature of public good and also that there are significant economies of scale in delivering a single national service (for example, healthcare identifiers).

6 Digital Health vision

The individual is placed at the centre of healthcare. Individuals and their healthcare providers are supported through the availability of up-to-date, accurate and reliable health information about the individual's health. Digital health solutions will enable a safe, high quality and more cost effective health system for all Australians.

The objectives of the National Digital Health Strategy are:

Objectives
1. Provide individuals with electronic access to the information needed to better manage and control their personal health outcomes, maintain health and wellbeing, improve health literacy, and enable them to capture and securely share that information.
2. Support more informed population health management, continuous improvement, research, policy development and investment in the health system through access to timely, accurate and comprehensive health activities and outcome information.
3. Enable health care providers and multi-disciplinary teams - and the individual they are caring for - to electronically communicate and exchange information to provide more integrated and better coordinated health care across the continuum of care.
4. Enable the Australian health sector to more effectively operate as an inter-connected system, overcoming the current fragmentation and duplication of service delivery, and drive efficiencies in the management of health service delivery.
5. Enable better health outcomes and improved accessibility to services, particularly for individuals within remote and rural communities.
6. Improve the quality, safety and efficiency of clinical practice by giving health care providers better access to patient health information, clinical evidence and clinical decision support tools.
7. To create a collaborative marketplace to foster support for innovation and competition in the digital health market to encourage the development of innovative digital health solutions that meets the needs of the health sector.

The guiding principles for implementing the National Digital Health Strategy are:

Principle	Description
User centred design	Consumers and health care providers will be actively engaged in the design and delivery of digital health solutions.
Health care transformation first	Digital health solutions are key enablers to the transformation, or continuous improvements within the health system. The technologies are not solutions on their own.
Iterative design and continuous learning	Iterative design of digital health solutions and standards will be used to prototype, test, and refine these solutions to allow for continuous product improvement and learnings.
Strong policy support	Strong policy design will guide and support digital health solutions, including the setting and regulating of data and privacy guidelines, and will keep pace with the development of digital health innovation.
Encourage innovation	Health care participants and vendors will be encouraged to implement locally relevant innovative solutions leveraging national digital health capabilities.
Collaboration	Collaboration, shared collateral and knowledge sharing will be fostered across the Digital Health ecosystem.

6.1 What does this strategy mean to the key users of digital health solutions?

The following section describes what the vision and objectives of this strategy will mean to the key users of digital health solutions.

Consumers will be able to:

- Have the ability, through the use of mobile applications and devices, to manage their health and wellbeing, make healthy lifestyle choices, and to self-monitor their own healthcare.
- Benefit from the knowledge gained from population based studies of disease risk factors, disease prevalence and the measurement of the effectiveness of treatments.
- Have access to their shared care plans where needed, and be able to electronically self-monitor their progress in reaching their care plan goals.
- Have improved access to shared health summaries, event summaries, pathology and imaging reports, medications information, discharge summaries and specialist letters, through the My Health Record system and share these with other people they choose, such as family and carers.
- Have better access to healthcare services in rural and remote areas through the use of technology enabled access.
- Benefit from the improvements made to referral processes so that they will have a better understanding of when they might receive care and treatment.
- Benefit from clinicians who look after them having complete and up to date medications to provide safe treatment.

- Have confidence that their health information is being managed appropriately in the provision of care, and securely and protected from any unauthorised use of the information.

Healthcare providers will be able to:

- Have access to better quality, structured data to support healthcare delivery, population based studies, research and precision medicine.
- More easily communicate digital health information securely across the health sector.
- Electronically receive health information, in a timely manner that is important for the coordination and continuity of care delivery or receipt of transfer of care.
- Have access to a summary of the care of an individual, across their healthcare providers, through the My Health Record system.
- Electronically refer patients to other healthcare providers and receive timely information back in relation to the progress and outcome of that referral.
- Remotely monitor their patients using telehealth, regardless of their geographic location.
- Increasingly are able to reconcile medications information received electronically from multiple sources, within their clinical information systems, on first presentation of a consumer.
- Have access to improved information in relation to a consumer's allergies or clinical alerts.

Healthcare administrators will be able to:

- Facilitate the implementation of new models of care, make better use of staffing resources, or streamline current processes, through the use of digital health solutions that enable automation of processes and/or provide improved access to information.
- Undertake more timely and informed population health review and management through access to timely, standardised, accurate, comprehensive health information.
- Provide value to researchers, in providing the health information that is important in the evaluation of health outcomes and service delivery mechanisms, and applying this knowledge to improve healthcare processes.
- Improve the integration and coordination of care, within and outside their healthcare services, through the access to timely, accurate, comprehensive health information.
- Be provided with greater visibility of supply utilisation, be able to reduce waste and manage costs better through electronic supply chain management.
- Improve healthcare service quality through access to the data required to measure healthcare outcomes and the clinical effectiveness of care and treatment.
- Consider alternative healthcare service delivery options through the use of telehealth, including the remote monitoring of individuals.

7 Key strategic areas of focus

The strategy comprises seven key strategic areas of focus. These seven areas of focus have been determined based upon an assessment of the current health system challenges, undertaking an analysis of the likely changes to healthcare delivery in the next ten years, and undertaking an alignment to the current health system priorities.

These seven key strategic areas of focus are:

- Person-centred care and Precision Medicine;
- Population health focus;
- Coordinated and integrated care;
- Health service efficiencies;
- Improved access to care;
- Quality and safety; and
- Encouraging innovation.

The specific national strategic initiatives to be undertaken in order to realise the strategic objectives of this strategy are described in the section below. It is not intended that government will necessarily have the lead, or have sole responsibility for the delivery of these strategic initiatives. The detail of the responsibilities for leading and delivering the strategic initiatives is reflected within the implementation plan that will complement this strategy.

7.1 Person-centred care and Precision Medicine

Person-centred care is about placing the person at the centre of their own care to both consider their point of view, and engage them in the healthcare decisions that affect them. It is also about empowering a consumer to be more involved in, or in control of, the management of their health and wellbeing. This represents a major shift in the way clinical care has been delivered, moving from a provider-centric driven model of care to a model that places the consumer at the centre.

A real opportunity exists to utilise digital health solutions to empower consumers to make healthy lifestyle choices or to self-monitor their health conditions. That if sustained will deliver long term beneficial health outcomes for the individuals concerned and economic benefits to the broader community.

Some of these digital services include the:

- Provision of access to online healthcare services and wellness information focussed on the prevention of disease;
- Use of mobile applications to promote health and wellbeing;
- Use of mobile applications to provide digital therapies for health and social interventions;
- Use of mobile applications and/or sensors to track and improve personal health goals;
- Self-monitoring of certain health conditions, such as blood pressure and blood glucose levels; and
- Use of online communities of health to enable people from any location to connect with others who have a common interest in a health condition.

There are a wide range of applications and devices already available that could be better utilised to keep people in their homes, self-monitoring their own care. Greater use of these technologies would enable consumers to be cared for in more convenient and cost effective ways whilst maintaining their independence. There are technologies in development that could further enable improved remote management and self-care of a person's health condition, such as smart drug delivery mechanisms that are intended to enable a consumer and their healthcare provider to monitor and improve adherence to prescribed medications through the automation of drug delivery or the provision of information about drug usage.

Equally, improved interactions between consumers and their healthcare providers could be enabled through the use of digital health solutions. Whether this is the sharing of an individual's clinical information so that they can better understand their clinical condition, the use of telehealth to review an individual without the need for them to travel, or the remote monitoring of an individual's condition to keep them in their home until such a time as they require intervention at a higher level. The more a person is informed and engaged in their healthcare the more likely they are to make appropriate changes to their disease management behaviours.

Diagram 1 Examples of Consumer use of digital health solutions.

Whilst it is fully expected that the majority of initiatives within this area will be driven from outside of the government sector it is recognised that there is still the need for the national coordination of activities. A coordinated approach to the evaluation of the suitability of applications and medical devices, developed for this purpose, needs to be established to ensure that these technologies are suitable for health care use, and safe to be used as a health application or device.

Ensuring government considers health specific requirements in its plans to address digital inclusion are another important consideration, to ensure consumers who currently do not have access to these technologies are not disadvantaged.

Further, the summary information stored within the My Health Record system will be made available for use within these applications (subject to privacy and access requirements being met) and it is intended that health information from personal health and self-monitoring devices will be able to be stored within the My Health Record system in a future release (subject to consultation with consumers and healthcare providers as to the information to be included).

7.1.1 Precision Medicine

Precision Medicine is an emerging field of medicine that has already started to transform the way disease is treated leading to more accurate diagnosis and better health care outcomes. Precision Medicine takes the personalisation of health care to an entirely new level. Precision medicine takes

into consideration an individual's genomic profile, the environment in which they live, their previous medical history, their medication information, and their lifestyle to tailor the treatment of disease to match these unique characteristics. Individual patient data can be derived from a number of different sources, including patient generated information, records of clinical consultations, genomic data and sensor data derived from medical devices for use in precision medicine. Precision medicine predicts which interventions are more likely to improve patient outcomes for an individual, and thus provides healthcare providers with recommendations in relation to the appropriate courses of treatment specific to that individual.

