

**VOLUME 2** RESEARCH REPORTS

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**Research  
Report 1** *Can HealthConnect  
prove its value?*



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HealthConnect is Australia's proposed network of electronic health records that aims to improve the flow of information across the health sector. The concept of HealthConnect is based on the recommendations of the National Electronic Health Records Taskforce in its July 2000 report to health ministers. In November 2000, ministers subsequently agreed to fund two years research and development work to test the value and feasibility of HealthConnect ahead of implementation on a national scale.

As a research project, the HealthConnect Project is shaped by a set of high-level research questions which are intended to gauge the potential of HealthConnect to be developed as a national system. They are:

- 1 Can HealthConnect prove its value?
- 2 Is HealthConnect technically feasible?
- 3 Is there a preferred implementation model?
- 4 What role should the private sector play?
- 5 What will be necessary to manage privacy?
- 6 How should HealthConnect be governed?
- 7 What will HealthConnect cost and is it sustainable?

The HealthConnect Project has also undertaken an assessment of the progress to date on national building blocks – that is, the design and development of health infostructure requirements which are necessary not only for HealthConnect but for the broader e-health agenda.

Each of the research questions and the assessment of building block development are the subject of a stand alone research report. This report addresses the issues underpinning Question 1. The findings should be considered as interim only. The findings will be reviewed at the end of the two-year research and development phase, following completion of the HealthConnect trials in June 2003.

# 1 BACKGROUND

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A fundamental component of assessing the impact of *HealthConnect* is to determine the value that a system of national electronic health records can offer the modern health care environment. This environment is primarily made up of consumers and health professionals who regularly interface with the health care system, as well as other participants such as health administrators, policy makers and researchers. The question ‘Can *HealthConnect* prove its value?’ is one of the key, seven research questions that underpin the *HealthConnect* Project. This report addresses the value question.

In order to explore the question, what is meant by ‘value’ needs to be defined. The approach taken in this paper is to define value in terms of the components of a traditional program evaluation i.e. effectiveness, efficiency and appropriateness. These measures also reflect the high level objectives of *HealthConnect* endorsed by the *HealthConnect* Board, which are:

- improved health outcomes
- improved health care delivery
- improved participant satisfaction.<sup>1</sup>

In linking these objectives back to the three measures for assessing value, effectiveness can be defined as improved health outcomes, efficiency as improved health care delivery and appropriateness as participant satisfaction. These outcomes set out the framework for what needs to be achieved for *HealthConnect* to be of value to the Australian health care system.

The purpose of this report is provide an interim assessment of the extent to which *HealthConnect* can demonstrate its value to the health care system within this framework. First it will define the elements that constitute value in terms of a national system of electronic health records. The policy context of these elements will be considered, including the importance of, and evidence for considering each of these. This includes a summary of preliminary evidence of the benefits of *HealthConnect*. An overview of the information sources used to provide these answers, including a series of case studies on electronic health records will follow. Finally, a summary of the learnings and suggestions for further work on researching the value of *HealthConnect* is presented.

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<sup>1</sup> *HealthConnect* Program Office, ‘*HealthConnect* Project Proposal’, unpublished, Canberra, 2001.

## 2 POLICY CONTEXT

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The health system relies largely on paper-based records and unaided recall. These practices are ‘ripe for change’ as evidence-based medicine requires new tools that will facilitate improved quality and outcomes in delivering care.<sup>2</sup> In July 2000, the National Electronic Health Records Taskforce proposed the concept of a national health information network for Australia — *HealthConnect*— that would allow personal information to be collected, safely stored and exchanged electronically with consumers’ permission. It would provide a systematic and comprehensive management of health information resulting in many benefits for consumers. By assisting consumers and health care providers to make important decisions, *HealthConnect* would contribute to improved safety and quality of patient care.

The National Electronic Health Records Taskforce has outlined the broad range of expected practical benefits from implementing a national health information network. They include:

- **Patient safety** — provider access to a patient’s complete medical history plus access to best practice methods will fill in information gaps and remove the guesswork out of health care.
- **Integration of care** — online communication between general practitioners, community care and hospitals will improve access to services and information such as referrals and test results.
- **Improving health outcomes** — providers will be able to make better decisions with complete and legible clinical histories, up to date test results, best practice guidance, relevant alerts and reminders.
- **Convenience and time-saving functions** — consumers will not have to repeat their demographic details and history to several health care providers. Health providers will spend less time collecting data and using information, freeing them to spend more time on patient care.
- **Improved privacy and confidentiality** — compared to a paper-based system, electronic health records can significantly increase the security of personal health information by restricting access to authorised users. Consumers will also have increased control over their own records.
- **Evidence based health care** — integrating electronic health records with clinical systems will provide clinicians with desk-top access to referral guidelines and advice on best-practice guidelines and the latest research findings and treatment options. The use of electronic health records as an evidence base also expands to population health and medical research.<sup>3</sup>

Because individual health records will be instantly accessible when and where they are needed, it can be expected that Australians who suffer from chronic conditions or have complex health needs will be among the first to benefit from a national system of electronic health records given their need to access different providers. However, all participating consumers will benefit from improvements in quality and safety of health care.

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<sup>2</sup> B Raymond and C Dold, *Clinical Information Systems: Achieving the Vision*, Kaiser Permanente, California, 2002, p. 1.

<sup>3</sup> National Electronic Health Records Taskforce, *A Health Information Network for Australia: Report to Health Ministers*, Department of Health and Aged Care, Canberra, 2000, p. 170.

## 3 COMPONENTS OF QUESTION 1

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The benefits outlined by the National Electronic Health Records Taskforce fall under the three components of assessing value described earlier i.e. effectiveness (improved health outcomes), efficiency (improved health care delivery) and appropriateness (satisfaction). The *HealthConnect* Project proposal paper (at volume 3 of this publication) sets out a hierarchy of expected outcomes to evaluate each component.

This report presents the interim evidence for *HealthConnect* to demonstrate its capacity to meet each of the expected outcomes. The evidence has been informed by the *HealthConnect* trials, analysis of electronic health record activities in Australia and overseas — including a series of the case studies developed by an independent consultant, and other research such as consumer and provider consultations. A description of these data sources is at section 4 (Information sources).

The data collected from the Tasmania and Northern Territory *HealthConnect* trials constitute the main source of evidence at the time of writing, with further information to be obtained from the New South Wales and Queensland trials in 2004/2005.

Given the Tasmanian and Northern Territory trials are still in progress, and that data is continuing to be collected from two trials, the answers to the question ‘Can *HealthConnect* prove its value?’ should be read as interim findings only.

### 3.1 Effectiveness

Measuring the effectiveness of *HealthConnect* commences at the highest level of achieving improved health outcomes. The next level of detail includes benefits such as more empowered consumers, health care, providers and planners; improved knowledge creation, more informed consumers, less time and resource wastage; more appropriate health care delivery and decision making; better informed, planned and coordinated care; and more effective targeting of resources.<sup>4</sup>

#### Improved health outcomes

There is a growing body of evidence that use of electronic health records and clinical information systems will lead to an improved quality of care, and ultimately improved health outcomes. These resources not only provide access to comprehensive patient information, but also valuable tools to assist in decision making, such as clinical guidelines, alerts and information to encourage preventative care. The subsequent enhancements in the quality and safety of care result in improved health outcomes. This claim is supported by studies in the United States (US) that have demonstrated that these systems have a positive impact on a range of mental and physical diseases<sup>5</sup> including diabetes, hypertension, asthma, tuberculosis and HIV/AIDS. The studies also suggested that patient satisfaction would subsequently increase and have a positive influence on health outcomes.

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<sup>4</sup> *HealthConnect* Program Office, ‘*HealthConnect* Project Proposal’, unpublished, Canberra, 2001.

