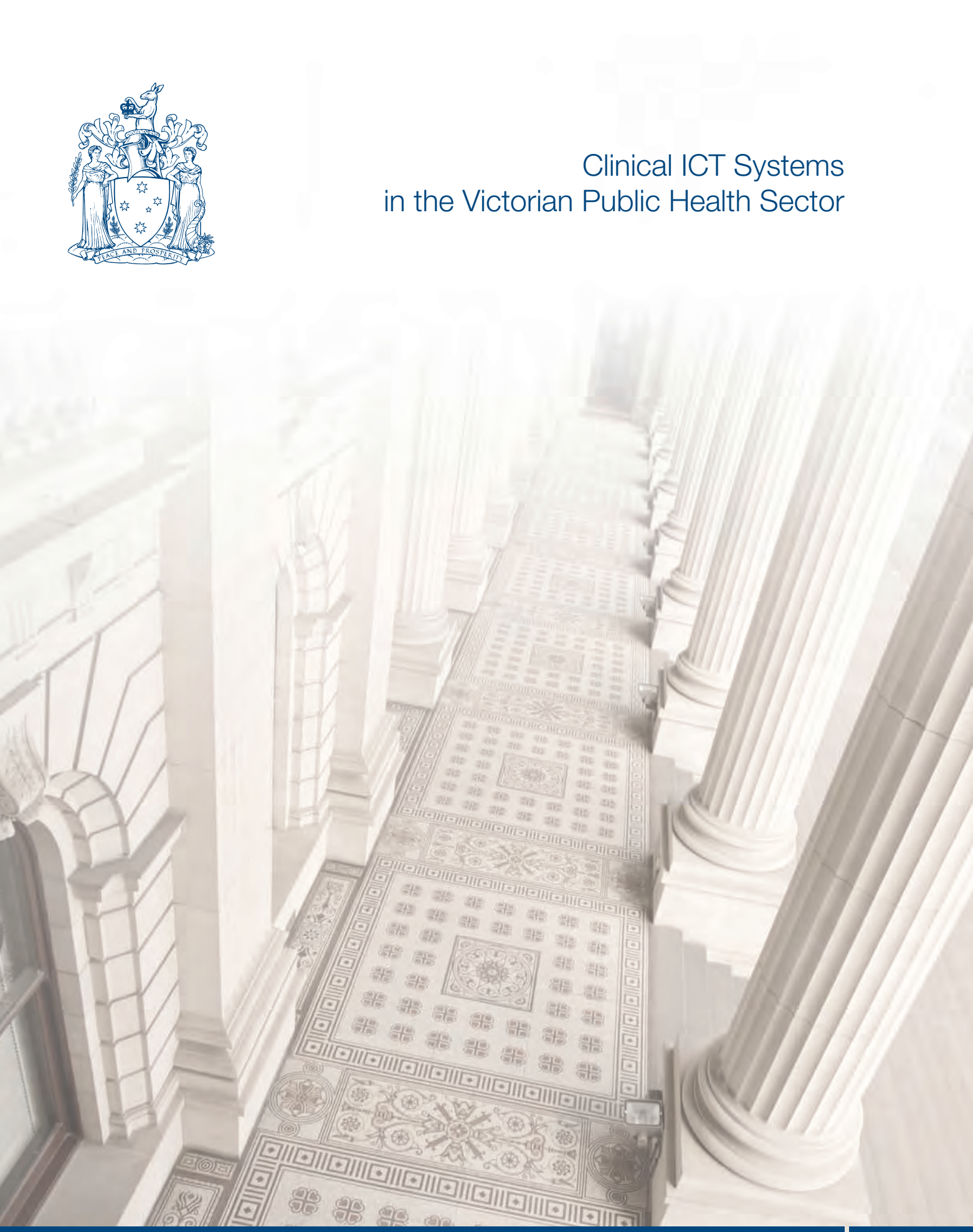
Clinical ICT Systems in the Victorian Public Health Sector



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Clinical ICT Systems in the Victorian Public Health Sector

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VAGO

Victorian Auditor-General's Office

Auditing in the Public Interest

The Hon. Bruce Atkinson MLC
President
Legislative Council
Parliament House
Melbourne

The Hon. Ken Smith MP
Speaker
Legislative Assembly
Parliament House
Melbourne

Dear Presiding Officers

Under the provisions of section 16AB of the *Audit Act 1994*, I transmit my report on the audit *Clinical ICT Systems in the Victorian Public Health Sector*.

This audit reviewed clinical ICT systems in eight Victorian public health services and examined whether they have been appropriately planned and implemented and whether expected outcomes and benefits are being realised.

I found that poor planning and inadequate understanding of the complex requirements of designing and implementing clinical ICT systems meant that the Department of Health has delivered the Health*SMART* clinical ICT system to only four Victorian health services and at a cost of $145.3 million. Some clinical ICT systems have issues that potentially affect patient safety and need to be closely monitored and resolved by the department and relevant health services.

Outside the Health*SMART* program, other clinical ICT systems that have been incrementally developed with strong clinician engagement enjoy wide acceptance and support from end users. Although their functionality is not directly equivalent to the Health*SMART* system, these other systems have involved significantly less capital and ongoing expenditure.

Yours faithfully

John Doyle
Auditor-General

30 October 2013

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Auditor-General's comments

John Doyle
Auditor-General

Audit team

Paul O'Connor
Sector Director

Elsie Alcordo
Team Leader

Kate Day
Senior Analyst

Celinda Estallo
Annie Skelton
Kudrat Gill
Analysts

Dallas Mischkulnig
Engagement Quality Control Reviewer

Timely and reliable patient information is fundamental to the delivery of safe and effective healthcare.