Objective

1. **Provide individuals with electronic access to the information needed to better manage and control their personal health outcomes, maintain health and wellbeing, improve health literacy, and enable them to capture and securely share that information.**

National Strategic initiatives

S1.1 Software vendors in partnership with consumers, healthcare providers and organisations will design and implement digital health solutions aimed at delivering person centred care.

S1.2 Design and implement a national solution to enable appropriate health information from personal health and self-monitoring devices to be able to be recorded within the My Health Record system.

S1.3 Coordinate the rollout of a national solution to enable information from the My Health Record system to be utilised within third party mobile and other applications aimed at delivering person centred care.

S1.4 Design and implement an agreed national approach to the evaluation of the fitness of use and safety of third party health applications and medical devices, leveraging off international standards already developed for this purpose.

S1.5 Work with Commonwealth Agencies, (outside of Health), to ensure that health specific requirements for digital inclusion are addressed in governmental digital inclusion plans, and to ensure that majority of Australians can benefit from the solutions being developed.

S1.6 Establish a nationally considered position on the management of genomic data, leveraging international practices and standards already developed for this purpose.

Benefits

- Empower individuals to make healthier lifestyle choices;
- Provide the information and tools for consumers to self-monitor their healthcare conditions;
- Lessen the avoidable demand for services through improved self-management and/or improving health and wellbeing; and
- Provide the information and tools for consumers to be able to make informed choices about what, and how they receive care.
- Trust by consumers to fully utilise digital health technologies.

Case Study

Bowel Cancer Australia – Bowel Cancer app. Informing and empowering individuals (and their carers) with or at risk of bowel cancer.

Bowel cancer is Australia's second most common cause of cancer related deaths. Bowel Cancer Australia has developed a bowel cancer app that is smart phone enabled, to both inform and empower individuals (and their carers) with or at risk of bowel cancer. The app assists individuals to better understand this condition and to be better equipped to manage their health and wellbeing. This app is able to be personalised to store screening reminders, treatment and mood diary entries, and to record notes from medical appointments.

Other features of the app include:

- Interactive treatment and screening pathways;
- Diet and lifestyle strategies to reduce the risk of bowel cancer;
- Videos such as how to perform a bowel cancer screening test;
- Quick links to Bowel Cancer Australia's nurse and nutrition advisory services;
- Consumer Medicines Information (CMI) for medicines used in bowel cancer treatment;
- Bowel-friendly recipes and meal plans; and
- The latest statistics on bowel cancer in Australia.

This app provides easy access to accurate information about bowel cancer, its prevention, diagnosis and management. [7]

[7] www.bowelcanceraustralia.org/bowel-cancer-app

7.2 Population health focus

An increased emphasis on the collection, analysis and use of healthcare data as an important asset, is emerging across healthcare systems internationally, and has the potential to significantly change the way healthcare can be delivered into the future. The enhanced use of healthcare data will see a continual shift away from the traditional output based evaluation of the health system, to a healthcare delivery system that places far more of an emphasis on person centric care delivery, prevention of disease and the measurement of healthcare outcomes. The timing is right for the Australian health system to consider these capabilities as:

- There is an increase in population based healthcare data available through the digitisation of clinical information;
- The technologies are now available to manage these large data sets, including the management of data that is both structured and unstructured;
- There are a number of tools available or emerging, such as graph analytics, machine learning, predictive analytics, artificial intelligence and risk stratification that are able to be used to analyse and report on large volumes of health information; and
- There is an increased demand from healthcare providers for population based health data to become available in a more timely fashion.

The analysis of these large population based healthcare datasets will increasingly be used for activities, such as:

- Identifying the presence of health and disease risk factors;
- Identifying the level of prevalence of disease;
- Evaluating the effectiveness of treatment methods;
- Better measurement of healthcare outcomes;
- Developing predictive models for diagnosis, treatment and care delivery (e.g. patterns of usage);
- Informing evidence based treatment and care; and
- Informing clinical decision support.

These healthcare data sets will over time also be combined with other data sets, such as social indicators, to develop a better understand of how social determinants and consumer behaviours influence health outcomes.

There needs to be a nationally considered position in regard to the how this ‘secondary’ use information will be shared, managed and stored with the view to avoid the unnecessary duplication and overlap in the provision of these services. Both government and non-government healthcare organisations have a vested interest in defining how information might be stored, contributed to and accessed for population based studies, research and precision medicine. A review of the legislation, governance structures and policies for the establishment of these population based data repositories should also be undertaken, including clinical registries.

The My Health Record system will be a contributor to these population based datasets and to precision medicine. The governance structures and policies to enable the My Health Record system data to be used for these purposes, needs to be developed and implemented.

The use of clinical data models are important to the aggregation of health information for both population based studies and research. One of the functions of the national Clinical Terminology and Information Service is to be utilised for the creation of clinical data models. These clinical data models may be used for the storage of data for direct healthcare provision or utilised for other purposes, such as the measurement of health outcomes or clinical effectiveness. It is important that the clinical data models developed within this Service are able to be shared and leveraged across the health sector.

Objective

2. **Support more informed population health management, continuous clinical improvement, research, policy development and investment within the health system through access to timely, accurate and comprehensive health information.**

National Strategic Initiatives

S2.1 Work with the Australian Institute of Health and Welfare (AIHW) and the National Health Information and Performance Principle Committee (NHIPPC) to advance the collection and use of health information for population based studies and research and develop a national considered position in relation to the contribution of health information to population based data repositories.

S2.2 Australian Health Ministers Advisory Council (AHMAC) to undertake a review to ensure that the legislation, governance structure and policies are in place to enable the establishment of population based data repositories, including clinical registries.

S2.3 Establish the governance structures and policies for enabling secondary use of My Health Record system data.

S2.4 Establish a nationally coordinated approach to enable the sharing and leveraging across the healthcare sector of the clinical data models developed within the National Clinical Terminology and Information Service.

Benefits

- Improve the ability to identify disease risk factors in a timely manner for individuals and population groups;
- Improve the ability to identify the level of prevalence of disease in a timely manner within population groups;
- Provide the information to improve clinical decision support capabilities and evidence based treatment and care;
- Improve the ability to measure and evaluate health outcomes;
- Increase the accuracy of clinical diagnosis;
- Personalise the treatment and care provided to individuals; and
- Rationalise the prevalence and costs of population based repositories.

Case Study

Innovations in Chronic Care Delivery Using Data-Driven Clinical Pathways

A study published in the American Journal of Managed Care details how researchers at Carnegie Mellon University used machine algorithms to learn data-driven and practice based clinical pathways, using structured and de-identified electronic health records from 2009 to 2013 for 664 chronic kidney disease patients.

Using this technique they were able to identify seven patient subgroups within this patient cohort, distinguishable primarily by their type of complications. They were also able to accurately predict the most probable clinical pathways of care delivery for these patient subgroups and predict the future states for these patients.

This study demonstrated the potential for the use of currently available large population sets of clinical information to influence clinical care in the delivery of standardised but personalised care.[8]

[8] Zhang, Yiye, MS and Padman, Rema PhD, Innovations in Chronic Care delivery Using Data-driven Clinical Pathways, American Journal of Managed Care, 23 December 2015, www.ajmc.com/journals/issue/2015/2015-vol21-n12/innovations-in-chronic-care-delivery-using-data-driven-clinical -pathways

7.3 Coordinated and integrated care

The coordination of healthcare provision is important to all recipients of healthcare services. For those consumers with chronic and complex health conditions, the coordination of care across the multiple healthcare providers they attend is essential for the effective management of their health conditions, and their holistic treatment. Digital health solutions enable the provision of knowledge and health information to healthcare providers, to assist them to provide well organised, structured and planned care for an individual, taking into consideration an individual's needs and preferences.

Digital health solutions can also assist in the continuity of healthcare provision, particularly in the provision of information on handover of care from one service provider to another.

Having digital health solutions to support the coordination of care will become increasingly more important as new models of healthcare delivery emerge. It is anticipated that many services currently provided in traditional healthcare facilities, such as hospitals, will increasingly be provided within community based settings, within people's homes or wherever the person is.

To facilitate integrated and coordinated care there needs to be the timely creation and sharing of key clinical information important for the transfer or shared care of an individual. Whilst individuals with chronic and complex conditions are likely to be managed in the future through a 'healthcare home', (that coordinates their care across the healthcare system), many of these 'healthcare homes' are likely to be virtual. The preference is that this information can therefore be produced and shared electronically between the care team and with the individual concerned. A nationally agreed approach to the timely electronic creation and sharing of shared health summaries, specialist letters and discharge summaries should be developed to facilitate this care coordination, building on the many advances already achieved.

Shared care plans are another key clinical information source that will become increasingly more important for the management of individuals with chronic and complex conditions, particularly when care is provided by a number of healthcare providers in a range of settings. A shared care plan is a multidisciplinary tool for the recording of information, (over a period of time), in relation to an individual's healthcare condition(s), related goals to improve health and wellbeing, and a series of actions to achieve each of these goals. A shared care plan covers the entire duration of care of a condition from assessment, planning, care delivery to the evaluation of healthcare outcomes. A nationally agreed approach to the timely electronic creation and sharing of care plans should be developed building on integrated care pilots already underway in a number of States and Territories.

National coordination of these activities is important to ensure that specifications are consistently applied, thus ensuring important clinical information is able to be accessed and understood throughout all parts of the healthcare system.