<sup>5</sup> B Raymond and C Dold, op. cit. p. 11.

The analysis of information contained in electronic health systems is also a valuable resource in generating improved health outcomes. The collection of aggregate data in HealthConnect could be used by health managers to measure progress against standards targets for quality assurance and accreditation processes. By way of example, data from the Open Architecture Clinical Information System (Oacis) being progressively implemented by the South Australian government is used by hospital management for quality assurance meetings. It is used for monitoring the progress of individual patients and considering treatment options. The Walsall Electronic Records Development and Implementation Programme (ERDIP) site in the United Kingdom (UK) also collates data from its system to compare against quality assurance targets to make it easier to assess outcomes.

Evidence for improvements in better health outcomes arising from the HealthConnect trials is likely only to emerge in the long term, given that the measurement of health surrogates over a significant period of time is required. This is in line with the wider body of evidence that these benefits will flow in time. For example, only a preliminary indication of whether HealthConnect has had an impact on health surrogates<sup>6</sup> for diabetes (HbA1c,<sup>7</sup> blood pressure, total cholesterol, triglyceride, HDL cholesterol and microalbuminuria) will be determined at the end of the first phase of the Tasmania trial in June 2003. Measurements will be compared with baseline measurements established at the commencement of the trial in October 2002 using standard clinical guidelines. The trial will have to run for at least a further 12 to 18 months before clearer evidence can be collected. However, a pilot of an integrated care server between general practitioners and hospitals in New Zealand has resulted in a reduced incidence of severe cases of diabetes. The proportion of patients with a HbA1c reading of nine or more reduced from 34 to seven per cent over three months. The general practitioners submit data on diabetic patients to the server which provides clinical support in the form of a 'rules engine'; the same rules a doctor would apply when assessing a patient.<sup>8</sup>

## Consumer empowerment

This benefit relates to consumers being better informed about the choices available to them about their health care and being empowered by taking greater responsibility for managing their health.

Consumers are increasingly becoming interested in health, more educated about health issues, and willing to challenge health care providers and the basis for their advice. Timely and appropriate access to, and exchange of electronic health records can empower consumers and facilitate the health focus. This benefit is articulated in *Health Online: A Health Information Action Plan for Australia*:

Health consumers should be able to access their personal health information and it should be accessible across national and international borders in the interests of their own health care.<sup>9</sup>

This degree of access means consumers need to be able to control and monitor access to, and the content of their electronic health records, including the disclosure of information appropriate to the type of care received. According to the National Electronic Health Records Taskforce, there is evidence that when given the opportunity to access their own health records online almost all consumers elect

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<sup>6</sup> Health surrogates are measures of diabetes markers according to guideline targets that are compared pre and post trial.

<sup>7</sup> HbA1c is a measure of blood glucose levels and an indicator of the seriousness of diabetes.

<sup>8</sup> D Watson, 'IT pilot helps curb diabetes', *Computerworld*, viewed 13 February 2003 at <<http://www.computerworld.co.nz>>.

<sup>9</sup> Department of Health and Ageing, *Health Online: A Health Information Action Plan for Australia*, 2nd edn, Department of Health and Ageing, Canberra, 2001.

to do so. Studies also indicate that the quality of record keeping improves when consumers are given access to their medical records.<sup>10</sup>

Electronic health records enable consumers to become better informed about their health care, especially given the information and communication benefits of the internet make it significantly easier for consumers to research different treatment options and develop a better understanding of their diagnoses. This knowledge empowers consumers to have a greater degree of responsibility for their health care.<sup>11</sup>

However, in order for consumers to take up this responsibility, it is important that they are directly involved in creating their own health records. This will enable the perceptions of consumers to be captured in the record, and reviewed for accuracy and completeness.<sup>12</sup> Direct involvement in their records may also result in improvements to consumers' health given they can be productively involved in negotiating the outcomes sought from clinical interventions.<sup>13</sup>

Electronic health records are also a valuable communication tool for clinicians to explain health concepts to consumers and inform them about their care. For example, clinicians participating in the Oasis Programme in South Australia have found it useful in engaging their patients during consultations by showing and discussing information on the system.

The capacity of HealthConnect to lead to consumers being better informed and empowered is evident from the Tasmanian trial. Consumers were empowered to manage their health information by controlling who has access to it and which parts of it can be accessed. When enrolling in the trial, consumers consented to appropriate staff at the Royal Hobart Hospital and Hobart Pathology being able to access demographic and personal information about their diabetic condition in HealthConnect. They also had the right to consent selectively to their background information being loaded onto the HealthConnect repository. When visiting their general practitioner, a small number of participants elected not to share information held in an event summary with the HealthConnect repository. The option of choosing which group of providers information can be withheld from will be introduced as the trials develop.

While these findings are useful, the outcomes of focus groups undertaken by trial evaluators revealed that neither consumers nor providers were fully aware of their consent rights and obligations respectively. The lack of dialogue between the groups meant general practitioners presumed that because consumers agreed to participate in the trial, they automatically consented to sending event summaries to the HealthConnect repository. General practitioners were inclined to submit an event summary after consultations, so consent was generally not obtained. However, consumers indicated they would prefer that their HealthConnect records were accessed and updated in their presence. Clearly, participants need to be fully educated about sensitive consent arrangements before they agree to participate in electronic health systems. The need to keep stakeholders fully informed in this way is a learning from the implementation of the Toronto electronic Child Health Network<sup>14</sup> (see 4.3 International electronic health projects).

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<sup>10</sup> National Electronic Health Records Taskforce, op. cit. p. 55.

<sup>11</sup> In acknowledging this benefit, the Health Insurance Commission is developing a product called Medicare Online to give consumers access to their personal Medicare records.

<sup>12</sup> For example, paediatric records have been shown to be more complete and accurate when parents were given access to enter information directly into the record.

<sup>13</sup> National Electronic Health Records Taskforce, op cit. p. 54.

<sup>14</sup> HealthConnect Program Office, *HealthConnect Interim Research Report*, vol. 3, part 2, Canberra, 2003.

## Better decision making

By providing comprehensive, accurate and timely patient information at the point of care, better decision making will result. A national electronic health information network would provide clinicians with access to the most up to date and comprehensive clinical information (e.g. medical histories, relevant alerts/reminders and personal preferences) to make the most informed decision possible, in tandem with the consumer. Research from the US<sup>15</sup> has demonstrated that use of clinical information systems has resulted in:

- better health outcomes for disease management
- improved quality of health services
- a reduction in medical errors and adverse drug events.

Preliminary findings from the Tasmanian trial indicate that HealthConnect can lead to better decision making by providers. Even at this early stage, approximately one third of general practitioners surveyed found that access to HealthConnect was useful in the decision making process. Access to up to date pathology and medication information as well as reminders about managing patients diabetes requirements were considered particularly useful in managing patient care.

## Better quality of health services

Modern health care systems are increasingly complex, comprising many interdependent parts that must interact perfectly to avoid mistakes being made and thus ensure patient safety. Achieving a consistent high quality of care is difficult in complex health systems because it relies on the flawless interaction of a range of monitoring, treatment and support mechanisms.<sup>16</sup> However, there is a growing consensus that electronic health records can be the bridge to a new way of delivering health care.<sup>17</sup> They can play a key role in reducing a major source of error — lack of information about an individual's previous health history. Eliminating memory and guesswork as much as possible is a necessary starting point for building safe health care services and encouraging a culture of safety more generally.<sup>18</sup> Several studies in the US have shown that physicians support the use of electronic health records and new information sources to reduce medical errors and improve the quality of care in their practices.<sup>19</sup>

Interim findings from the HealthConnect trial sites show that using the system results in improved communication between health care providers, leading to the provision of high quality health services. Half of the participating general practitioners at the Tasmanian site found that using HealthConnect improved the flow of information and strengthened partnerships with the Royal Hobart Hospital, Hobart Pathology and diabetes educators. Benefits of having instant access to patient test results have also been clearly demonstrated in a pilot of ERDIP in the UK. There are several examples of where the course of treatment was either directly influenced or changed as a result of using this information.<sup>20</sup>

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<sup>15</sup> As described in B Raymond and C Dold, op. cit. p. 14.