Modern technologies should enable patient records to be efficiently and accurately recorded, stored and shared across hospitals. However, the majority of our hospital patient records and practices are still paper based. They operate as unconnected islands of patient data and are unable to be efficiently shared with clinicians across the state's various health services to improve patient treatment and care.

In 2003, the government committed to the $323 million Health*SMART* program, which included the roll out of clinical ICT systems to 19 health services by 2007. Like any other transformational ICT project, clinical ICT systems require a significant investment of people and money. They are complex and risky, and unforeseen issues often emerge which need to be addressed.

This audit found that poor planning and an inadequate understanding of the complex requirements to design and implement clinical ICT systems has meant that the Department of Health exhausted its allocated funds, and ultimately delivered the Health*SMART* clinical ICT system to only four health services.

Outside the Health*SMART* program, a number of other hospitals have incrementally developed clinical ICT systems with strong clinician involvement. They are being used to good effect and, although their functionality is not the same as the Health*SMART* ICT system, they have been implemented at a fraction of the cost and have significantly lower ongoing costs.

Unfortunately, there has been limited assessment to date of the benefits and outcomes of the various clinical ICT systems put in place by either the department or health services, apart from some anecdotal statements and minor preliminary studies.

Until this work is done, it will be difficult to convince taxpayers that public funds have been well spent on these systems and that any further investment on clinical ICT systems is justified, or will improve clinical and patient outcomes.

At three of the health services we audited, we found evidence of clinical patient safety risks arising from the implementation of the Health*SMART* clinical ICT system. While those hospitals have put manual workarounds in place to mitigate these risks, the relevant hospitals have themselves identified that these workarounds are not fail-safe and are prone to error.

The department and relevant health services have committed to take action to resolve these issues. This needs urgent attention and I will be monitoring the actions taken to implement my recommendations closely.

In this report I have also made a number of recommendations to improve the way the Department of Health and health services procure and manage major ICT investments. This is not the first time that my office has made recommendations about the need for good planning, careful consideration and assessment of the needs and functionalities required for good ICT implementation and careful governance.

The recommendations that my office made in a 2008 audit of the Health*SMART* program identified many areas for improvement that were not effectively actioned by the department. The Victorian Ombudsman and the Public Accounts and Estimates Committee also found similar issues that should have been addressed promptly.

The responses from the various health services to the recommendations in this report have mainly focused on those that are specifically directed at them. However, most of my recommendations also apply generally, and both the department and health services need to ensure their future ICT investments are well planned, implemented, monitored and evaluated.

I will be following up periodically to see how the department and various health services have implemented my recommendations. This will provide assurance to the Parliament and the community that the same mistakes will be avoided to avert the further waste of scarce public funds.

John Doyle
Auditor-General

October 2013

Audit summary

Timely and reliable patient information is fundamental to the effective planning, management and delivery of clinical healthcare. Advances in ICT are having a profound effect on healthcare service delivery and raising expectations that patient information will be readily available to clinicians in electronic rather than paper formats.

Electronic patient records must be legible, accurate, up to date, and easily accessible in order to provide relevant patient information at the point of care. The use of ICT systems to manage clinical patient information has the potential to reduce the risk of medication error and to avoid patients being subjected to unnecessary or duplicated medical tests or interventions.

Moving from manual paper-based patient records to electronic systems is a major transformation effort. It requires significant financial investment, careful planning and design, detailed project management, extensive staff training, and the close management of desired organisational and cultural change.

Few hospitals across the world have successfully tackled this transformation, which demonstrates the complexity of this challenge.

In 2003, the government committed to roll out clinical ICT systems in all major Victorian hospitals by 2007. The Department of Health's (DH) funding submission aspired 'to deliver ICT that is well integrated and actively used in clinical practice'.

By October 2013, the Health*SMART* clinical ICT system has been installed at four health services, instead of all 19 major Victorian hospitals as planned, and the system had only been fully implemented at one of these health services.

VAGO examined the overall Health*SMART* program in 2008. The previous audit did not examine the clinical ICT system component in detail because it was still being developed and yet to be deployed to health services.

This audit examined whether:

- clinical ICT systems rollouts were appropriately planned and implemented
- expected outcomes and benefits are being realised
- the functionality of installed clinical ICT systems is likely to efficiently deliver interoperability—the ability of clinical ICT systems to work together within and across organisational boundaries—across the Victorian public health sector and effectively align with national e-Health initiatives.

Conclusions

DH has failed to complete the expected implementation of clinical ICT systems across 19 Victorian health services due to poor planning and an inadequate understanding of system requirements. It significantly underestimated project scope, costs and time lines, as well as the required clinical and other workflow redesign and change management efforts.

At all the health services we visited for this audit, project teams, clinical staff and senior management have worked hard to implement clinical ICT systems over a number of years.

It is also clear that clinicians are increasingly using and seeing the benefits of clinical ICT systems, although it is evident that the installed Health*SMART* system is not well suited to the specialist needs of some hospitals.

Clinical ICT system implementations are complex and like any other transformational ICT project, unexpected and unforeseen issues can often emerge. In the case of Health*SMART*, the introduction of electronic medication ordering and management has been the most difficult and complex component of the clinical ICT system program. To date, only three Health*SMART* sites have implemented this component.