The My Health Record system has an important role to play in enabling the sharing of health information about an individual with chronic and complex conditions, particularly when that individual moves location or requires care outside of their 'healthcare home'. The My Health Record system will also provide the platform to electronically share health information with an individual about their care and provide a means by which an individual can record and track their progress against their care plan goals. Increasing the volume of health information uploaded and accessed through the My Health Record system is a priority.

An inhibitor to the effective communication and coordination of services across the health sector, particularly in the transfer of care, is the inability to achieve interoperability between health service provider organisations using secure messaging. Whilst various attempts have been made in the past to address this, secure message interoperability continues to be a significant issue. A national coordinated approach to address this issue, working with the software vendors involved needs to be developed.

There are many determinants of the health and wellbeing of an individual. Not all of these factors are managed within the healthcare sector. It is important that there is the ability to manage information held about an individual across the various government departments and support agencies that provide social, aged care and disability services along with healthcare information, (providing the individual consents), so that the health and wellbeing of that person can be managed holistically, rather than as fragmented services. A nationally coordinated approach to the sharing of information with other government initiatives such as the My Aged Care record, National Disability Insurance Scheme and Mental Health portal needs to be developed to ensure access to both health and other relevant information is easily accessible to healthcare providers.

3. Objective

Enable health care providers and multi-disciplinary teams - and the individual they are caring for - to electronically communicate and exchange information to provide more integrated and better coordinated healthcare across the continuum of care.

National Strategic Initiatives

S3.1 Establish a nationally coordinated approach to the management of secure messaging that enables interoperability across the Australian healthcare sector.

S3.2 Develop and implement a nationally coordinated approach to increase the volume of high value clinical information made available to the My Health Record system and the meaningful use of information by healthcare providers.

S 3.3 Develop and implement a nationally coordinated approach to the timely electronic creation and sharing of key clinical information important to the coordination of care and all transitions of care, such as shared health summaries, specialist letters, discharge summaries and shared care plans.

S3.4 Develop and implement a nationally coordinated approach to the sharing of information with other relevant government initiatives such as the My Aged Care record, National Disability Insurance Scheme and Mental Health portal.

Benefits

- Improve electronic communications and exchange of information between service providers;
- Improve the ability for healthcare providers to coordinate services across the healthcare continuum for an individual with chronic or complex conditions;
- Enhance the ability to structure care for an individual with chronic or complex conditions by giving increased consideration to their individual needs and preferences;
- Improve the ability to coordinate care of an individual across health and other social services; and
- Reduce the rate and requirement for hospitalisation by enhancing the ability for individuals to be cared for within their homes or community settings.

Case Study

Shared digital record system enabling coordinated care in the Northern Territory

An evaluation of the Northern Territory My eHealth Record service (MyEHR) undertaken in 2015[9] produced evidence of how a shared digital health record system can bridge information and sector silos, and by doing so deliver significant quality and efficiency benefits to both healthcare providers and patients. The MyEHR service does this by facilitating vast flows of clinical information between and within sectors. The evaluation found the MyEHR service is relied on most frequently at points of clinical handover. For example, the service is used by hospital pharmacists while undertaking admission medication reconciliation; during preoperative anaesthesia consultations; and upon return to primary care following an emergency department or hospital admission. In effect, it is enabling more coordinated and integrated care to occur irrespective of where and how a patient interacts with the health system.

In 2015, the Northern Territory MyEHR service, a former HealthConnect trial, successfully transitioned functionality to the national My Health Record system.

[9] MyEHR to National eHealth Record Transition Impact Evaluation, NEHTA, http://www.nehta.gov.au/get-started-with-ehealth/ehealth-benefits/case-studies/northern-territory/918-myehr-to-national-ehealth-record-transition-impact-evaluation

7.4 Health service efficiencies

Australia has a quality healthcare system that rates highly when compared internationally.[10] Australia expends a considerable amount of money on healthcare, and this expenditure is growing. Without detracting from the quality of healthcare delivery, or the excellent health outcomes that Australians receive, it is important that every opportunity is taken to look for ways of improving the health system to relieve some of the pressures associated with the growing healthcare expenditure.

Digital health solutions can assist in improving the efficient management of health service delivery. Improved access to timely health information can contribute to a reduction in the duplication of tests and services and more efficient use of resources (both human and goods and services) has the potential to be a key enabler to the health reform process.

Having pathology and diagnostic imaging results available in a single location and accessible by all healthcare providers caring for an individual, is important for the clinical management of that individual. Timely and easy access to pathology and diagnostic imaging test results has the potential to reduce unnecessary repeat tests where a healthcare provider is unable to obtain access to a result or is unaware that a test has been previously performed. To meet this requirement there needs to be a nationally coordinated approach to enabling the upload of pathology and diagnostic imaging results from both government and private sector pathology and diagnostic imaging providers into the My Health Record system.

The current process associated with obtaining access to diagnostic images for an individual is very time consuming, as the information required can often be housed in a number of different diagnostic imaging repositories. The health care provider needs to maintain access to all of these repositories in order to get access to diagnostic imaging information about their patients. It is for these reasons that having diagnostic image reports and images accessible via a single location and accessible by all healthcare providers providing care to that individual is sought after.

The increased use of digital technologies in the management of the healthcare supply chain, (one of the biggest costs to healthcare providers behind labour costs), will provide health services with a better visibility of the products, devices and supplies used within their service, thus improving utilisation of these products, reducing possible waste and improving cost management. Real opportunities exist to positively impact on the performance of healthcare organisations through enabling the improved management of the processes associated with the purchase, management and use of healthcare supplies. Equally from a quality of care perspective, it is important to understand when a particular product or device has been used on an individual in the event of a product recall. Patient safety could be improved through the unique identification of supplies across the health system.

In order to enable improvements in supply chain management across the health sector, a nationally coordinated approach to the adoption of specifications for the consistent identification of all products, people (both staff and patients) and locations for use in healthcare supply chain management should be developed. Undertaking this work nationally will ensure that the same methods for identifying these supply chain attributes are consistently applied across the health

[10] K. Davis, K. Stremikis, C. Schoen, and D. Squires, Mirror, Mirror on the Wall, 2014 Update: How the U.S. Health Care System Compares Internationally, The Commonwealth Fund, June 2014. www.commonwealth fund.org/publications/fund-reports/2014/jun/mirror-mirror

sector, rather than developing multiple different methods for the same purpose. Equally there should be the facilitation of the use of the national product catalogue by healthcare organisations and suppliers for the consistent identification of products used in the supply chain.

Healthcare organisations are recognising the significant contribution digital health solutions can make to improve the efficient management of hospitals of the future. There is an increasing number of healthcare organisations within Australia who have built, or are in the process of building, digital hospitals. Similarly, a number of sites are retrofitting digital technologies into existing hospital sites. The introduction of Digital Hospitals will result in the automation of clinical and business processes, streamlining the use of information, enabling better use of staffing resources, and assist in the design and implementation of new and innovative models of care and treatment within and beyond the hospital settings.

This investment in digital hospitals is not only important to support the service transformation and improvements in care delivery and management of services at the local level, but also contributes to the longer term national goal to enable the digitisation and interoperability of all clinical records. It is therefore important that there is a nationally consistent means of measuring and benchmarking the level of digitisation within Australian hospitals.

Objective

4. Enable the Australian health sector to more effectively operate as an inter-connected system, overcoming the current fragmentation and duplication of service delivery, and drive efficiencies in the management of health service delivery.

National Strategic Initiatives

S4.1 Design and recommend a nationally consistent means of being able to both measure and benchmark the level of adoption and use of clinical information systems within Australian hospitals, taking into consideration system-wide capabilities that may underpin such adoption.

S4.2 Design and implement a nationally coordinated approach to the adoption of specifications for the consistent identification of all products, people (both staff and patients) and locations for use in healthcare supply chain management.

S4.3Establish a benefits realisation framework for the National Product Catalogue, and through the use of this framework facilitate the improved uptake of the National Product Catalogue by health care organisations and suppliers.

S4.4 Design and implement a nationally coordinated approach to enable the upload of pathology information to the My Health Record system.

S4.5 Design and implement a nationally coordinated approach to enable the upload of diagnostic imaging reports to the My Health Record system.

S4.6 Design and implement a nationally coordinated approach to enable the access to diagnostic images via the My Health Record system.

Benefits

- Reduce the rate of duplication of pathology and diagnostic image testing across the healthcare sector;
- Improve the utilisation, reduce wastage and improve the cost management of healthcare supplies through more effective electronic supply chain management; and
- Through the introduction of digital hospitals:
- Improve inpatient outcomes, as measured by a reduction in length of stay and readmission rates;
- Improve access, quality, safety, sustainability and operational efficiencies of hospital services; and
- Enable new models of care to be able to be designed and introduced.