<sup>16</sup> National Electronic Health Records Taskforce, op. cit. p. 52.

<sup>17</sup> As described in B Raymond and C Dold, op. cit. pp. 1–4.

<sup>18</sup> M Millensen, *Demanding Medical Excellence*, University of Chicago Press, Chicago, 1997.

<sup>19</sup> R Blendon et al, 'Physicians' View On Quality of Care: A Five Country Comparison Health Affairs', *Health Affairs*, May/June 2001, pp. 233–243.

<sup>20</sup> HealthConnect Program Office, *HealthConnect Interim Research Report*, vol. 3, part 2, Canberra, 2003.

As well as providing consumers' comprehensive medical histories, a network of electronic health records would have the ability to link to other systems such as billing, referral to specialists, pathology and radiology orders. The major benefits of coordinating this information online would be more efficient ordering processes, enhanced communication among providers, and streamlined work practices for clinicians and managers.<sup>21</sup>

Information could also be made available in an emergency to help health care providers diagnose illnesses and determine the most appropriate treatment quickly and accurately. Anecdotal evidence from South Australia indicates that the Oacis system is very useful for assessing clinically unstable patients in an emergency. This is considered particularly important for multi-disciplinary teams and clinicians who have not treated the patient before.<sup>22</sup> Similarly, a pilot of a diabetes tracking system in New Zealand allows doctors in a hospital emergency department to be instantly alerted when a diabetic patient is admitted.<sup>23</sup> In surveys and focus groups concerning consumer attitudes towards the HealthConnect concept, the potential to improve the quality of care in an emergency setting was cited as being of particular benefit.<sup>24</sup>

## Fewer adverse events

By providing systematic and comprehensive health information, use of a national network of electronic health records could prevent a significant number of adverse health events that cause avoidable pain and suffering and claim over 10 000 lives in Australia each year.<sup>25</sup>

Providers often have access to only a portion of a patient's record because medical histories are spread across multiple information silos i.e. doctors' surgeries, hospitals and pharmacies. Recent studies conducted in the US have provided evidence that between 10 to 81 per cent of the time, clinicians do not find patient information that has been previously recorded and belongs in the medical record.<sup>26</sup> Therefore, when information is unavailable, clinicians must provide care without the benefit of medical history, which could lead to incorrect diagnoses and adverse events. However, a health information network would provide patient information whenever and wherever it is needed to fill in the information gaps and remove a lot of guesswork from health care.<sup>27</sup>

The social and economic costs of adverse events are significant. Costs are incurred by hospitals in delivering patient care and to the community in terms of deaths, increased disability benefits and lost productivity.<sup>28</sup> However, it is estimated that up to 70 per cent of these incidences are avoidable.<sup>29</sup>

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<sup>21</sup> Ibid.

<sup>22</sup> Ibid.

<sup>23</sup> D Watson, op cit.

<sup>24</sup> Consumers' Health Forum of Australia, 'Consumers and E-health Workshops', report prepared for the Commonwealth Department of Health and Ageing, unpublished, 2001.

<sup>25</sup> National Electronic Health Records Taskforce, op. cit. p. 169.

<sup>26</sup> B Raymond and C Dold, op. cit. p. 4.

<sup>27</sup> National Electronic Health Records Taskforce, op. cit. p. 169.

<sup>28</sup> Western Australian Department of Health, 'Clinical Governance Issues Paper', Western Australian Department of Health, Perth, 2001, p. 51.

<sup>29</sup> B Raymond and C Dold, op. cit. p. 14.

Medication error is one of the most common causes of adverse events.<sup>30</sup> Patients will often have difficulty recalling the details of all their medications when they come to a hospital or other health facility for treatment. The inability of a health professional to detect or discover what medications a patient may be taking can lead to confusion and adverse drug interactions. This is a particular problem when patients go to more than one doctor. Medication error is very costly, with inappropriate use of medicines in Australia costing \$380 million per year in the public hospital system alone.<sup>31</sup>

In recognition of this problem, the *Second National Report on Patient Safety* released by the Australian Council for Safety and Quality in Health Care in 2002 focuses on improving medication safety as a high priority. This can be achieved by using computerised physician order entry (POE) systems to automate the medication ordering process and eliminate errors resulting from the interpretation of hand-written prescriptions. Studies on the effects of POE systems in the US have shown that drug administration and patient safety is improved through better drug dosing, a reduction in adverse drug reactions and more appropriate utilisation.<sup>32</sup> In one study, at least 80 per cent of medication errors related to missed dosage were eliminated by computerised POE.<sup>33</sup>

The need to improve medication safety has been the impetus for the Federal Government's *MediConnect* initiative. *MediConnect* will be a secure national electronic system that draws together personal medicines information held by different doctors, pharmacies and hospitals. The system will provide these groups with access to more complete information about consumers' medicines and enable safer and more effective prescribing, dispensing and management of medicines. It has the potential to prevent unnecessary pain and suffering for thousands of people, as well as reducing costs to consumers hospitals and government<sup>34</sup> (see *Future role of MediConnect* p. 21).

## Building a best practice, evidence-based health system

A national health information network would be a highly valuable resource for supporting the development of evidence-based population health and prevention strategies, and implementing subsequent best practice methods in a clinical setting.

According to Raymond and Dold, electronic health information can be used to improve methods of best practice and 'drive the changes towards an evidence-based framework for the evaluation and treatment of patients'.<sup>35</sup> For example, electronic clinical support systems provide general practitioners with desktop access to referral guidelines and advice on the most appropriate treatment agreed with local specialists. Access to this information will improve the quality and appropriateness of referrals to hospitals. Hospital staff can also have instant online access to current best-practice guidelines, ensuring the most appropriate type of care is provided.

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<sup>30</sup> National Electronic Decision Support Taskforce, *Electronic Decision Support for Australia's Health Sector*, Commonwealth of Australia, 2002, p. 35.

<sup>31</sup> AIHW, *Australian Hospital Statistics 1999–00*, Australian Institute of Health and Welfare, Canberra, 2002, viewed 19 March 2003 at <<http://www.aihw.gov.au/publications/hse/ahs99-00/ahs99-00-co2pdf.>>

<sup>32</sup> B Raymond and C Dold, op. cit. p 10.

<sup>33</sup> B Raymond and C Dold, op. cit. p 14.

<sup>34</sup> Department of Health and Ageing, *Commonwealth to field test system to reduce drug errors*, media release, Department of Health and Ageing, Canberra, viewed 30 January 2003 at <<http://www.health.gov.au/mediarel/yr2003/kp/kp03002.htm>>.

<sup>35</sup> B Raymond and C Dold, op. cit. p 7.