In medical practice, prescribing medications is a complex clinical activity with many 'native risks', such as human error, that can cause adverse patient outcomes due to incorrect drug dosages and allergic reactions to certain medications.

Effective management of these risks requires clinicians to be intensively trained and supervised, irrespective of whether the medications ordering and dispensing process is paper-based or ICT-based.

This audit found evidence of a number of potential clinical risks at three of the Health*SMART* sites:

- At two of the Health*SMART* sites these potential risks relate to a discontinuity of patient treatment information during a hospital stay, and confusion around the ordering and dispensing of complex prescriptions.
- Another Health*SMART* site had an issue related to discharge summaries being completed prior to surgery or treatment, and system-printed prescriptions being hand-amended by clinicians with different medications.

In the absence of appropriate controls and effective mitigations, these issues could pose serious safety risks to patients.

While these three health services have put some manual workarounds in place to reduce the potential risks, they are not fail-safe, they increase inefficiency in the short term, and they do not provide a long-term solution to the identified problem.

As a result, there is a continuing potential risk to patient safety that needs to be closely monitored by both DH and the relevant health services. However, DH has not established processes to oversee either the management of risks, or the performance of installed clinical ICT systems, at either Health*SMART* or non-Health*SMART* sites.

Non-Health*SMART* sites have implemented clinical ICT systems at a fraction of the cost of implementing Health*SMART*. These non-Health*SMART* sites purchased their systems from other vendors and employ various hosting arrangements. They also have different maturity compared to Health*SMART* sites in terms of functionality and clinician usage.

Apart from some anecdotal statements and minor preliminary studies conducted by health services, DH and health services are currently unable to report on the delivery of intended benefits or outcomes from clinical ICT systems. Consequently, DH is unable to evaluate the benefits and value for money of one system versus others.

The installed clinical ICT systems do not currently deliver interoperability across the Victorian public health sector. Both Health*SMART* and non-Health*SMART* clinical ICT systems do not enable patient data to be shared across Victoria's public hospitals.

This compromises the fundamental achievement of DH's original objective of an integrated, cohesive and effective health system in which patient records will be transparently available to all providers of care.

Findings

Poor planning and implementation

The Health*SMART* clinical ICT system rollout has been a poor example of public sector leadership of government-funded transformative technology projects. In planning and implementing the system rollout, DH has not demonstrated:

- an auditable trail of authorisation by government of key changes in the program's scope and direction
- effective financial monitoring and oversight practices to generate reliable and consistent expenditure data
- appropriate attention and action in relation to previous review recommendations and other guidance
- effective governance and contract monitoring to ensure vendor performance.

By October 2013, the Health*SMART* clinical ICT system cost $145.3 million. Despite its significantly reduced scope, this is $87 million, or 150 per cent, more than the original approved budget of $58.3 million.

This translates to an average installation cost of $36.3 million for each of the four Health*SMART* sites.

Clinical ICT system installations in four non-Health*SMART* sites have cost much less. The average cost of installation is $1.8 million per site, although in terms of functionality, each of the systems has major differences compared to the Health*SMART* clinical ICT system.

The current configuration of the Health*SMART* clinical ICT system has introduced some potential clinical risks:

- **'Encounter' issue**—where the clinical ICT system considers the patient as having been discharged, even though they merely transferred locations within the hospital, e.g. from the emergency department to the ward. The main safety impacts are a discontinuity of care and clinician confusion, potentially resulting in patients either missing prescribed medication or receiving an incorrect dose. This issue was identified at two of the Health*SMART* sites.
- **Ordering and dispensing of complex prescriptions**—is related to difficulties clinicians face when using the clinical ICT system to administer complex drug prescriptions, for doctors when encoding the prescription in the system and for nurses when giving medication to patients. Similar to the 'encounter' issue, patients are potentially at risk of either missing prescribed medication or receiving an incorrect dose. This issue was identified at two of the Health*SMART* sites.
- **Clinical ICT system printed prescriptions being hand-amended with different medications**—due to the voluminous medication list that doctors have to make selections from, they sometimes print out an incorrect prescription and then manually 'overwrite' it. This practice results in an inaccurate electronic patient record unless pharmacists at the hospital dispense the medication and change the record to reflect the correct hand-amended prescription. This issue was identified at one of the Health*SMART* sites.

While the affected health services using the Health*SMART* clinical ICT system have put some manual workarounds in place to minimise the adverse consequences of these identified issues, documentation from one health service describes these workarounds as 'prone to error' with 'no tolerance for anyone missing a step'.

They also create an increased administrative burden and inefficiency, and reduce the realisation of potential benefits from the use of technology in clinical practice.

Although hospitals have clinical risk and quality systems and procedures in place that should identify and resolve potential patient safety risks arising from the clinical ICT system, immediate and focused action is required to analyse and effectively mitigate these potential risks in the short term.

It is also difficult to ascertain whether the Health*SMART* clinical ICT system is creating more incidents or is simply recording and capturing these more effectively.

There is a clear need to give more focused attention to the issues arising from the installed clinical ICT system so that the potential patient safety risks are effectively addressed. Software upgrades, configuration changes and the redesign of clinical treatment workflows all need to be actively considered and expedited by DH and the relevant health services.