Case Study

Ramsay Health Care realising significant financial savings through supply chain automation

Ramsay Health Care (Ramsay) has seen that supply chain improvements can add up to significant savings. With the automation of Ramsay's entire order-to-cash process, using NEHTA's eProcurement framework (based on GS1 EDI standards) and product data shared via the National Product Catalogue (NPC), Ramsay have been able to control escalating costs and optimise their supply chain through the use of data standards for purchase orders, purchase order responses, and invoices. Significant financial and process savings have been delivered already. Many of Ramsay's suppliers have posted their entire product catalogues in the NPC, with Ramsay also now requiring NPC data as part of its processes. Ramsay echoes the need for products that are always available, with the group inventory team supporting the Australian hospital group's supply chain with more than 70 hospitals across the nation. Andrew Potter, Group Inventory Manager advised: "Data is the lifeblood of our business. Leveraging product data for a highly efficient supply chain helps us ensure that every patient has a seamless care experience with a positive outcome."[11]

[11] http://www.gs1.org/sites/default/files/docs/data%20quality/gs1_value_of_trusted_data_for_hospitals.pdf

7.5 Improved access to care

The ability to access healthcare services in a timely fashion is important for all consumers. Equally, timely access to healthcare services is associated with better health outcomes for the recipients of these services. There are a number of reasons why barriers to timely access can exist; such as demand exceeding the number of services provided, or the lack of access to a particular healthcare service in a rural or remote area. The use of digital health solutions is one means by which improved access to care may be facilitated.

Digital health solutions can contribute to an individual receiving improved access to care through enabling improved communication and simplification of the processes when a consumer is referred from one healthcare provider to another for a service. The management of referrals amongst healthcare providers and healthcare organisations is complex. The largely manual processes that exist for the management of referrals, a lack of standard means of communicating referral information and a breakdown in the communication associated with the progress of a referral, all contribute to inefficiencies in the processing of this information and delays in receiving access to care and treatment. A national approach to the creation and transfer of electronic referrals for health and wellbeing needs to be developed to address this gap in the access and coordination of care.

A national approach to the creation and transfer of electronic referrals is important to ensure that referrals are able to be managed for the care of an individual, irrespective of State or Territory boundaries, and are able to be both accepted and understood by all participants within the healthcare system.

Equally there are significant opportunities for telehealth to reduce costs associated with healthcare delivery and to improve equity of access to services, particularly in rural and remote areas of Australia, but also in other under serviced areas. There is also the potential for telehealth to support new models of care that would enable the management of consumers within their homes or a regional centre, rather than requiring them to attend a healthcare facility or traveling long distances for care.

Telehealth includes the provision of the following types of services:

- Individual or group patient consultations in real time;
- Transmission of clinical data for diagnosis and disease management e.g. the remote patient monitoring via clinical devices;
- Transmission of clinical data for diagnosis, e.g. the store and forward of medical images;
- The provision of healthcare advice and healthcare coaching through remote modalities, including via a telephone service; and
- Remote medical education and training.

Whilst there has been some uptake of telehealth across Australia, particularly in areas where policy and funding issues associated with the delivery of telemedicine have been addressed, this uptake has been uneven. Telehealth has not as yet been uniformly accepted as an alternative method of

care delivery nor imbedded into mainstream clinical practice. There needs to be a national review of the known barriers to the adoption of telehealth (such as funding, policies and scheduling) and a plan developed to address these barriers to facilitate an improved uptake of telehealth.

Objectives

5. Enable better health outcomes and improve accessibility to services, particularly for individuals within remote and rural communities.

National Strategic Initiatives

S5.1 Continue to develop and implement a nationally coordinated approach to the creation and transfer of electronic referrals for improved continuity of care.

S5.2 Undertake a national review of the barriers to telehealth adoption (such as funding, policies and scheduling) and develop a nationally coordinated plan to address these barriers.

Benefits

- Improve the communication of and simplify the processes associated with referrals through the introduction of electronic referrals management;
- Improve consumer satisfaction through more informed and streamlined referral processes; and
- Through the use of telehealth:
- Reduce the cost of healthcare delivery;
- Improve the equity of access to services, particularly in rural and remote areas;
- Enable the introduction of new models of care, with an increase in care provided within the home or community settings; and
- Improve consumer satisfaction through enabling individuals to be cared for in their homes, community setting or regional centre.

Case Study

Telehealth reducing travel costs in the Northern Territory

Telehealth technology in the Northern Territory has resulted in more remote and regional Territorians getting the medical advice they need without having to always travel to major centres. Chief Minister Adam Giles has advised the telehealth program had received support from both patients and health professionals, and has delivered savings to Government of more than $1.1 million by reducing travel costs through the Patient Travel Assistance Scheme. Telehealth is

delivering better health outcomes in regional and remote communities and reducing the need for patients to travel long distances to access health services. [12]

7.6 Quality and safety

The Australian Commission on Safety and Quality in Healthcare has established, The Australian Safety and Quality Framework for Healthcare. This framework describes a vision for safe and high quality care for all Australians, and sets out the actions needed to achieve this vision. The Framework specifies three core principles for safe and high quality care. These are that care is consumer centred, driven by information, and organised for safety.

Building upon the vision outlined within the framework, in 2012 Australian Health Ministers agreed to the first set of Australian Safety and Quality Goals for Healthcare. These are safety of care (that people receive healthcare without experiencing preventable harm), appropriateness of care (that people receive appropriate evidence based care) and partnering with consumers (consumers are involved in their care). Digital health solutions can play a significant role in the attainment of both the vision for safe and high quality care and the safety and quality goals

One of the key digital health areas of focus for improving the safe and high quality care for all Australians over the next three years is the implementation of electronic medication management solutions. It is estimated that between 2-3 % of all admissions to Australian hospitals are medication related and around 10% of patients who have seen a GP and have used a medication in the previous six months have reported experiencing an adverse event. These adverse events are more likely to occur in the very young, people aged 65 and over, and people with complex care and medication requirements. Many of these adverse events could have been prevented through either better access to the individual's medications information or through the use of electronic medication management solutions. A number of States and Territories and private organisations are progressively introducing electronic medication management solutions into hospitals.

The improved sharing of electronic medications information will reduce errors associated with the transfer of medication information between healthcare providers across the health sector. Electronic transfer reduces the risk caused by illegible handwriting or the ambiguous use of language, or the incorrect or unclear recording of drug doses. Electronic medication information will also be able to be reconciled with medication information held by the receiving healthcare provider, so that they will be able to understand changes that have been made to the medications provided to an individual and use this information to reduce the likelihood of adverse interactions between drugs. A nationally agreed approach to improving the ability to electronically share and reconcile medications information across the healthcare sector, (including increasing the use of clinical terminologies), and the increased use of electronic transfer of prescriptions needs to be progressed. A summary of this information should be able to be submitted to the My Health Record system to create a shared medications list.

A national drugs catalogue should be implemented in order to store and maintain the medications information required by electronic medications management systems. Maintaining this information

[12] Media release, Northern Territory Government, Telehealth trial delivers more services for patients and savings for Government, 25 February 2016, available from: http://newsroom.nt.gov.au/mediaRelease/18334

is essential to effective electronic medication management however this is a very resource intensive process. It is preferable that this functionality is developed once, maintained nationally and be available for use by all of the jurisdictions, and potentially private health organisations.

The quality of healthcare data impacts every decision that is made within the health sector, including decisions affecting direct clinical care, population health management, continuous clinical improvement, research, policy development and investment. The need for quality data to fulfil all of these requirements is increasing in importance. It is essential that health information recorded within clinical information systems is accurate, reliable, timely, accessible and relevant, given that clinical information systems are the primary source of health information feeding into primary and secondary data collections. A nationally coordinated approach to drive improvements in the quality of health information collected within these systems is required.

Healthcare data has traditionally been collected in many different formats, using different data standards, often depending on the care setting in which they have been used. In order to improve the meaningful use of this information, (especially when this information is compiled to form datasets, e.g. for medications reconciliation), it is important that health information is collected in a standardised format using clinical data standards, irrespective of care setting. In order to facilitate this, a nationally coordinated approach aimed at driving the increased use of clinical terminologies within clinical information systems across the health sector will be undertaken.

To further improve the useability of, and relevance of health information, there is the requirement to develop nationally agreed guidelines in relation to the presentation of pathology, medical imaging, diagnosis and procedure information, to inform the display of this information within clinical information systems in a clinically safe and consistent manner.

Objective

6. **Improve the quality, safety and efficiency of clinical practice by giving care providers better access to patient health information, clinical evidence and clinical decision support tools.**

National Strategic Initiatives

S6.1 Design and implement a nationally coordinated approach to improve the ability to electronically share and reconcile medications information across the Health Sector.

S6.2 Develop and implement a shared medications list within the My Health Record system.

S6.3 Develop and implement a national drugs catalogue.

S6.4 Undertake a national review of the barriers to the adoption of electronic transfer of prescriptions across Australia, and develop a nationally coordinated plan to address these barriers.

S6.5 Develop and implement a nationally coordinated approach aimed at driving improvements in the quality of health information recorded within clinical information systems.

S6.6 Develop and implement a nationally coordinated approach aimed at driving the increased use of clinical terminologies within clinical information systems.

S6.7 Design and implement nationally agreed guidelines in relation to the presentation of pathology, medical imaging, diagnosis and procedure information to inform the display of this information within clinical information systems, aimed at improving the clinical safety and consistently in the display of this information.

Benefits

- Provide health care providers with better access to information to assist in making sound diagnostic and therapeutic decisions;
- Reducing the likelihood of harm to consumers from causes directly related to the delivery of healthcare;
- Reduce medication related harm as evidenced by benefits of electronic medication management systems being implemented in several jurisdictions;
- Proactively monitor and alert health care providers of potential safety concerns or deterioration in a person's condition before they occur; and
- Provide the information to be able to monitor the adherence to clinical practice guidelines and to measure improvements in care delivery.