The databases within electronic support systems can provide highly valuable information for health policy and planning. In time, comprehensive data contained in HealthConnect would become a valuable resource for policy and planning purposes to monitor population health and inform prevention strategies. By collecting and linking data, policy makers and managers can accurately anticipate future trends, determine cost-effectiveness and assess the evidence base of interventions.<sup>36</sup> For example, a hospital in British Columbia has linked data on hospital separations, deaths, long term care and prescriptions to assist in resource planning.<sup>37</sup>

A wide range of clinical data is collected and analysed for epidemiological research and to develop more appropriate, targeted population health initiatives and inform prevention strategies. Collating this data from a consolidated national health information network rather than multiple sources would be more efficient and more accurate. Such data could also be used to help prevent or monitor disease or promote treatment through mechanisms such as register tracing. There is evidence that data obtained from electronic health records can also assist in improving the health of under-served populations, such as Indigenous Australians and the homeless. According to Heard (2000) it can be argued that effective population based care is in fact very difficult without adequate electronic clinical support systems.<sup>38</sup> Research indicates that consumers and providers would support the use of de-identified HealthConnect data for population health research.<sup>39</sup>

## Enhanced privacy and security

Privacy is a fundamental principle underpinning quality health care, given health records contain highly sensitive information about an individual's health issues, personal behaviour and family history. The public has a high level of trust in current practices for protecting the privacy of their health information, however consumers are concerned about the uncertainty of who can access their records using information and communication technologies. In particular, there are concerns that they may become available to a wide range of third parties such as government agencies, employers, pharmacies and researchers. Without an assurance of privacy of health information, people may be reluctant to seek the health care they need, which may then put others in the community at risk.<sup>40</sup>

These concerns can be addressed by explicitly determining the extent of control an individual has over their health records, in regard to controlling access to the record and specific information held in the record. Compared to paper-based records, the use of electronic health records can significantly increase the security of personal health information, by restricting access to authorised users who must prove their identity and ensuring that information cannot be amended, lost or destroyed. Audit trails enable tracking of user access to the system and improper activity such as attempts to access unauthorised information to be recorded. The proposed national network of electronic health records, HealthConnect, will greatly increase the security of personal health information using these safeguards. Consumers

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<sup>36</sup> National Electronic Health Records Taskforce, op. cit. pp. 69.

<sup>37</sup> S Heard, T Grivel, P Schloeffel and J Doust, 'The benefits and difficulties of introducing a national approach to electronic health records in Australia', report to the Electronic Health Records Taskforce, appendix to National Electronic Health Records Taskforce, *A Health Information Network for Australia: Report to Health Ministers*, Commonwealth Department of Health and Aged Care, Canberra, 2000, p. 39.

<sup>38</sup> D Watson, op. cit.

<sup>39</sup> Consumers' Health Forum of Australia, op. cit. p.10.

<sup>40</sup> Australian Institute of Health Law and Ethics, *Public health law in Australia: new perspectives*, Australian Institute of Health Law and Ethics, Canberra, 1998, p. 156.

will have the capacity to control access to their health information by enabling this information to be available at any time to themselves and health care providers of their choice.

The privacy of consumers' health information was improved in the Tasmanian HealthConnect trial, where a number of the above measures are in place. For example, individual health records used can only be accessed by authorised health practitioners participating in the trial. At the commencement of the trial, participants specified which general practices could have access to their records. They can also elect to withhold part or all of their information from the HealthConnect repository. Almost all (90 per cent) of consumers in the Tasmanian trial are either confident or extremely confident in these privacy arrangements. Workshops conducted by the Consumers' Health Forum have also revealed that there is a high degree of consumer confidence in the ability of HealthConnect to improve the privacy of their health information.

However, consumers have indicated the importance of also being able to suppress certain sensitive information in HealthConnect, such as mental illness, HIV/AIDS, genetic and sexual health information.<sup>41</sup> The general practitioners in the Tasmanian trial stated they would consult with their patients to determine if they would like this type of information to be withheld.

To ensure that the proposed privacy arrangements in HealthConnect are governed by a robust framework, a National Health Privacy Code is being developed by the Australian Health Ministers' Advisory Council's Privacy Working Group to regulate the exchange of personal health information using electronic health records. The code is intended to provide a consistent set of rules for safeguarding the privacy of individuals in all states and territories and across the public and private sectors.<sup>42</sup>

## 3.2 Efficiency

A significant benefit offered by a national network of electronic health records is improved efficiency in delivering patient care. This outcome has been demonstrated in studies on the impact of clinical information systems in the US, where efficiency gains have been achieved through: significant time saving for consumers and health care providers, a reduction in unnecessary tests; and a more seamless, integrated approach offering better continuity of care.<sup>43</sup>

### Time saving for providers and consumers

The capacity for a national health information network to save time for providers and consumers is substantial. By improving communication and partnerships between these groups, better coordination of services between health care providers would result and mean less 'running around' for consumers. There would be a reduced need to remember all details of interactions with the health system and repeat them at each visit with a different health care provider.<sup>44</sup>

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<sup>41</sup> Consumers' Health Forum of Australia, op. cit. p. 16.

<sup>42</sup> The National Health Privacy Working Group of the Australian Health Ministers' Advisory Council, 'Draft National Health Privacy Code' discussion paper, unpublished, 2002.

<sup>43</sup> National Electronic Decision Support Taskforce, op. cit. p. 50.

<sup>44</sup> Consumers' Health Forum of Australia, op. cit. p. 9.

A benefit to clinicians is increased efficiency in performing administrative tasks and improved workflow practices, allowing more time to be spent in direct patient care. It is estimated that 25 per cent of doctors' and nurses' time is currently spent collecting data and information.<sup>45</sup> However, electronic health records can significantly decrease the amount of time spent on these activities, particularly when coupled with electronic decision-support tools. Studies in the US have shown that clinicians spent less time recording routine patient data and medication orders were filled more quickly when using electronic decision-support systems.<sup>46</sup> In another study, physicians who used electronic medical records found this achieved a time saving of 13 per cent overall and contributed to time saving in follow-up phone conversations and office visits.<sup>47</sup>

Evidence from the Tasmanian and Northern Territory trials shows that HealthConnect can provide substantial time saving benefits for consumers and providers, a feature of the proposed network that is very important to these groups.<sup>48</sup>

Forty per cent of general practitioners in the Tasmanian trial believe that using HealthConnect improved the ease of obtaining clinical information and reduced the amount of time spent collecting pathology test results. Staff at the Royal Hobart Hospital no longer had to prepare handwritten letters as part of the diabetes education work process.

Findings from the Northern Territory trial indicate that there are significant time saving benefits for consumers living in the remote area of Katherine, where there is a large geographical distance between health providers. Instant access to health information on HealthConnect means far less travelling time and greater convenience for patients.

The event summaries in HealthConnect assist in saving clinicians' time by providing superior legibility compared to paper-based records. They are designed to provide user dependent data layout and in the future, perform assisted searches as well as flexible output methods e.g. screen, paper, email, fax.

Time saving benefits have been demonstrated by the Walsall ERDIP project, especially for sourcing medical information for complex cases. There was also a reduction in the number of appointments required to effectively treat patients. Clinicians felt that a future benefit of more timely intervention using electronic records is the reduced risk of litigation. Similarly, clinicians participating in the South Australian Oacis Programme noted significant time savings in not needing to source test results prior to appointments.

Significant cost savings can result from these efficiency benefits. For example, by using electronic referral letters, the potential time saving that can be gained is estimated at six minutes per clinical letter sent or received. With a projected clinical letter rate of about 18 million clinical letters per year in Australia at a cost of \$10 per hour, this will mean a saving of \$36 million. Estimates from the UK predict savings from full electronic exchange of information to be approximately \$10 000 per general practitioner per year.

Cost savings have also been articulated in the US. A cost–benefit study on implementing medical records in primary care demonstrated an estimated net benefit for a five year period of \$86 400 per provider.<sup>49</sup> Similarly, the Kaiser Permanente health group estimated a financial gain of US \$3.4

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<sup>45</sup> Australian Audit Commission, *For your information*, Australian Audit Commission, Canberra, 1995.

<sup>46</sup> National Electronic Decision Support Taskforce, op. cit. p. 42.

<sup>47</sup> B Raymond and C Dold, op. cit. p. 16.