Outcomes and benefits

Despite flaws in the planning and implementation of the Health*SMART* clinical ICT system, there have been a number of positive outcomes from the program:

- The clinical ICT system is now allowing clinicians within the same health service to simultaneously access electronic patient data, which is a major advantage over paper files.
- The system has also enabled the four Health*SMART* sites to securely forward patient discharge summaries to general practitioners, with Barwon Health, a non-Health*SMART* site, also having this functionality.
- The Australian Medication Terminology catalogue has been developed and is now available for other Australian health services to use in their clinical ICT system implementations.

Beyond these readily observable outcomes, DH is not monitoring the achievement of other desired outcomes and is yet to report on any benefits realised from the program. Apart from anecdotal statements and some preliminary studies by health services, DH is not currently able to report on the delivery of intended outcomes.

DH claims that resource and funding limitations are significant barriers for health services to measure and report on benefits. However, these limitations arise because DH did not allocate funding to assess the achievement of intended benefits as part of the program budget.

Further, DH has not studied the performance of clinical ITC systems at non-Health*SMART* sites and is not able to evaluate the benefits of the Health*SMART* clinical ICT system compared to other systems.

Interoperability

Interoperability refers to the ability of clinical ICT systems to work together within and across organisational boundaries to advance the effective delivery of patient healthcare.

The 2003 Health*SMART* funding submission stated that by 2013 ‘paper will fundamentally be a thing of the past in the delivery of healthcare’, and ‘the health system as a whole will be an integrated, cohesive and effective system’ in which patient records will be ‘transparently available to all providers involved in their care’.

The current situation in the Victorian public health sector is far from meeting this aspiration. Hospitals are all still highly reliant on paper records, and are unable to directly access patient information held at other health services.

Isolated islands of data continue to exist among the Health*SMART* sites and even among locations of the same health service. The currently installed clinical ICT system does not allow patients’ clinical information to be shared across the Victorian public health sector.

The appropriate sharing of patient information across the Victorian public health sector could provide relevant and timely information at the point of care. It could minimise waste from unnecessary and duplicated clinical tests and provide clinicians with relevant medical data when needed.

Recommendations

Number	Recommendation	Page
	That the Department of Health:	
1.	develop a comprehensive strategic plan for the ongoing development of electronic medical record or clinical ICT systems across the Victorian public health sector	24
2.	conduct a review of its procurement, contract management and financial oversight practices for major ICT projects so that it can more effectively: • align functionality and usability of selected products with end user needs • manage the timeliness and quality of vendor performance • monitor expenditure against achievement of deliverables and functionality, and approved budgets • embed benefits realisation and evaluation into the project life cycle	24
3.	establish guidelines so that government-approved budgets, scope and schedules are followed and that any exceptions or revisions are documented and presented back to government for appropriate consideration.	24
	That the Department of Health and health services:	
4.	follow Department of Treasury and Finance guidance for future clinical ICT investments and require comprehensive business cases, relevant and measurable performance indicators and clearly articulated benefits and outcomes	24
5.	align any future clinical ICT procurements to the key principles of Victoria's ICT strategy	24
6.	ensure expertise is available to plan and implement future clinical ICT development and change projects, particularly in the areas of clinical engagement and leadership, socio-technical systems analysis, health informatics and benefits realisation.	24
	That the Department of Health:	
7.	conduct a comprehensive and standards-based assessment of clinical ICT system functionalities across the Victorian public health sector.	39
	That the Department of Health and relevant Health*SMART* sites urgently:	
8.	resolve the 'encounter', complex prescriptions, pre-prepared discharge summary and hand-amended prescription issues identified by this audit	39
9.	address identified potential patient safety risks arising from clinical ICT system installations through software upgrades, configuration changes and the redesign of clinical treatment workflows, as appropriate	39
10.	monitor and, as required, conduct root cause analysis of clinical incidents in health services which are attributable to these known issues.	39

Recommendations – *continued*

Number	Recommendation	Page
	That health services:	
11.	expedite mandatory and ongoing training for clinicians in the use of clinical ICT systems. Priority should be given to the appropriate prescribing and administration of medication, and any workarounds needed for known issues	39
12.	develop or review internal guidelines to make sure that electronic patient data is kept accurate and reliable throughout all phases of patient care.	39
	That the Department of Health:	
13.	comprehensively review and publicly report on the costs and benefits of the Health*SMART* clinical ICT system program	49
14.	seek a Gateway program review of the Health*SMART* clinical ICT system rollout to understand what value for money and other outcomes have been achieved since 2003	49
15.	identify options for health services to effectively and appropriately share relevant patient information by developing a secure data exchange or messaging network.	49

Submissions and comments received

In addition to progressive engagement during the course of the audit, in accordance with section 16(3) of the *Audit Act 1994* a copy of this report was provided to the following agencies with a request for submissions or comments:

- Alfred Health
- Austin Health
- Barwon Health
- Department of Health
- Eastern Health
- Peninsula Health
- Peter MacCallum Cancer Centre
- The Royal Children's Hospital
- The Royal Victorian Eye and Ear Hospital.

Agency views have been considered in reaching our audit conclusions and are represented to the extent relevant and warranted in preparing this report. Their full section 16(3) submissions and comments are included in Appendix A.

Three of the above agencies have received management letters which set out in detail the observed issues, proposed rectifications and a proposed time line for finalisation. We have requested specific advice about how these agencies propose to address this report's recommendations in relation to potential patient safety risk issues.

VAGO will periodically monitor agency progress to resolve these issues and may, at its discretion, report this progress to Parliament at a later date.

1 Background

1.1 Introduction

Timely and reliable patient information is fundamental to the effective planning, management and delivery of clinical healthcare. Advances in ICT are having a profound effect on healthcare, including raising expectations that patient information will be readily available to clinicians in electronic rather than paper formats.