Case study

Use of national digital health foundational capabilities in clinical decision support to identify avoidable adverse events

Dispense Works is an innovative, patient-centric community pharmacy dispensing solution utilising modern tools and technologies to deliver enhanced pharmaceutical care. It has full digital health capabilities including e-script scanning and My Health Record system integration. Using the national digital health infrastructure components as a platform for innovation, (Healthcare Identifiers, National Authentication Service for Health, Clinical Terminology, and the My Health Record system), Dispense Works clinical decision support is able to detect drug-drug and multi-drug interactions at the point of dispensing. Underpinned by Australian Medicines Terminologies (AMT), Dispense Works alerts pharmacists when medicines not currently recorded in the local system are documented within a person's My Health Record, while also alerting to potential drug interactions and other clinical problems using data from multiple sources, e.g. a medicine documented in a discharge summary as ceased, or dispensed by another pharmacy, against locally held medicine information.

Case Study

Victorian health services, Austin Health and Peninsula Health, introduce clinical information systems with electronic medications management capabilities that improve medications management and safety within two major metropolitan hospitals within Victoria.

Victorian health services Austin Health and Peninsula Health jointly completed a project in 2013 to digitise hospital clinical care activities. Areas digitised included medication administration, prescribing, radiology and pathology test ordering and results viewing. The project aimed to support clinical care by providing efficient, effective and timely access to patient data, at the point of clinical decision-making, whilst minimising duplication of information collection for both patients and clinicians.

The project included the incorporation of clinical terminologies, (both AMT and SNOMED CT-AU), within the clinical information system solutions deployed.

The project significantly improved medical safety in the two health services. Improvements in the management of medications were demonstrated at both hospital sites, across a range of indicators. A comparison of medication incidents in the 12 months before and after implementation in sub-acute areas, revealed an average decrease in medications incidents of 55%, with a decrease of 77% in incidents of moderate severity, and no severe incidents were recorded.

7.7 Encourage innovation

Digital health solutions have the power to be able to transform the health sector. Digital disruption and digital transformation have already had a significant impact on most other industries. Whilst digital disruption is already occurring within healthcare, (e.g. the use of implantables, sensors, wearable fitness tracking devices, enhanced diagnostics and remote monitoring capabilities), it is expected that this is just the beginning of significant changes to occur with the healthcare sector influenced by digital innovation.

It is highly likely that there will be new entrants into the healthcare market that will be able to offer new value in the form of innovative, convenient and affordable solutions to effect change in key areas such as:

- Driving value based healthcare;
- Improving the coordination of care;
- Enhancing the personalisation of care;
- Promoting patient-centred care and
- Enabling effective and affordable remote monitoring solutions.

This disruptive innovation and digital transformation is to be encouraged and should be supported by digital health experts, clinical experts, consumers and software vendors being brought together to collaborate on the co-design and development of innovative digital health solutions. A platform for innovation needs to be established to provide the collaboration forums, opportunities to engage, the data and the tools to enable digital health solution innovations to have a significant impact on the Australian health system.

Opportunities for the greater use of healthcare data, in a controlled manner, within this innovations platform should be considered. Whilst the security and privacy of healthcare information is paramount, it is through the increased availability and use of aggregated de-identified data, that innovation and transformation of the healthcare sector will be accelerated.

The Australian Digital Health Agency will establish national forums, connect-a-thons, hack-a-thons, and other accelerated innovation programs aimed at increasing the collaboration, leveraging and linking of digital health innovations across the health sector. This will include the potential to leverage existing innovative solutions already within the market place, existing innovation forums such as that run by the Health Informatics Society of Australia (HISA). Or look for opportunities to drive innovation in areas where there is a known healthcare service gap, an opportunity to improve consumer satisfaction, the potential to drive healthcare efficiencies, or where there is an emerging requirement within the health sector. Innovations forums and programs are expected to also be held within the States and Territories in order to address specific jurisdiction digital health requirements.

A well-recognised gap in the use of digital health solutions is seen in the level of uptake of technologies in the areas of allied health, community pharmacy and specialist medical practice. This is an area where opportunities exist for software vendors, healthcare organisations and healthcare providers to collaborate on the development of new and innovative digital health solutions to meet the specific clinical requirements within these areas.

The Australian Digital Health Agency will work with healthcare providers and organisations, and software vendors to encourage opportunities for collaboration with research institutions in the co-design, development and implementation of new digital health capabilities.

Opportunities for the public procurement of innovative digital health solutions will be encouraged in the same way.

The health information stored with the My Health Record system will be made available, (subject to appropriate privacy, access and data governance controls), for usage in alternative primary and secondary use solutions; such as mobile applications, predictive medicine tools and population based surveillance systems. Innovation within this area is expected to be driven by parties outside of government.

At a more tangible level the national Digital Health Reference and Testing Platform housed within the Australian Digital Health Agency will be available to all healthcare providers and organisations and software vendors to test the integration of new capabilities within their software, with the national foundational digital health capabilities. The use of this platform is envisaged to assist software vendors to develop new and innovative ways to leverage the national foundational digital health capabilities.

Objective

To create a collaborative marketplace to foster support for innovation and competition in the digital health market to encourage the development of innovative digital health solutions that meets the needs of the health sector.

National Strategies Initiatives

S7.1 Create an innovations platform that enables digital health innovation through either the use of existing health information within digital health solutions, and/or through the use of the national Digital Health Reference and Testing Platform.

S7.2 Establish national forums, connect-a-thons, hack-a-thons, and other accelerated innovation programs aimed at collaborating, leveraging and linking digital health innovations across the health sector.

Benefits

- Reduce barriers to the introduction of innovative, convenient and affordable digital health solutions; and
- Enhance collaboration on the co-design and development of innovative digital health solutions.

Case Study

National Blood Authority, Haemophilia Foundation Australia and Australian Haemophilia Centre Directors' Organisation – My ABDR smart phone app and website improving the care and management of people with bleeding disorders within Australia.

The MyABDR is a secure app for smartphones and websites for people with bleeding disorders (or their carers) to record home treatments and bleeds. It also allows an individual to manage home treatment products stocks, receive notifications of any product recalls, and to share all of this information with their Haemophilia Centre.

This application integrates with the Australian Bleeding Disorders Registry (ABDR) used by Haemophilia Centres around Australia for the clinical care of their patients. This application empowers the individuals concerned to be able to better manage their health condition, provides aggregated information for health providers to use to improve treatment and care, and has the potential to provide invaluable data to reduce the wastage of perishable blood products, used to treat blood disorders within Australia.[13]

[13] http://www.blood.gov.au/myabdr

8 Alignment to health sector directions

The National Digital Health Strategy aims to support the achievement of the key national healthcare outcomes currently being pursued by the Commonwealth, States and Territories. Each of the key strategic areas of focus in this Strategy is aligned, and enables the realisation of, the national healthcare outcomes, as shown in the table below.

Healthcare outcomes / Strategic Areas	Person Centred Care	Population Health Focus & Precision Medicine	Coordinated and Integrated Care	Improved Health Service Efficiencies	Improved Access to Care	Quality and Safety	Encourage Innovation
1. Improve the management of chronic disease and complex conditions	✓	✓	✓	✓	✓	✓	✓
2. Reduce health care inequality based on economic, geographic, cultural or societal factors	✓		✓		✓		
3. Reduce waste and inefficiency in the health care system				✓	✓	✓	✓
4. Improve coordination and integration of health services			✓	✓	✓	✓	
5. Enable introduction of new models of care to shift demand away from acute forms of care	✓		✓	✓	✓		✓
6. Empower patients to manage their own healthcare, including providing them with access to their own health information	✓						
7. Encourage, engage and support individuals, and communities to live better lifestyles	✓	✓					✓
8. Improve the collection, analysis and reporting of healthcare costs, demand, outcomes and quality		✓		✓		✓	
9. Improve working environments which attract, support and retain health sector workers				✓			✓

9 National foundational digital health capabilities

The core components of national digital health infrastructure and services, (the national foundational digital health capabilities), have been established to support an integrated and digital health enabled Australian health system. These national foundational digital health capabilities have been established where it:

- Was important to implement this capability once, i.e. where this function is used by all services across the health sector;
- Needed to be standardised to ensure a decreased likelihood of clinical risk e.g. clinical terminologies; and/or
- Is necessary for interoperability across the entire health sector.

The national foundational digital health capabilities will be evolved to keep pace with the contemporary digital health requirements and emerging needs of the Australian healthcare system. Some of these changes will be business as usual, and others will be significant enough to require their own strategic initiatives.

9.1 My Health Record

The national My Health Record system was launched on 1 July 2012, as the Personally Controlled Electronic Health Record (PCEHR). The My Health Record system is a secure online summary of an individual's health information. The individual is able to control what goes into their My Health Record, and who is allowed to access it. An individual's My Health Record allows an individual and their healthcare providers to view and share the individual's health information to provide the best possible care.

In order for the My Health Record system to be successful the following need to be addressed in the next three years:

- A critical mass of consumers registered;
- Active participation by healthcare providers, to both contribute clinical content and to use the information to inform clinical care;
- Sufficient clinical information available to make accessing the content worthwhile;
- Clinical information included of sufficient quality for healthcare providers to be able to confidently use the information for clinical care; and
- The use of the My Health Record needs to be embedded within the clinical practice and workflow of healthcare providers.

Strategies to address these goals have been reflected within strategic initiatives throughout this document.