<sup>48</sup> Consumers' Health Forum of Australia, op. cit. p. 9.

million to operations after implementing a clinical information system. Further, analyses predict that the real returns will come from improved clinical management rather than the present savings on administrative efficiencies.<sup>50</sup>

Additional findings from a large practice of 9 000 patients cites the need to send discharge summaries and clinical letters electronically. The current system of manually scanning letters into individual electronic records often results in errors.<sup>51</sup>

## Reduction of unnecessary tests

A common problem in the health system is the unnecessary duplication of tests that occurs when patients are admitted to hospital and previous test results are not available. Studies in the US on clinical information systems have demonstrated reductions in the number of unnecessary tests ordered, as well as efficiency gains through enabling faster ordering times.<sup>52</sup>

Similarly, the Walsall ERDIP site has demonstrated a significant reduction in duplicated tests. 10–25 per cent of test orders were eliminated, resulting in a saving of £175 000 per annum.<sup>53</sup> Anecdotal evidence from the electronic record project also indicates a reduction in the number of radiology tests repeated.

The National Electronic Health Records Taskforce has estimated that a national health information network could eliminate the duplication of tests and subsequently save the Australian health care system around \$56 million per annum.

## Provision of a flexible, seamless and integrated process of care

One of the objectives of implementing a national electronic network of health records is to provide a flexible, seamless and integrated process of care delivery of health care, better quality of care and better exchange of information.<sup>54</sup>

Electronic health records make it possible for different health providers to access information simultaneously at multiple sites, across public and private sector health systems, and internationally.<sup>55</sup> By using a standardised system of seamless communication across the health system, information can be integrated between multiple groups, such as doctors' offices, hospitals, and pharmacies. The integration of care online between health care providers will also speed access to services and information such as electronic referrals, outpatient bookings, discharge information and test results.

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<sup>49</sup> S Wang, B Middleton, B Prosser et al. 'A cost–benefit analysis of electronic medical records in primary care', *The American Journal of Medicine*, vol. 114, 2003, pp. 397–403.

<sup>50</sup> National Electronic Health Records Taskforce, op. cit. p. 68.

<sup>51</sup> A Majeed, S Lusignan, S Teasdale, 'Ten ways to improve information technology in the NHS', *BMJ*, January 2003, pp. 326–204.

<sup>52</sup> B Raymond and C Dold, op. cit. pp. 15–16.

<sup>53</sup> HealthConnect Program Office, *HealthConnect Interim Research Report*, vol. 3, part 2, op. cit. pp. 41–43.

<sup>54</sup> As described in National Electronic Health Records Taskforce, op. cit. p. 9.

<sup>55</sup> S Heard, T Grivel, P Schloeffel, J Doust, op. cit. p. 26.

These benefits are highly advantageous to specialised health care services and providers, who often work closely in multi-disciplinary settings. Health professionals will be able to provide better continuity of care and the most appropriate type of care, quickly and accurately, based on complete and up to date information accessed from all providers involved in the patient's care. For example, the coordination of multi-professional and multi-agency care for elderly patients can be substantially improved and better continuity of care provided.<sup>56</sup>

Approximately half of participating general practitioners in the Tasmanian trial believe that using HealthConnect has improved the flow of information between participating providers. Anecdotal evidence from hospital based clinicians in the trial is that they expect that the coordination of care for hospital outpatient clinics will also benefit by seamless online access to general practice and pathology reports.

The Walsall ERDIP site is an example of how a system of electronic health records can be used to integrate care across primary, secondary, community and social service settings. Similarly, providers using the Toronto electronic Child Health Network believe continuity of care across health care providers has improved since it was implemented.<sup>57</sup> Compelling anecdotal evidence has also emerged from the Oacis sites in South Australia for the capacity of a health information network to provide a more seamless, integrated process of care. A patient was treated effectively at three different locations in one day using the information on Oacis. The delivery of the most appropriate care in a very short time frame could not have occurred if the patient's health information was not available on the system at the point of care.

### 3.3 Appropriateness

A national network of electronic health records would need to be relevant and appropriate to users, by providing access to information that is highly useful and fits in with the way providers and consumers streamline their work and conduct their business.

#### Acceptability of a national system (for collecting, storing and sharing clinical event summaries)

A high degree of acceptability, in terms of enrolment numbers and use of data by consumers and health care providers would be necessary for a national system of electronic health records to function effectively and provide more effective and efficient health care. Consultations with these groups have demonstrated such acceptability for a national system of collecting, storing and sharing health information using electronic health records envisaged through HealthConnect.<sup>58</sup>

Opinion surveys conducted in Australia, England and Canada also demonstrate that use of electronic health records are widely accepted by consumers as a valuable resource for achieving and maintaining health.<sup>59</sup> In fact, 60 per cent of consumers interviewed for the Tasmania HealthConnect trial

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<sup>56</sup> National Electronic Health Records Taskforce, op. cit. pp. 169–170.

<sup>57</sup> HealthConnect Program Office, *HealthConnect Interim Research Report*, vol. 3, part 2, op cit. p. 91.

<sup>58</sup> As described in Consumers' Health Forum, op. cit.

believe that not sharing their health information using electronic health records will have a negative impact on their health care. This group expected ‘providers to know their current medication and other details’ and for there to be less reliance on consumers recalling health events at the point of care when using HealthConnect.<sup>60</sup> They also expected that their health records should be readily available in an emergency situation.

Research on international electronic health systems has shown that stakeholder acceptance is critical to successful implementation. The endorsement of health care providers would be particularly important to the acceptance of a system in the community.<sup>61</sup> Strong acceptance of HealthConnect by consumers and providers has been demonstrated in the Tasmanian trial, by strong enrolment rates and very low opt-out numbers. One quarter of eligible consumers and almost two-thirds of eligible general practices agreed to participate. Of the 295 consumers enrolled, only three have withdrawn, and no general practitioners have withdrawn. A high degree of acceptability of the Walsall ERDIP electronic health information network in the UK was also demonstrated by consumers and providers, where no participants opted out during the two-year trial period.

## Usefulness of information held on HealthConnect

As discussed under ‘Better decision making’, the potential for a national electronic network of health records to provide accurate, timely and comprehensive medical information when required would result in better health outcomes and better quality health services. Consultations with consumers and providers show that these groups consider that the potential to reduce the incidence of medical misadventure such as adverse drug events would be especially useful.<sup>62</sup> The fact that information would be available in an emergency to assist providers determine the problem or treatment was seen as another potential benefit. They have also expressed confidence that HealthConnect would fill information gaps and improve continuity between providers.<sup>63</sup> HealthConnect would also provide valuable information for health managers and epidemiologists.

## Consumers

The information held on HealthConnect is demonstrated to be useful to consumers in the Tasmanian and Northern Territory trials. Firstly, participants do not have to repeat their demographic details and medical history to different health care providers. The proposed HealthConnect will also enable them to access their health information held in medical records, as well as information such as treatment and intervention options and possible side effects. According to the National Electronic Records Taskforce, when given the choice to access their health records online, almost all consumers take up the opportunity. Timely and appropriate access to health records empowers consumers to exercise more control over their health and become more involved in the decision making process.

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<sup>59</sup> A Cornwall, *Connecting health: a review of electronic health records projects in Australia, Europe and Canada*, Public Interest Advocacy Centre, Sydney, 2002.

<sup>60</sup> see ‘Tasmanian HealthConnect trial interim evaluation report’, *HealthConnect Interim Research Report* vol. 3, part 3, Canberra, 2003.

<sup>61</sup> Albert Research, ‘Results of Research into HealthConnect’, report prepared for HealthConnect Program Office, unpublished, Melbourne, 2001.

<sup>62</sup> Albert Research, op. cit.

<sup>63</sup> Consumers’ Health Forum of Australia, op. cit.