In order to provide relevant patient information at the point of care, electronic patient records need to be legible, accurate, up to date, and easy to access. Using ICT systems to manage clinical patient information potentially reduces the risk of medication error and can help avoid subjecting patients to unnecessary or duplicated medical tests.

In 2003, the government committed to rollout clinical ICT systems in all major Victorian hospitals by 2007. The Health*SMART* funding submission also noted that by 2013 'paper will fundamentally be a thing of the past in the delivery of healthcare', and 'the health system as a whole will be an integrated, cohesive and effective system' where patient records will be 'transparently available to all providers involved in their care'.

1.1.1 Electronic medical records

An electronic medical record (EMR) is a computer-based record of patient information about their previous, current and future care. It replaces paper-based records by electronically documenting and storing relevant information.

Department of Health (DH) documents state that, within the Victorian public health sector (VPHS), an EMR is a 'patient-centred system that staff can use to fulfil their patient-care duties without using paper; and which stores data in a structured, computable form, supports real-time active decision support, and meets legal requirements and best-practice standards for medical records'.

ICT devices, systems and applications used by doctors, nurses and other clinicians to record, store and access patients' EMRs are commonly referred to as 'clinical ICT systems'.

EMR systems

DH defines an EMR system as comprising 'clinical information and capabilities needed to deliver healthcare, where the information is captured in a computer readable form that supports interoperability and clinical decision support'.

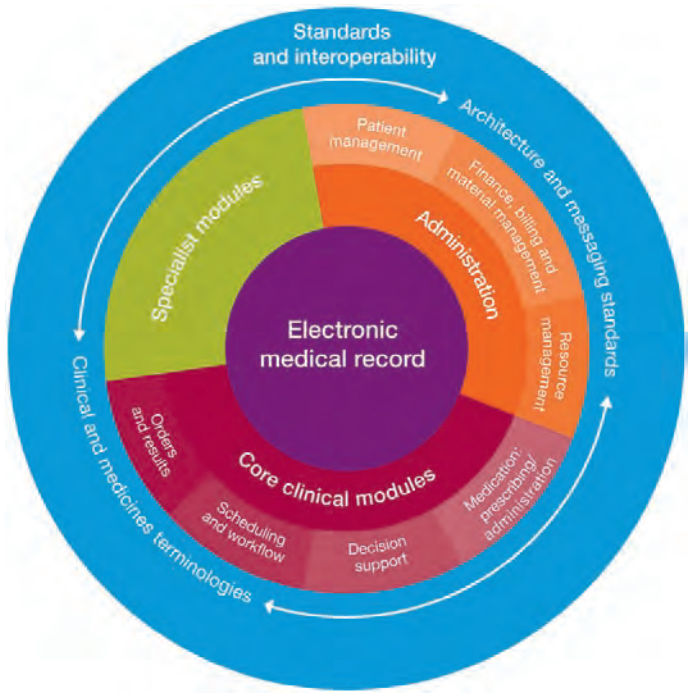
An EMR system is designed for healthcare providers to document, monitor and manage patient information. DH also expects that within the VPHS, EMR systems should be operated 'without using paper medical records'.

DH states that an EMR system should provide the following minimum capabilities:

- **Electronic medical record**—a repository of patient clinical information, captured in a structured computer-readable format supporting interoperability and clinical decision support.
- **Administration**—provides functions to support patient management and other administrative processes, such as accepting referrals from external organisations.
- **Clinical modules**—provide functions to support clinical care such as diagnosis, treatment, closed-loop medication management, real-time decision support and alerts. This must include access to historical clinical information such as scanned paper documents and other unstructured data. The clinical modules must also support standards-based communication with external organisations to enable, for example, the sending of standard format discharge summaries.
- **Specialist modules**—include support for specialised clinical-care processes, such as managing dialysis patients or transplant surgery patients. These modules could also include extended support for clinical research.

DH advises that, at present, no Australian health service has installed an EMR system which includes these capabilities. Figure 1A illustrates DH's definition of an EMR system.

Figure 1A
EMR system and supporting capabilities



Source: Defining an Electronic Health Record, Department of Health, 2012.

Benefits of a clinical ICT system

Before the development of clinical ICT systems, patient clinical information was mainly handwritten, stored in folders, and filed in medical records held at hospitals. This approach often resulted in lost or illegible patient notes, time delays when retrieving and transporting files, and prescribing errors due to a lack of clarity within paper medication charts and pathology and radiology orders.

Academic and medical research has identified clinical ICT systems as offering significant potential for quality improvement within the healthcare sector. Some of the expected benefits to clinicians, clerical staff, and patients include:

- better treatment information at the time of admission
- reduced medication errors and adverse drug reactions
- reduced duplicated, invasive or expensive tests
- reduced delays in patient discharge due to the more timely availability of test results and the completion of discharge summaries
- reduced hospitalisation or additional bed-days associated with adverse events that take place in hospitals
- reduced clinician administrative tasks, resulting in more time spent with patients
- improved communication between clinicians and the community
- improved data entry for auditing and clinical research purposes.

1.2 The Health*SMART* program

1.2.1 Overview

In 2003, the government announced the Health*SMART* program, a whole-of-health ICT strategy to modernise and replace ICT systems throughout the VPHS. It established the Office of Health Information Systems within the then Department of Human Services—which later split into two, to establish a separate DH—to deliver the program.