Following a recent architectural review of the My Health Record system, it has been recognised that changes are needed to the design of the underlying My Health Record system technical infrastructure in order to meet emerging and future clinical requirements. These changes will be considered within this current planning period.

9.2 Healthcare Identifier Service (HI Service)

The Healthcare Identifiers Service is a national system for uniquely identifying eligible healthcare providers and individuals (patients). The accurate identification of individuals is critical in all health information communications.

There are not expected to be any significant changes to the Healthcare Identifier Service within this planning period beyond those identified and agreed to in the Healthcare Identifiers Act and Service Review.

9.3 National Authentication Service for Health (NASH)

The National Authentication Service for Health provides a secure and authenticated service for healthcare providers and organisations to exchange sensitive digital health information. It also authenticates healthcare providers and other participants to the My Health Record system.

The processes associated with the issuing and renewal of certificates, (to digital health solutions), are currently not meeting the requirements of healthcare providers and organisations. Enhancements are required to the National Authentication Service for Health to improve these processes, as the issues experienced by clinical users in this area, are inhibiting the uptake of digital health technologies. Healthcare providers are currently also expected to maintain additional authentication certificates for alternative purposes, such as for Medicare claiming. There needs to be a rationalisation of the authentication certificates in use to improve the healthcare provider end user experience when authenticating to external electronic systems, and reduce the inherent issues associated with the management of multiple certificates.

9.4 National Clinical Terminology and Information Service

The National Clinical Terminology and Information Service (NCTIS) is responsible for managing, developing and distributing terminology to support the digital health requirements of the Australian healthcare community. This responsibility extends to licensing SNOMED CT on behalf of the International Health Terminology Standards Development Organisation (IHTSDO®). The clinical terminology solutions include: SNOMED CT-AU and Australian Medicines Terminology (AMT).

The strategies related to increasing the utilisation of the national clinical terminology service and the clinical terminologies have been reflected within the strategic initiatives section of this document.

9.5 National Product Catalogue (NPC)

The National Product Catalogue is a central repository of accurate, standardised information about healthcare products (from large medical devices to consumables and medicines) using GS1's Global Trade Item Numbers (GTINs).

The strategies related to increasing the utilisation of the national product catalogue have been reflected with the strategic initiatives section of this document.

9.6 Digital Health Reference and Testing Platform

The Digital Health Reference and Testing Platform aims to provide healthcare providers and organisations and software vendors with a platform to demonstrate and consider new capabilities, or test new software and clinical processes integration with the national foundational digital health capabilities.

9.7 Prescription Exchange Services (PES)

The electronic transfer of prescriptions (ETP) describes the safe and secure transfer of a prescription to a dispenser using a prescription exchange services (PES). There are currently two PES available within Australia for dispensers and prescribers to use. A prescriber will use their clinical information system to send an electronic prescription to a PES for later retrieval by a dispenser, at the time of dispensing. When an individual presents a script to a dispenser, the barcode is scanned and the script information is automatically uploaded from the PES to the dispenser's software. The greater use of ETP will improve the overall accuracy and safety of medication management processes.

9.8 National Health Services Directory (NHSD) including the National Endpoint Proxy Service (NEPS)

The National Health Services Directory (NHSD) provides access to reliable and consistent information about Australian healthcare services. For consumers and healthcare providers this includes information such as contact details, location, opening hours, wheelchair access and bulkbilling services. For health practitioners, the National Health Services Directory facilitates the coordination of ongoing care for patients providing connection of care and referral pathways for location based services.

The National Endpoint Proxy Service contains healthcare provider and organisation identity and address information within a national electronic 'address book' that is essential for the effective electronic communications between healthcare providers and organisations. NEPS simplifies integration with multiple systems of record required to support digital health communications. These systems include the healthcare identifier (HI) service, the health provider directory (HPD), the national authentication service for health (NASH), various endpoint location service (ELS) databases and, through the national health services directory (NHSD), a range of other systems of record such as Medicare and Australian Health Practitioners Registration Agency (AHPRA).

9.9 METeOR

The Australian Institute of Health and Welfare (AIHW) uses its online metadata registry, METeOR, to manage and share data standards with the Australian community. METeOR is Australia's repository for national metadata standards for health, housing and community services statistics and information. This shared metadata forms the basis for consistent, comparable and linkable data collections that can create valuable statistical information for policy making and planning in Australia.

National Strategic Initiatives

S8.1 Design and implement changes to the My Health Record system technical infrastructure in order to meet emerging and future consumer and clinical requirements.

S8.2 Develop and make available a My Health Record system release and development roadmap.

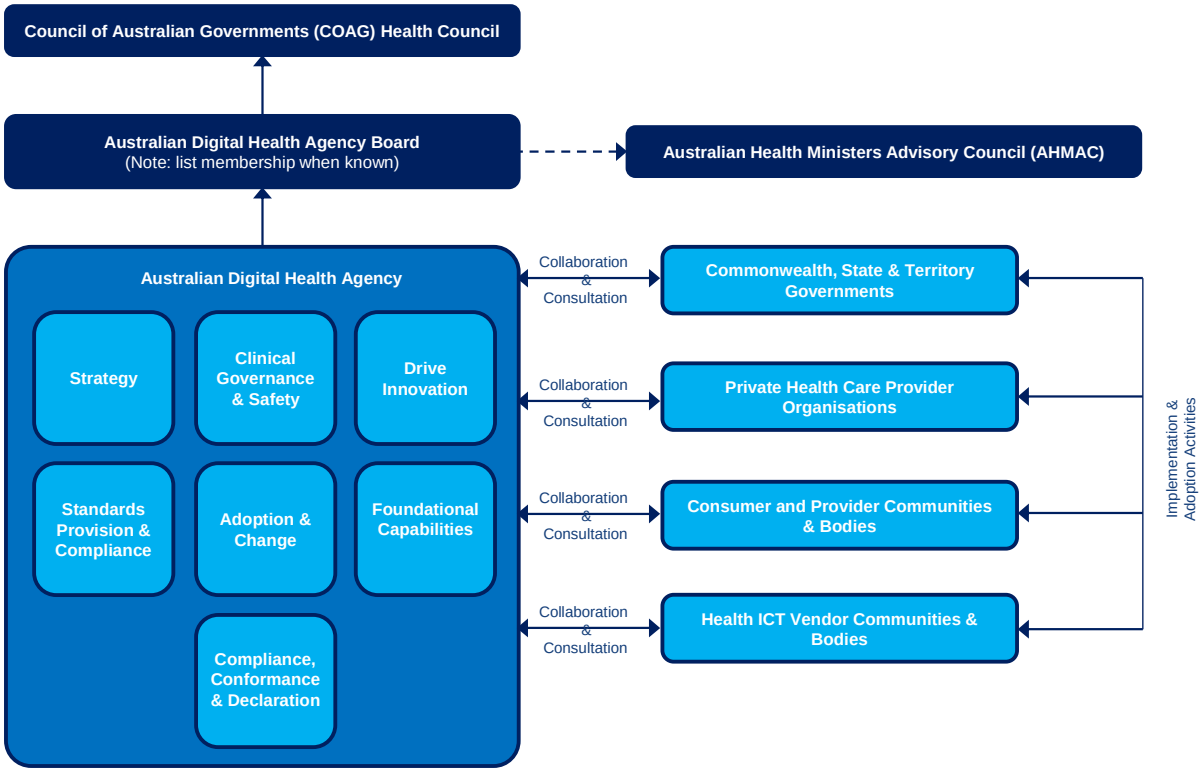
S8.2 Implement changes to the authentication services for connectivity to digital health solutions, focusing on improving registration and renewal processes for healthcare providers and organisations and to rationalise the number of authentication certificates required.

S8.3 Establish better alignment of the roadmaps for the National Health Services Directory, including the National Endpoint Proxy Service, with the other strategic initiatives detailed within this strategy.

10 Critical success factors

10.1 Leadership and governance

Strong and effective leadership is critical to the delivery of the vision for Digital Health within Australia, and the attainment of the deliverables articulated within both this strategy and the associated implementation plan. Effective governance and leadership to support the development of partnerships with all of the stakeholders, with a vested interest in the attainment of the vision, will be equally as important. There will also be the requirement to not only maintain, but evolve the national digital health foundational capabilities to keep pace with contemporary digital health requirements and the emerging needs of the Australian healthcare system.



Digital Health governance as of 1 July 2016

The Australian Digital Health Agency

The Australian Digital Health Agency (the Agency) has been established commencing operation from 1 July 2016, as the single accountable organisation for coordination of all digital health activities at the national level within Australia. It will deliver strong governance and leadership to support all Governments and Industry in the coordination, ongoing development and implementation of the National Digital Health Strategy. The Agency will have the responsibility of developing, setting and delivering of the National Digital Health Strategy, as directed and agreed by the Australian Governments, setting the direction for the national digital health ecosystem, including both government and private sector elements. This will be achieved in collaboration with governments, the healthcare software industry, consumers, universities, digital health experts, peak bodies, professional bodies and other interested parties.

The Agency will report through its Board to the Council of Australian Governments (COAG) Health Council.

There will be broad stakeholder representation on the Agency's advisory committees. These committees are the:

a) Clinical and Technical Advisory Committee;

b) Jurisdictional Advisory Committee;

c) Consumer Advisory Committee; and

d) Privacy and Security Advisory Committee.