## Providers

The information held on HealthConnect is demonstrated to be useful to health care providers. Almost 90 per cent of hospital staff in the Tasmania trial found the information in HealthConnect to be beneficial in treating patients at the point of care. Hospital nurses found that in 63 per cent of cases, the information in HealthConnect changed how they managed the care of patients.<sup>64</sup> Similarly, clinicians in the Walsall ERDIP trial reported the information contained in the system to be ‘extremely useful’.<sup>65</sup> A survey of physicians in the US, Canada, Australia, the UK and New Zealand revealed that nearly half (66 per cent in the UK) also thought that a system of electronic records would be ‘very useful’ if put into place.<sup>66</sup>

The HealthConnect system would also offer health professionals a clear, structured system of records detailing patients’ medical history. Providers consider that the concept of event summaries to record consumer information would meet their information needs.<sup>67</sup> This system provides many advantages over paper-based records. The structure of paper-based records allows for free text documentation, which can result in disorganised content, making it difficult for clinicians to locate essential information quickly. HealthConnect can provide essential patient information that can be easily interpreted at the point of care and assist in more efficient, accurate decision making.

## Health managers

HealthConnect would also provide an invaluable national data set for a range of administrative, quality control, clinical governance, policy making and research purposes. The collection of aggregate data from HealthConnect can be used by health managers and administrators to measure progress against standards targets for quality assurance and accreditation processes. The data can also be used to meet the requirements for planning processes. (see Building a best practice, evidence-based health system on page 8).

## Across participant groups

The information held on health information networks also plays a role in epidemiological and medical research. The new way of evidence-based medicine requires new tools that will enable improved quality and outcomes. A wide range of data is already collected and analysed for policy-making purposes to monitor population health and inform prevention strategies. The collation of this data using HealthConnect would be more efficient and more accurate. It can also be used to help prevent or monitor disease or promote treatment through, for example, the establishment of mechanisms such as cancer, immunisation and AIDS registers to enable contact tracing. The data can also assist in improving the health of under-served populations.

## HealthConnect fits with consumer and provider business processes

For a national electronic health records system to work successfully and be accepted in the long term, is it critical that it is compatible with the way health service providers and consumers conduct

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<sup>64</sup> Trilogy Information Solutions, op. cit.

<sup>65</sup> LMC Consulting, ‘Walsall ERDIP case study’, op. cit. p. 16.

<sup>66</sup> Blendon, R et al, op. cit. p. 240.

<sup>67</sup> Interaction Consulting, ‘Findings from consumer and provider consultations in Hobart and Brisbane on the HealthConnect concept’, unpublished, Canberra, 2001.

their everyday business.<sup>68</sup> Integration with electronic business processes and workflow is a necessary feature to achieve long term acceptance and use of the system. For example, it should interface seamlessly with other clinical systems, such as decision-support systems and databases.

It should also be easy for providers and consumers to enter and access information. To address this need event summaries would be used to store and retrieve patient data in HealthConnect. These electronic summaries provide an overview of a health care event such as a visit to a general practitioner or test results from hospital. They contain information that is relevant to the future health and care of health consumers, such as their condition, diagnosis and treatments. The collection of event summaries relating to an individual over time will constitute that person's electronic health record.<sup>69</sup>

While changes to workflows and business processes for consumers and providers would be necessary, it is important that an electronic health records system would not impose new business requirements that are unacceptable to these groups.<sup>70</sup> According to the National Electronic Health Records Taskforce, certain conditions must be met in order to achieve maximum benefit from implementing an electronic health records system. They include that:

- consumers and providers must have confidence in the data stored in the system
- they must use the record actively at the point of care
- they must be proficient in the use of the system.<sup>71</sup>

Accordingly, the change management process involved in implementing a national health records system would require education, training and cultural changes that are acceptable to its users.

In developing the Business Architecture for HealthConnect, consumers and providers were consulted on how they would interact with the proposed system based on their existing workflow arrangements. Several proposed business process models were circulated widely to stakeholders for comment and subsequently revised.<sup>72</sup> Based on this initial set of processes, the Tasmanian and Northern Territory trials have undertaken development work to integrate the HealthConnect system into existing work processes as seamlessly as possible. In doing so, the business processes were adapted to the unique context of each trial, effectively translating a conceptual model into a pragmatic, working process.

Preliminary evidence suggests that the HealthConnect system would fit seamlessly with consumer and provider business processes. The impact of HealthConnect on the Royal Hobart Hospital in the Tasmanian trial was judged to be either minor or as having a positive impact on workflow processes by 43 per cent of participating hospital staff. General practices and hospital providers found the event summaries were 'straightforward and easy' to create and use.<sup>73</sup>

However, one third of these providers said there was a small negative impact due to a lack of computers to fill out event summaries. Clearly, a number of infrastructure issues would need to be

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<sup>68</sup> HealthConnect Program Office, *HealthConnect Interim Research Report*, vol. 3, part 5, Department of Health and Ageing, Canberra, 2003, p. 4.

<sup>69</sup> Department of Health and Ageing 2003, Department of Health and Ageing, Canberra, viewed 20 January 2003 at <[http://www.health.gov.au/healthconnect/building\\_blocks/event\\_summ.html](http://www.health.gov.au/healthconnect/building_blocks/event_summ.html)>.

<sup>70</sup> HealthConnect Program Office, op. cit.

<sup>71</sup> National Electronic Decision Support Taskforce, op. cit. p. 61.

<sup>72</sup> see 'HealthConnect Business Architecture version 1.0,' *HealthConnect Interim Research Report*, vol. 3, part 6, Canberra, 2003.

<sup>73</sup> Trilogy Information Solutions, op. cit. p. 38.

addressed in implementing an online health information network. For example, the Brisbane Waters Smart Patient Data system requires further technical amendments before it can properly integrate with hospital business processes and become fully operational.

Infrastructure and technical questions pertaining to the integration of HealthConnect with business processes are addressed by the research reports on question 2 (Is HealthConnect technically feasible?) and question 3 (Is there a preferred implementation model?) in volume 3 of this publication. They provide a preliminary evaluation of the success of HealthConnect in meeting the technical and business needs of consumers and providers. question 7 (What will HealthConnect cost and is it sustainable?) provides an interim assessment of the long-term sustainability of the HealthConnect model.

## 4 INFORMATION SOURCES

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### 4.1 HealthConnect trials

The HealthConnect trial sites are a central feature of the HealthConnect research and development project. They will test the feasibility of the health information network in a 'live' setting and will inform what might be the preferred model for HealthConnect if it is implemented nationally.

There are two types of trials — fast track trials which commenced in October 2002 and longer-term trials which will commence in 2003. The fast track trials are being held in the Clarence municipality of Tasmania and the Katherine region of the Northern Territory. The interim outcomes from these trials have been analysed to answer the research questions.

The findings from the fast track trials will feed into HealthConnect design work and the longer-term trials currently planned for NSW and Queensland in 2003/2004.

#### Tasmanian trial

The Tasmanian trial of HealthConnect focusses on adult Tasmanians with diabetes who live in Clarence, and their associated care arrangements. It involves consumers and health care providers from general practice, pathology, the Royal Hobart Hospital, as well as diabetes specialists and educators.

The trial is testing the overall HealthConnect concept and, in particular, arrangements for the gathering, transmission and storage of information from various service providers, with the information being accessed for ongoing planning and delivery of care for trial site participants.

Several data collection activities have been undertaken by independent consultants to provide preliminary trial results that answer some of the research questions. The Tasmanian HealthConnect trial interim evaluation report at volume 3 of this publication provides an overview of these outcomes.

#### Northern Territory trial

The Northern Territory trial focuses on the health issues of a mobile Indigenous population in the remote Katherine region. It aims to test the basic components of HealthConnect including consumer consent and technical arrangements such as information storage and retrieval involving different health service providers.

Each provider stores medical event summaries for consenting clients. Then, with the client's permission, providers linked into the trial are able to access the client's event summaries, enabling them to provide services to support a continuity of care.