The $323 million Health*SMART* program was to be delivered via a ‘statewide footprint’ by adopting standardised approaches to information systems. The objective of the program was to improve patient care, reduce the administrative burden on healthcare professionals, and ease the costs associated with the updating of technical infrastructure.

1.2.2 The Health*SMART* clinical ICT system program

DH documents state that the rationale for the Health*SMART* clinical ICT systems project was that ‘information critical to the provision of patient care should be available at the point of care and the point of clinical decision-making’.

The Health*SMART* clinical ICT system program aimed to provide the foundation for an EMR system, and to deploy functionalities for clinical decision support, electronic medication management and patient discharge summaries at all major Victorian hospitals.

The intention was to enable health services to 'improve the quality, safety and efficiency of patient care by:

- providing relevant information at the point of care
- incorporating evidence into tools that actively support clinical decisions
- reducing wastage of resources through duplication of activities and resources
- implementing common applications with common and standard configurations to reduce variability across organisations'.

Phases of rollout

Following a request for tender, DH engaged a single vendor to supply the Health*SMART* clinical ICT system through a Head Agreement signed in March 2006. The state build version of the Health*SMART* clinical ICT system was intended to be developed and released in three phases:

- **Release one: Clinical workbench and ePrescribing**—including functionality for results reporting (pathology and medical imaging), problem list, allergies, alerts, discharge summary, electronic medication profile, and electronic discharge medications.
- **Release two: Order entry and medication management**—including functionality to electronically order pathology and medical imaging tests, electronic prescriptions (inpatient, emergency and outpatient), and electronic medication administration.
- **Release three: Clinical documentation**—automation of clinical documentation across one specialty.

Participation policy

The Health*SMART* program was originally established as a partnership between DH and the VPHS. This meant that health services could decide whether, when and to what extent they would participate in the implementation of any of the ICT applications procured for the program.

However, in 2006, after the program had not achieved anticipated levels of uptake, a participation policy was introduced which specified conditions under which health services were required to participate in the program, unless an exemption was given by DH.

Number of sites

The 2003 government funding decision expected that the Health*SMART* clinical ICT system would be implemented at all major Victorian hospitals. Initially, 10 health services were identified as lead sites for the system, but implementation only proceeded at four of these sites, as shown in Figure1B.

Figure 1B
Selected lead sites for Health*SMART* clinical ICT system

Health service	Implemented
Austin Health	Yes
Eastern Health	Yes
Peninsula Health	Yes
The Royal Victorian Eye and Ear Hospital	Yes
Loddon Mallee	No
Rural Health Alliance	No
Melbourne Health	No
Northern Health	No
The Royal Women's Hospital	No
Southern Health	No
Western Health	No

Source: Victorian Auditor-General's Office analysis of Department of Health data.

Governance arrangement

Governance for the Health*SMART* clinical ICT system component was managed through a hierarchy of boards, project committees and advisory groups, as well as contractual instruments and financial agreements.

In 2003, the Board of Health Information Systems (BHIS) was formed to provide high-level direction for the program. It was chaired by the Secretary of the Department of Health and included senior representatives from DH, the Department of Treasury and Finance, primary and community health agencies, metropolitan health services, and rural and regional health ICT alliances. The Department of Premier and Cabinet was added to the group in 2010.

As previously reported in VAGO's 2008 Health*SMART* audit, 'the BHIS has no executive powers, being in effect an advisory body within the broader governance environment' of the then Department of Human Services.

The following steering committees, reference groups, and councils directly and/or indirectly reported to the BHIS:

- Clinical Systems Steering Committee
- Clinical Systems Reference Group
- clinical systems advisory groups—including Medications, e-Health and Radiology
- agency steering committees—for health service implementations.

Various contractual arrangements governed the responsibilities, and financial arrangements for the implementation of the Health*SMART* clinical ICT systems:

- Head Agreement between DH and the vendor
- implementation purchase order contracts between each health service and the vendor
- funding agreements between DH and health services.

Tripartite funding agreement

In Victoria, each health service is accountable for its own ICT procurement and funding decisions. However, in the case of the Health*SMART* program, DH provided direct funding to the final four health services included in the implementation.

These health services signed funding agreements with DH in 2009 to rollout the Health*SMART* clinical ICT system across all their facilities.

The funding agreement covered:

- licensing of the new clinical ICT system software and vendor professional services
- implementation staff and other expertise as required
- upgrade of ICT infrastructure at each included site
- purchase of point of care devices to enable access to the clinical ICT system
- post-implementation and benefits realisation reports
- support for the new system once it had been implemented.

Funding was not to be used for support and maintenance of existing ICT systems that were not associated with the Health*SMART* clinical ICT system implementation.

In May 2012, the Minister for Health announced that Health*SMART* funding would cease from 30 June 2012. New expenditure on clinical ICT would be funded from hospitals' own funds, within the context of annual funding allocations from DH, or any specific capital funding directly provided to the health service by the government from time to time.

1.3 Non-Health*SMART* clinical ICT system installations

Outside the Health*SMART* program, some health services have implemented their own clinical ICT systems. This occurred before and during the same period when the Health*SMART* rollout was underway.

Because they were outside the auspices of the Health*SMART* clinical ICT systems program, these hospitals primarily use their own funds to pay for the development, installation and maintenance of their own clinical ICT systems.

This audit examined clinical ICT systems rolled out at four non-Health*SMART* installations:

- Alfred Health
- Barwon Health
- Peter MacCallum Cancer Centre
- The Royal Children's Hospital.