The Agency will have the responsibility for the ongoing development and management of the three year implementation plan that will complement this strategy. The Implementation Plan will detail how each of the strategic initiatives will be implemented, the timeframe for delivery of these initiatives and how these will be funded.

The Agency will have the responsibility for the development of a Benefits Realisation Management Strategy and Plan to measure the obtainment of the outcomes and benefits expected to be delivered by this strategy.

The Department of Health

The Department of Health will retain the responsibility for the setting of My Health Record system and Health Identifier Service policy and legislative amendments or revisions as they relate to the My Health Record system and the Health identifier Service. The Department of Health will also retain responsibility for managing any specifically Commonwealth (as opposed to National which sits with the Agency) interests in the application of digital health (e.g. for digital health as it pertains to a Commonwealth program).

The States and Territories

The Ministers for Health in each jurisdiction have overarching accountability for the digital health initiatives implemented in their jurisdictions. Each State/Territory is responsible for working collaboratively with the Agency and each other to contribute to the development, implementation and enforcement of the National Digital Health Work Programme.

The Office of the Australian Information Commissioner

The Office of the Australian Information Commissioner has responsibility for the oversight of the development of national privacy laws, which are an important enabler for digital health to operate effectively across jurisdictions and is the independent regulator of the My Health Record system and the Health Identifier Service

HealthDirect Australia

HealthDirect Australia is responsible for the coordination and ongoing development of the National Health Services Directory (NHSD) as directed and agreed by its shareholders.

The Australian Institute of Health and Welfare (AIHW)

The AIHW is responsible for the coordination and ongoing development of the national online metadata registry, METeOR.

10.2 Change and adoption

Change and adoption is undeniably one of the key critical success factors for the term of this National Digital Health Strategy. Change and adoption needs to be specifically targeted to drive the uptake and meaningful use of digital health solutions nationally.

Whilst the majority of the change and adoption should ideally be managed at the local or regional level there is a clear need to have a national approach to the acceleration of the adoption of digital health within Australia.

Change and adoption has been recognised in other areas of this strategy, particularly in working towards an increase in the:

- Volume of clinical information made available through the My Health Record system and the meaningful use of this information by healthcare providers;
- Creation and sharing of key electronic clinical information important to the coordination of care and the transfer of care;
- Number of healthcare providers and organisations within Australia moving to digitisation of clinical information. (There is a strategic initiative specific to hospitals, however this is also true of other areas such as specialists and allied health professionals);
- Use of standardised clinical terminologies within clinical information systems; and
- Ability to electronically share and reconcile medications information.

The Australian Digital Health Agency will promote and support digital health implementation and adoption activities across all sectors of the healthcare system drive implementation, adoption and meaningful use of national digital health foundational capabilities among consumers, healthcare providers and healthcare managers.

These change and adoption programmes will take into consideration the known barriers to the adoption and use of digital health technologies to assess the readiness for change. These barriers or perceived barriers include:

- The introduction of the new technology causes, or is perceived to cause an interruption or disruption to the expected clinical workflow;
- The introduction of the new technology causes, or is perceived to cause an increase in the length of time for clinical consultations;
- There is a lack of understanding of what the benefits that the new technology might deliver and how it might assist in healthcare provision;
- Useability or flexibility issues may exist with the new technology;
- The introduction of new technology has a negative impact on the interactions between the healthcare provider and the patients they are providing care for, during consultations;
- A lack of time for training, particularly of clinical staff;

- The health care providers, or their staff, might lack the requisite basic computer skills in order to gain full benefit from the use of the new technologies; and
- The healthcare provider may lack the required information technology infrastructure in order to fully participate.

Adoption and use of digital health solutions by consumers is as equally as important as adoption by healthcare providers and organisations. The Australian Digital Health Agency will need to work with consumers, healthcare providers and software vendors to ensure that consumer focussed digital health solutions are easy to use and able to be understood by consumers, whilst still providing the level of detail and the information required for a consumer to be active in the management of their healthcare.

10.3 Collaboration and consultation

As already conveyed the obtainment of the vision and objectives of this strategy can only be realised through effective and meaningful collaboration and consultation with all of the stakeholders with a vested interest in digital health. These stakeholders include (but are not limited to):

- Consumers, community and consumer representative groups;
- Healthcare providers and their respective professional bodies;
- Healthcare organisations, both government and private sector;
- Governments;
- Australian Commission on Safety and Quality of Healthcare;
- Digital health experts;
- Health Informatics experts;
- Primary Healthcare Networks;
- Health insurers;
- Privacy regulators and advocates;
- Public and private health researchers;
- Universities; and
- Software vendors and their representative groups.

Collaboration and consultation with these key stakeholders is central to:

- Setting the appropriate policies and standards for the safety, quality and protection of healthcare information;
- Setting the appropriate policies and standards for data, clinical terminologies and interoperability;
- Driving the rapid development and adoption of digital health to contribute to an interoperable healthcare system;
- Informing the education and guidance materials developed for the more widespread adoption of digital health;
- Ensuring that the national capabilities continue to provide benefits contributing to the clinical care of individuals;
- Ensuring that the national capabilities continue to provide benefits contributing to governmental digital health initiatives and priorities;

- Enhancing the intergovernmental and non-governmental cooperation and collaboration on digital health initiatives ; and
- Providing the forums in which to discuss and share experiences and challenges in the implementation of digital health.

The Australian Digital Health Agency will:

- Engage with key stakeholders through representative committees, advisory groups, and forums to gain sector input on strategy, standards, architecture, work programme design and Digital Health policy;
- Encourage collaboration, shared collateral and knowledge sharing across the digital health ecosystem so that the experiences of digital health initiatives already implemented can be leveraged by others; and
- Promote and support digital health investment and stimulate open innovation allowing the wider health system to invest in solutions that safely leverage the national digital health foundational capabilities to improve health outcomes.

10.4 Standards and interoperability

Within Australia there is a myriad of IT platforms, applications and online services in use across government and private healthcare services. It is currently very difficult to integrate between these different technologies and thus sharing of healthcare information is limited. What is needed is a national approach to interoperability and data standards.

The Australian Digital Health Agency will have the strategic oversight for the development or adoption of specifications and standards to support the digital health solutions within Australia, and in the case of clinical terminologies the responsibility for the development and maintenance of SNOMED CT-AU and the Australian Medicines Terminologies (AMT).

The following set of principles will guide how the Australian Digital Health Agency will undertake this role:

- The leadership for the identification, development, adoption, implementation and use of the standards required to support digital health solutions will be a shared responsibility involving all interested stakeholders (such as consumers, healthcare providers, governments, private sector, professional groups, health informatics experts and standards setting bodies). The role of the Australian Digital Health Agency will be to orchestrate and facilitate these activities;
- All standards and interoperability requirements developed or adopted will meet the business and clinical process needs of healthcare providers, and will be consumer –centric;
- There will be alignment to international standards wherever practicable. The preference is to adopt existing standards where appropriate, rather than developing new standards;
- Open standards will be adopted before proprietary standards are considered; and
- Standards will be developed iteratively, tested for practical use within the live environment and continuously refined in order to ensure that the products developed meet the needs of clinical end users.

The Australian Digital Health Agency's role, (in collaboration with interested stakeholders), will incorporate the review of current standards utilised, the assessment of emerging or international standards, (suitable for adoption in Australia) such as Fast Healthcare Interoperability Resources (FHIR), and the identification of gaps in standards based upon identified health system's requirements and priorities e.g. convergence of medical devices and digital health solutions.

10.5 Legislation, policy and compliance

It is important that the digital health ecosystem is supported by a robust policy and legislative framework that engenders trust from all of the parties involved. This policy and legislative framework needs to be able to accommodate changes that will occur from time to time, and for the maturation of implemented solutions.

The Commonwealth will provide leadership in the development of a nationally consistent approach to digital health throughout the healthcare system through a range of mechanisms including policy settings and legislation. States and Territories will provide input into the process of developing these mechanisms, and where necessary align their policy settings and legislation with those put in place by the Commonwealth.

Legislation in in place to govern the operations of the My Health Record system and the Healthcare Identifiers service, as well as the oversight and mandate for the digital health agenda under the Australian Digital Health Agency. By law, a review of the enabling legislation for the My Health Record system and the Healthcare Identifiers service needs to be undertaken every three years. The next review for both of these Acts will be required during the timeline of this strategy.

The privacy of personal healthcare information is protected by existing Commonwealth and State and Territory privacy legislation.

A national Conformance, Compliance and Declaration scheme is in place to support the delivery of a consistent, effective and sustainable conformity assessment approach for Australia's health ICT sector, particularly where health IT systems interact with each other and the national digital health foundational capabilities.

10.6 Information governance

The secure, reliable and timely exchange of high quality electronic healthcare between a wide variety of different healthcare organisations and providers, both government and non-government, is critical for efficient operation of the digital health ecosystem. An agreed national approach for information governance will enable and support this exchange of electronic health information.

A national approach to digital health information governance will need to take into consideration the needs and circumstances of all of the involved parties, both government and non-government. It will supplement existing standards and interoperability arrangements, to ensure that individual healthcare information is stored and used responsibility by all system participants.