At the time of writing, independent consultants were undertaking data collection activities for the trial. Useful preliminary findings have emerged, especially relating to time saving benefits for the local population. A progress report on the Northern Territory trial is at volume 3 of this publication.

## 4.2 Other electronic health projects in Australia

In addition to the HealthConnect trials and background research, the HealthConnect research framework<sup>74</sup> anticipates that some questions can be answered by learnings from other key electronic health projects. Three case studies have been developed to provide evidence for the benefits of these systems. The projects were chosen for their similarity to the HealthConnect concept and their unique client groups. Two of the case studies focus on the Brisbane Waters Smart Patient Data system and the Open Architecture Clinical Information System (Oacis). The role of the Commonwealth's MediConnect and the Veteran's Online Health Information project are also considered.

The third case study on the UK Electronic Record Development and Implementation Programme (ERDIP) is outlined in section 4.3 (International electronic health projects), along with the Toronto electronic Child Health Network.

### Brisbane Waters Smart Patient Data system

The Smart Patient Data system is an electronic health records project that was implemented at the Brisbane Waters Private Hospital in May 2000. It is designed to facilitate the exchange of electronic health records with Brisbane Waters Radiology, cardiac specialists and several general practitioners to achieve the following benefits:

- the provision of better informed care
- a reduction in unnecessary and duplicate servicing
- increased efficiency in providing health care
- reducing instances of medical misadventure.

The Smart Patient Data system contains information relating to hospital pre-admission, admission and discharge data, cardiac specialist consultation summaries, radiology reports and general practice consultation summaries. It is intended to include pathology results and more medication data in the future. Participants are patients from the hospital aged between 45–80 years.

Patients are identified by a 'smart card' token. The token is used store demographic details and information on health events. This alleviates the need to remember details of previous events, particularly important with the elderly consumers. Patients can also use it to control access to their records.

The Brisbane Waters project is currently limited in its capacity to provide a fully operational network of health records for the Brisbane Waters Hospital, given the very small number of patients and providers enrolled and restrictions on the type of information that can be included in the database. A higher participation rate is essential for a greater variety of data to be available on the system and subsequently be an effective tool for hospital staff. However, based on anecdotal feedback, a case study of the project has identified several benefits of the Smart Patient Data system, including:

- a reduction in duplicate radiology tests
- time saving benefits for clinical and administrative staff, examples include not needing to interpret handwritten requests or retrieve patient information via phone

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<sup>74</sup> This framework sets out a national research methodology for the HealthConnect Project to address the seven high level research questions, including the evaluation of the HealthConnect trials and analysis of other electronic health projects.

- the capacity to improve privacy compared to using paper-based records. The combination of the consumer controlling access through the smart card and the provider requiring PKI-based card access is considered to significantly increase security of patient records.

While some preliminary benefits have been achieved, a key finding of the review is that the system needs to mature and include a broader range of information before it can demonstrate significant usefulness and assist in decision making processes. Busy health care providers will be reluctant to participate in a new technological initiative if they are not confident that it will provide the range of clinical information required to assist at the point of care.

The ability of the system to interface with other clinical systems and business practices is also critical to its long term use and acceptance. Further enhancements and compatibility with the existing information technology environment are required before it can become fully operational in the clinical environment.

## Open Architecture Clinical Information System

The Department of Human Services in South Australia is implementing the Open Architecture Clinical Information System (Oacis) to bring together patient and clinical information across health units. The Oacis Programme is aligned with state and national objectives to raise the quality and safety of health care in South Australia.

This major project is a first step to enable patient access to personal health information and sharing health information between health care providers in the South Australian health system.

The system allows clinicians to build electronic records which can be more readily and efficiently manipulated than traditional paper-based records. Oacis interfaces with other key clinical and support systems and builds an electronic record for each patient, including identification of the services provided and key outcome indicators. This architecture enables clinicians to gain immediate access to patient-specific clinical information. It also enables participating hospitals to view a consistent, up-to-date comprehensive set of clinical information for any particular patient.

The system also provides for the collection of a longitudinal record of services and patient outcomes, thereby facilitating improved care in a direct sense as well as through research.<sup>75</sup>

Oacis involves all patients in eight metropolitan Adelaide hospitals, plus a remote dialysis unit in Port Augusta. These health services represent 75 per cent of all public health encounters in South Australia.

The project has received in excess of \$90 million in funding to operate from 2000–2005. Qualitative evidence to date shows a wide range of benefits for the value of the system:

- Better decision making ability for quick assessment of unstable patients presented at emergency. This is considered particularly important for multi-disciplinary teams and anaesthetists.
- Data in the system is used to support regular Renal Quality Assurance meetings where the progress of individual patients and treatment plans are discussed.
- The privacy of consumers is considered to be superior compared to using paper-based records.
- The provision of seamless, integrated care across hospitals. One example cited is the efficient treatment of a patient at different sites on the same day.

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<sup>75</sup> North Western Adelaide Health Service, 'North Western Adelaide Health Service, Adelaide' viewed 18 December 2002 at <<http://www.nwahs.sa.gov.au/corporate/organisation.htm>>, 2002.

- A reduction in the number of repeated pathology and radiology tests ordered. Senior clinicians also use the system to monitor the ordering activities of interns.
- The elimination of hardcopy tests results, saving administrative time filing and sourcing test results prior to appointments.
- Engaging patients in consultations by viewing their records and graphical representation of data, improving consumer confidence and increasing involvement in the consultation.
- Acceptance by participating consumers and providers. The consumers that are actively involved are enthusiastic about the concept. 40 per cent of providers actively use the system and are positive about its potential.

A substantial quantitative evaluation is underway to assess the effective of Oacis in meeting key objectives related to consumer and provider needs.

## Future role of MediConnect

*MediConnect*, formerly the Better Medication Management System (BMMS) is similar in concept to *HealthConnect*. *MediConnect* will make possible the creation of an electronic patient medication record, which is put together by linking prescriptions written by different doctors and dispensed by different pharmacists. It will include prescription medicines, over the counter medicines and complementary medicines that the patient agrees to be included on the record. It will also provide drug alerts and record information such as patient allergies. Doctors and pharmacists will be able to download information from *MediConnect* to incorporate into their patient files. Participation will be completely voluntary for all consumers, and doctors and pharmacists will only be part of the system if they choose to join it.<sup>76</sup>

*MediConnect* is designed to improve consumer and health provider access to medicines information. It is a Federal Government project that is initially being administered by HIC (Health Insurance Commission). Ultimately *MediConnect* will provide the electronic medication record for *HealthConnect*.

There are two *MediConnect* field test sites commencing in March 2003, with an initial phase of three months and second phase of six months, followed by an evaluation. The issues that are to be tested in the evaluation will be very similar to *HealthConnect*. In terms of the value of the system, these include usefulness of the data, adequacy of privacy arrangements, participation rates, user satisfaction and how workflow and business processes are affected.

Given the similarity of *MediConnect* to the *HealthConnect* concept in terms of in terms of its technical, administrative and business arrangements, it is considered a testing ground for exploring and observing features which are central to the wider concept of *HealthConnect*.<sup>77</sup> The learnings from the *MediConnect* implementation are expected to feed into the latter initiative as it develops.

<sup>76</sup> Department of Health and Ageing and the Health Insurance Commission, 'BMMS Field Test: questions to be answered', Department of Health and Ageing, Canberra, viewed 19 December 2002 at <<http://www.health.gov.au/bmms/paper1.pdf>>, 2002.

<sup>77</sup> Department of Health and Ageing, 'Better Medication Management System (BMMS): What is the BMMS?' Department of Health and Ageing, Canberra, viewed 19 December 2002 at <<http://www.health.gov.au/bmms/index.htm>>, 2002.