1.4 Relevant audits and reviews

A number of audits and reviews have previously highlighted a range of issues within the Health*SMART* program.

Delivering HealthSMART – Victoria's whole-of-health ICT strategy

In April 2008, we reported that, of all the administrative and technical components of the Health*SMART* program, the clinical ICT system component was at greatest risk of not achieving expected benefits due to implementation delays and cost overruns.

We recommended that DH confirm which health agencies were in-scope for the clinical ICT system and devise a realistic schedule, and adequate contingency to successfully implement the full program.

Own motion investigation into ICT-enabled projects

In November 2011, the Victorian Ombudsman reported that the Health*SMART* clinical ICT system, which had the potential to deliver the most benefits, had not been delivered as planned and was facing strong resistance among user groups.

The Ombudsman recommended that DH complete the four Health*SMART* clinical applications that it had commenced, and review the functionality of the system.

Inquiry into Effective Decision Making for the Successful Delivery of Significant Infrastructure Projects

In December 2012, the Public Accounts and Estimates Committee noted that there had been a failure by DH to recognise the extent to which Health*SMART* would require health services to change their clinical ICT systems, ICT infrastructure and other specialist operations, in order to realise the expected benefits from the invested public funds.

Ministerial Review of Victorian Health Sector Information and Communications Technology

In January 2013, the Minister for Health established an expert review panel to:

- conduct a high-level review of the usefulness of all Health*SMART* applications, as recommended by the Victorian Ombudsman
- provide advice on future directions for Victorian health sector ICT, consistent with the *Victorian Health Priorities Framework 2012–22*
- confirm the cost of the current program
- provide advice on the approach to allocating $100 million over four years from the government's Innovation, e-Health and Communications Technology Fund.

At the time of this audit, a confidential draft report by the expert review panel had been provided to the Minister for Health for his consideration.

1.5 National e-Health Strategy

A National e-Health Strategy was launched in 2008 by all Australian Health Ministers. The National e-Health Transition Authority was set up in July 2005 and is responsible for delivering key components of the 2008 strategy and developing better ways of electronically collecting and securely exchanging information between health agencies.

The Personally Controlled Electronic Health Record (PCEHR) launched in 2012 is a key component of the National e-Health Strategy. The PCEHR electronically stores and manages summary consumer health information, which can be made available to health providers if a patient consents.

In practice, this means that a clinician at a Victorian hospital should be able to access health information—such as known allergies, vaccinations received, as well as previous medications prescribed and administered—for any patient who has opted into the PCEHR.

The PCEHR has the potential to become a comprehensive shared health summary generated from a trusted source that is timely, accurate and reliable. However, it is not designed to be a substitute for a detailed clinical record which is used during a hospital stay.

1.6 Legislative and policy framework

The Secretary of the Department of Health has the primary responsibility for administering the *Health Services Act 1988*. Principal functions of the secretary include policy development, planning, accountability and funding.

The Act establishes public hospitals and other public health services as incorporated public authorities and sets out their governance, powers and functions. Under the Act, each hospital board is accountable for:

- effectively and efficiently managing the organisation
- providing high-quality care and services
- meeting the needs of the community
- meeting financial and non-financial performance targets.

1.7 Audit objectives and scope

This audit examined the effectiveness of a selection of clinical ICT systems rolled out across the VPHS and assessed whether intended benefits from these investments are being realised.

To address this objective, the audit examined whether:

- clinical ICT system rollouts have been appropriately planned and implemented
- expected outcomes and benefits have been realised
- the functionality of installed clinical ICT systems is likely to efficiently deliver interoperability across the VPHS and effectively align with national e-health initiatives.

1.8 Audit method and cost

Audit methods included interviews with health service clinicians and staff, direct observation of live ICT systems being used in clinical environments, and analysis of documents and data from health services and DH.

An audit reference committee and an independent subject matter expert were also engaged to provide specialised clinical and technical guidance to the audit team.

The audit was conducted under section 15 of the *Audit Act 1994* and in accordance with the Australian Auditing and Assurance Standards.

Pursuant to section 20(3) of the *Audit Act 1994*, unless otherwise indicated, any persons named in this report are not the subject of adverse comment or opinion.

The cost of the audit was $515 000.

1.9 Structure of the report

This report is structured as follows:

- Part 2 examines whether clinical ICT system rollouts were appropriately planned and implemented
- Part 3 examines the functionalities of the various clinical ICT systems
- Part 4 assesses whether expected outcomes and benefits have been realised including whether installed systems will deliver interoperability across the VPHS and effectively align with national e-health initiatives.

2 Planning and implementation

At a glance

Background

The original funding decision for the Health*SMART* program was to implement the clinical ICT system at all major Victorian hospitals by 2007.

Conclusion

The Department of Health (DH) has failed to complete the expected implementation of clinical ICT systems across 19 Victorian health services. This is due to poor planning and inadequate understanding of the complex requirements of designing and implementing clinical ICT systems.

DH significantly underestimated the project scope, costs, and time lines, as well as the effort required for process redesign and change management.

Findings

- DH cannot demonstrate an auditable trail of authorisation by government of key changes in program scope and direction.
- DH did not have effective financial monitoring and oversight practices to monitor total expenditure and assess value for money compared to other systems.
- DH did not have effective governance and contract monitoring to ensure vendor performance.
- DH has not effectively actioned recommendations from reviews conducted by this office in 2008 and the Ombudsman in 2011.