The national approach to digital health information governance will need to provide principles and guidelines for the following:

- The provision of accurate and timely healthcare information nationally to support healthcare providers in the delivery of best practice care;

- Information privacy, integrity and provenance for the flow of information within the Australian health system;
- Information quality standards, covering the whole information lifecycle;
- Information management, audit and assurance for secondary usage data repositories;
- Best practice advice and standards for different parties across the sector (e.g. software vendors, healthcare providers and individuals);
- The provision of information governance for the national foundational digital health capabilities.

10.7 Cybersecurity

The protection of the security of personal information, such as health information, from the threat of misuse or tampering by cyber-attack is considered of utmost importance. For this reason, a Digital Health Cybersecurity Centre is to be established within the Australian Digital Health Agency. The main goal of the Digital Health Cybersecurity Centre is to protect the digital health ecosystem from cyber threat through:

- Enabling secure use and operation of the My Health Record system; and
- Improving the security hygiene of the broader digital health ecosystem through proactive cyber threat analysis, monitoring and guidance.

Whilst the Digital Health Cybersecurity Centre will provide this analysis, monitoring and guidance to all healthcare providers and organisations, it is the responsibility of healthcare providers and organisations to ensure the safe, resilient and secure operations of ICT networks and applications within their control, to protect personal health information from cyber threat.

10.8 Digital workforce capability

All health workers increasingly need a core set of digital competencies to enable them to work safely, effectively and efficiently. There is an urgent need to identify targeted ongoing education, training and development which recognises the potential impact on the skills of the workforce that could come about as a consequence of digital systems deployment.

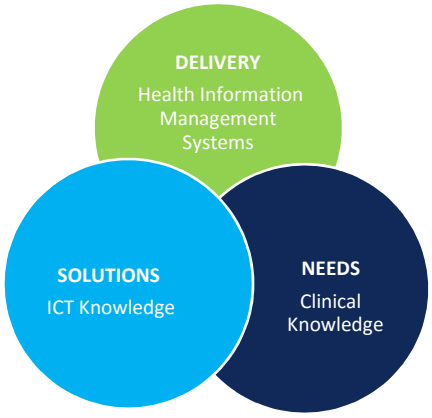
Recently published material from the US and UK[14] has highlighted that ongoing training is found to be critical as opposed to one-off courses, which were found to be ineffective. Training needs to be embedded into organisational workflow and inductions. Furthermore, a core set of competencies including information input and retrieval skills, security, privacy, confidentiality and quality management; and some knowledge of project and benefits lifecycles are also seen as essential. Extra skill-sets should also be provided for according to clinical level of use and for specialised system use.

Apart from the need of the core clinical workforce, there is an even greater need for increased capability in health informatics. Health informatics has been defined as the science and practice around information in health that leads to informed and assisted healthcare. “Informed” here means that the right information about the subject (consumer, patient or population), together with the relevant health knowledge, is available when required and in a form appropriate to use.

[14] The adoption and use of digital health and care record systems: International Success Factors, NHS England and Department of Health and Human Services USA, February 2016

"Assisted" means that the job of the healthcare worker is made safer and easier and that the consumer is supported in their decisions and actions.[15]

Health informatics is the space where the roles of the clinician, ICT professional, and administrator overlap to create and deliver fit-for-purpose solutions to clinical needs. The discipline is the intersection of information science, computer science, social science, behavioural science and healthcare. Health informatics knowledge and skills provide the foundation that enables digital health to be safe and effective.



Health Informatics Space[16]

Health informatics trained workers are necessary at every stage of any digital health reform to ensure successful implementation.

Unfortunately Australia has:

- A limited body of knowledge and experience in health informatics;
- Only a small identifiable workforce, and no definitive way of estimating the workforce;
- Limited tertiary qualification opportunities;
- No defined pathway for attracting new staff or developing existing staff;
- No plan in place to deal with expected shortages and manage risks.

Solutions must operate at all levels if the problems are to be satisfactorily addressed, spanning actions with a national, state-wide and local focus, and requiring action by government, health agencies, education providers, and by health informatics workers themselves.

The adoption of digital health, and a maturing understanding of the value of health data, has led to a global shortage of health informatics workers. The problem spans all levels of worker, and agencies in Europe and North America have published research on potential responses.

The Health Informatics Society of Australia in collaboration with Australasian College of Health Informatics and the Health Information Management Association of Australia have developed a

[15] Health Informatics Society of Australia, 2009, 'A review of the Australian Health Informatics Workforce V1.1'. HISA, Melbourne.
[16] HISA, What is health informatics at: http://www.hisa.org.au/?page=about_hi&hhSearchTerms=%22is+and+health+and+informatics%22

program to obtain a Certified Health Informatician Australasia designation, which is a generalist entry level qualification based on a range of competencies. However, the wider challenges remain.

In Australia, Health Workforce Australia identified a shortage of workers for the health informatics workforce (see its report “Health Information Workforce Report October 2013”). Following on from that report the Health Workforce Principal Committee of the Australian Health Ministers Advisory Council is leading a review the recommendations of the Health Workforce Australia (HWA) Health Information Workforce Report and develop an action plan to implement agreed recommendations.

11 Appendix

11.1 Consultation List

Jurisdictional Working Group	
Julie Crowe	Strategy and Projects, Corporate Policy and Regulatory Services, Department of Health and Human Services, Tasmania
Tanya Harch	Acting Senior Director, ICT Planning and Innovation, eHealth Queensland, Queensland
Peter Williams	Principal Advisor Digital Design and Information Management, Department of Health and Human Services, Victoria
E-Health Working Group	
Paul Madden	Deputy Secretary and Special Adviser, Strategic Health Systems and Information Management, Department of Health, Australian Government
Zoran Bolevich	Chief Executive, Chief Information Officer, eHealth NSW, New South Wales
Michael Costello	Strategic Advisor, eHealth NSW, New South Wales
Cathy Ford	Acting Chief Information Officer, Queensland Health
Tom Simpson	Acting Chief Information officer, Department of Health and Human Services, Tasmania
Andrew Saunders	Chief Information Officer, Department of Health and Human Services, Victoria
Marcos Chouris	Assistant Director, eHealth Strategy and Architecture, SA Health, South Australia
Frank Patterson	Acting Manager eHealth, ICT Business Engagement and Policy, Department of Health, West Australia
Robyn Daniels	Senior Legal Advisor, Legal & Legislative Services, Department of Health, West Australia
Stephen Moo	Chief Information Officer, Department of Health, Northern Territory
Cherryl Harris	Acting Director, ICT Policy, Department of Health, Northern Territory
Warren Prentice	Executive Director, Acting Chief Information Officer, ACT Health, Australian Capital Territory

Ian Bull	eHealth Manager, ACT Health, Australian Capital Territory
NEHTA	
Owen Torpy	Head of Policy and Planning
Larissa Briedis	Manager, Policy and Planning
Kate Ebrill	Head of National Services Operation and Management
David Bunker	Head of Strategy, Architecture and Informatics
Saneel Vasram	Manager, eHealth Solution Architecture
Rodney Ecclestone	Manager, Clinical Systems Safety and Design Assurance
Teri Snowdon	Head of Clinical Governance
Other Stakeholders	
Jackie Plunkett	Chair, National Telehealth Working Group
Paul Mc Rae	Consultant, Digital Health Division, Department of Health

11.2 Glossary

Artificial Intelligence - Artificial Intelligence is the science and engineering of using the intelligence of computer programs or machines to undertake pattern recognition, predictive modelling and other forms of analysis of large sets of data.

Cyber-attack – Cyber-attack is a deliberate exploitation of networks, applications and other computer devices.

Cyber security – Cyber security is a collection of strategies, policies, procedures and practices and technologies designed to protect networks, applications and other computer devices.

Cyber threat –Cyber-threat is the threat of deliberate exploitation of networks, applications and other computer devices.

Digital disruption – Digital disruption is change that is enabled by digital technologies that occurs rapidly and is of significant size that it disrupts the established way of doing things.

Disruptive innovation – Disruptive innovation is an innovation that creates a new market or new way of doing things that eventually disrupts the existing market or established way of doing things.

Digital Health ecosystem – Digital Health ecosystem is the technologies and the people, within a given population, that are delivering, or working towards the delivery, of a digital enabled interconnected health care system.

Digitisation- Digitisation is the conversion of analog information in any form, eg text, voice, images into a digital format.

Healthcare home – A healthcare home is the assignment of a consumer with chronic or complex conditions to a "home" clinician, who will have the responsibility for the coordination of the care of that individual with the healthcare providers who are collectively providing care for that individual. This will be undertaken in collaboration with the individual involved.

Healthcare supply chain – Healthcare supply chain is the purchase, management and usage of pharmaceutical products, medical devices, surgical consumables and other medical supplies within the health sector.

Internet of Things- The "Internet of Things" is a network of physical objects, such as devices, buildings, machinery and everyday appliances that have internet connectivity allowing them to both send and receive data.

Person centred care – Person centred care is the treatment of each person as an individual, and ensuring that healthcare provided to an individual focuses on the needs of the person rather than the needs of the service.

Precision Medicine - Precision Medicine takes into consideration an individual's genomic profile, the environment in which they live, their previous medical history, their medication information, and their lifestyle to tailor the treatment of disease to match these unique characteristics.

Telehealth – Telehealth is the use of electronic information and telecommunications technologies to support remote clinical consultations, transmission of diagnosis and disease management via clinical devices (remote monitoring), healthcare coaching and education and training.