## Future role of Veterans' Online Health Information project

The Veterans' Online Health Information project is designed to provide an effective model of electronic health records specifically for war veterans, and offer a more efficient alternative to paper-based methods of reporting. The project is being implemented at the Brisbane Waters Private Hospital in conjunction with other health care providers.

The objectives of the project are:

- To deliver more effective and efficient health care to veterans by providing clinical information online that is readily accessible by participating providers. Veterans are typically elderly and require more intensive and frequent care than other patients. The online nature of the project will enable access to up to date medical information and improved information flows between health care providers, resulting in cost savings and improved service delivery.
- To improve the timeliness of reporting on Veterans' treatment to the Department of Veterans' Affairs (DVA) by health care providers. Hospital claims for payment for treatment are currently lodged manually with DVA via the Health Insurance Commission. Hospital Casemix reporting is provided to DVA on floppy disks up to eight weeks after treatment has been provided. The project aims to eliminate the use of paper forms through use of online reporting and improve the speed at which reporting occurs.

The project will involve other time-saving features such as patient 'smart cards' to initiate automated generation of hospital admission forms and eliminate the need for handwritten forms. Health care providers will also be able to pre-admit patients to the Brisbane Waters hospital online.<sup>78</sup>

Given the similarities of the project to the HealthConnect concept, the Commonwealth Department of Health and Ageing is providing advisory support for the project, which is expected to culminate in June 2003. The outcomes of the project are expected to inform the majority of the sub-questions in the HealthConnect research methodology, particularly those related to the value of the system including acceptability, usefulness, time saving, and congruity with business processes.

### 4.3 International electronic health projects

Many countries have made substantial billion dollar investments in the development of infrastructures to allow for the delivery and exchange of electronic health records on a national level, or in the case of the US, regional or sector level. These countries include Canada, Hong Kong, the UK, Brazil, Sweden, the Netherlands and South Africa. A report analysing activities in these countries is located at volume 3 of this publication.

The following examples from Canada and the UK have been selected for their similarity to the HealthConnect concept in improving the quality of care across the health sector, and are useful examples of the value provided by these systems.

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<sup>78</sup> Smarthealth solutions, 'Veterans' Online Health Information Management Implementation Plan', report, unpublished, Sydney, 2002.

## Toronto electronic Child Health Network

The electronic Child Health Network (eCHN) is an electronic health system for paediatric records in the Greater Toronto area.<sup>79</sup> Membership of the network is made up of paediatricians, a regional tertiary care children's hospital, community hospitals, teaching hospitals and children's treatment centres that deal with chronic illness and a home care program. In total, more than 50 physicians and eight organisations are enrolled.

eCHN is an ambitious project that aims to 'build an accessible, family-centred high-quality regionalised health system for mothers, infants, children and youth across the Greater Toronto Area'. It also intends to achieve a number of high level objectives relating to common standards, to carry out research and education activities, and to advocate for improved access to maternal, newborn and child health services across the continuum of care.

Anecdotal evidence from eCHN is that the system has shown a number of key benefits including improved decision making, decreasing adverse events and improving quality of care. Users also believe that eCHN has improved continuity of care since providers have ready access to patient's comprehensive medical history. A report summarising the scope and preliminary outcomes of the Toronto electronic Child Health Network is at volume 3 of this publication.

## Electronic Record Development and Implementation Programme

### Overview of ERDIP

The UK Electronic Record Development and Implementation Programme (ERDIP) is a significant component of the *Information for Health strategy for a modern National Health Service (NHS)*. Established in 2000, the program involves 17 demonstrator communities that have been selected to pioneer the use of online health records, and demonstrate how electronic records can be used to share patient information across health and social service communities.<sup>80</sup>

The communities have been piloting different aspects pertinent to the use of electronic health records, such as patient access; support for specific disease groups; and information exchange across NHS providers and social services.

A national evaluation of the demonstrator sites was completed in January 2003. Given it can be considered the UK equivalent of HealthConnect, learnings and outcomes from the program will provide invaluable input to the development and implementation of Australia's national health information network.

### Walsall case study

Given the demonstrator site in the Walsall region is the most comprehensive and advanced, it has been selected as an appropriate case study for ERDIP. A formative evaluation of the site concluded in late 2002, as part of the national evaluation plan. The review found that Walsall has demonstrated

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<sup>79</sup> Child Health Network, 'Child Health Network, Toronto', viewed 20 January 2003 at <<http://www.echn.ca/hsc/chn-ech.nsf/pages/chninf>>, 2002.

<sup>80</sup> National Health Authority, 'Electronic Record Development and Implementation Programme', viewed 25 January 2003 at <<http://www.nhsia.nhs.uk/erdip/pages/backgroundtoerdip.asp>>.

that electronic health records can deliver measurable benefits in the form of time and cost savings. These benefits include:

- a reduction in repeated and duplicated tests
- a reduction in the number of appointments required to treat patients
- significant time saving in obtaining information for complex cases.

The use of electronic health records also provided qualitative evidence of improved quality of care, through benefits including:

- improved decision making, given test results are readily available online and very soon after appointments
- access to clinical guidelines to guide clinicians through the disease management process.

The evaluation also found a high degree of acceptability to consumers and providers. Clinicians reported the system (FUSION) to be easy to use and 'extremely useful'.<sup>81</sup>

The HealthConnect Project is clearly well placed to take advantage of the UK's experiences with ERDIP and apply learnings to its development and implementation.

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<sup>81</sup> HealthConnect Program Office, *HealthConnect Interim Research Report* vol. 3, part 2, op cit. p. 43.

## 5 CONCLUSION AND RECOMMENDATIONS

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Based on learnings and evidence from the National Electronic Health Records Taskforce, overseas and local experiences and Australia's commitment to developing *HealthConnect*, it is expected that resulting benefits of an electronic health information network will emerge in a number of key areas i.e. greater efficiency, improved quality of care, and ultimately, improved health outcomes and lives saved. However, it needs to be acknowledged that to date, a comprehensive national electronic health record system has not been implemented in any country worldwide. Rather, there are a variety of pilot sites and projects yet to be expanded to assist acute and community care. Therefore, it will take time for these benefits to become fully apparent.

This paper provides a preliminary status report for a key question in considering the impact of *HealthConnect*— whether it can prove its value. The evidence presented suggests that this is the case. However, some findings from the Tasmanian *HealthConnect* trial and electronic health projects analysed in this report indicate there are several common challenges to be met. Primarily, these involve educating participants about their rights and responsibilities in regard to access and consent of records, and managing the integration of a health information network with current business processes. The lessons from the Brisbane Waters Smart Patient Data system, in particular, demonstrates the importance of a high level of acceptance for, and participation in, an electronic health system for it to be effective. Strong preliminary evidence suggests however that the *HealthConnect* concept is highly acceptable to consumers and health care providers.

Based on analysis of the evidence, it is indicated that *HealthConnect* can provide a significant range of benefits in managing and delivering care including:

- consumer empowerment in the decision making process
- better decision making leading to higher quality care and improved health outcomes
- improved patient safety and fewer adverse events
- significantly improved privacy arrangements for health records
- substantial time saving benefits for consumers and health care providers
- high quality, consolidated data for quality assurance purposes, epidemiological and medical research.

Given the short time frame in which data has been collected, and that the primary focus of the research has been on the Tasmanian *HealthConnect* trial, these findings must be treated as being of an interim nature and by no means definitive. Further research is necessary to comprehensively answer the research questions. The Queensland and New South Wales trials that commence in late 2003/2004 and further outcomes from the fast track trials will contribute further evidence in assessing the capacity of *HealthConnect* to provide value in terms of effectiveness, efficiency and appropriateness to the Australian health care system. Ongoing research including the UK ERDIP, *MediConnect* and Veterans' Online Health Information projects will continue to provide useful learnings on the implementation of electronic health records to contribute to further analysis on how *HealthConnect* could provide maximum value for consumers and health care providers.

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