Recommendations

That the Department of Health:

- develop a comprehensive strategic plan for the development of electronic medical record or clinical ICT systems across the Victorian public health sector
- conduct a review of its contract management, financial oversight and procurement practices for major ICT projects
- establish guidelines so that approved budgets, scope and schedules are followed and that any exceptions or revisions are appropriately documented.

That the Department of Health and health services:

- follow Department of Treasury and Finance guidance for future clinical ICT investments and require comprehensive business cases, relevant and measurable performance indicators and clearly articulated benefits and outcomes.

2.1 Introduction

The Health*SMART* clinical ICT system has been installed at only four health services rather than all major Victorian hospitals—across 19 health services—as originally planned. At the time of this audit, the Health*SMART* clinical ICT system had only been fully implemented at one of these four health services.

2.2 Conclusion

The Department of Health's (DH) poor planning and inadequate understanding of the complex requirements of clinical ICT systems was the main reason that it failed to complete the implementation as originally expected. DH significantly underestimated project scope, costs and time lines, as well as the required process redesign and change management efforts.

The Health*SMART* clinical ICT system rollout is an example of poor leadership of government-funded transformative technology projects. In planning and implementing the system rollout, DH has not demonstrated:

- an auditable trail of government authorisation for the many material changes it made to program scope and direction
- effective financial monitoring and oversight practices, nor an ability to generate reliable and consistent expenditure data
- appropriate attention and actions in relation to previous review recommendations and guidance
- effective governance and contract monitoring to ensure vendor performance.

Despite its significantly reduced scope, the Health*SMART* clinical ICT system has cost $145.3 million. This is $87 million or 150 per cent more than the original $58.3 million approved budget.

In simple terms, this translates to an average cost of $36.3 million for each of the four Health*SMART* sites. The truncated rollout to only four sites from the original 19 health services also equates to under performance of the original public investment by at least 60 per cent.

Clinical ICT system installations in the four non-Health*SMART* sites we examined have been more effectively planned and implemented. At an average cost of $1.8 million per installation, financial expenditure at the non-Health*SMART* sites has been significantly less than the Health*SMART* clinical ICT system.

For context, this cost differential should be balanced by a consideration that the systems installed at non-Health*SMART* sites have less functionality, less complexity and fewer users than Health*SMART* sites.

2.3 Planning

Moving from manual paper-based patient records to electronic systems is a major transformation project. It requires significant financial investment, careful planning and design, detailed project management execution, extensive staff training, and close management of desired organisational and cultural change.

Few hospitals across the world have successfully tackled this transformation which demonstrates the complexity of this challenge.

When planning the Health*SMART* clinical ICT system, DH significantly underestimated project scope, costs, time lines and effort required for process redesign and change management.

The funding submission to government in 2003 was an aspirational document. It did not have the level of detail that would be expected in a business case and it did not provide a considered analysis of an identified need or a detailed options analysis.

Whole-of-life costs and expected benefits were not clearly defined.

DH acknowledged in a presentation to government in August 2011 that the original business case 'was overly optimistic', and that the department had an 'inadequate understanding of the complexities of the clinical system at project commencement'.

It also noted that 'the competitive nature of the budget bidding process tends to lead towards overselling of a case to attract funding'.

2.4 Implementation

The 2003 decision anticipated that Health*SMART* would be completely rolled out in all major Victorian hospitals—across 19 health services—by 2007.

However, it was ultimately rolled out to only four health services, and at the time of this audit, was fully implemented at only one of these.

This audit has found inadequate oversight and decision-making processes in relation to project budgets and rollout schedules and an absence of appropriate sign-off by government of key decisions made by departmental officers or stakeholder committees.

2.4.1 Descoping of the program

DH did not seek or receive government approval to reduce the scope of the Health*SMART* clinical ICT system from the originally planned 'all major Victorian hospitals' to 10 health services, and then ultimately to only four health services.

Once DH realised that it did not have sufficient project funds to implement the Health*SMART* clinical ICT system in all major hospitals, it should have reported back to government with a revised business case to seek approval for a reduction in project scope, or an increase in funds and time.

This approach could have potentially remedied the deficiencies of the original business case and given government a more considered and realistic project overview.

Poor and incorrect advice to government

DH advised the Minister for Health in mid-2012 that 'the original scope was not completed at this date with only four of 10 clinical systems implementations completed, but funds had been exhausted and it was a decision of government based on advice from the department that the project be concluded at that time'.

This advice to the minister by DH is factually incorrect:

- The original scope of implementation agreed in 2003 was not 10 health services but all major Victorian hospitals.
- The Health*SMART* clinical ICT system was not completed in four health services—Eastern Health and Peninsula Health implementations are still underway. Austin Health finished its implementation in May 2013. The Royal Victorian Eye and Ear Hospital (RVEEH) decided to stop further implementation late in 2012.
- There is no document evidencing government approval of the scope reduction.

During our 2008 audit, DH asserted that the implementation scope had been revised down to 10 health services. However, there is no DH documentation verifying government approval to reduce project scope to 10 health services.

DH documentation from 2009 referred to a further reduction in scope from 10 to four health services. DH documentation in April 2009 states that 'The scope of this program had been altered with only four health services able to implement the clinical system program within the current funds available'.

There is no documentation evidencing government approval to further reduce the scope from 10 to four health services. DH's failure to report back to government on two occasions when major changes were proposed to the program's scope shows serious disregard for the government's budget monitoring and approval processes.

In June 2011, the Department of Treasury and Finance advised DH that, although it noted that DH was only aiming to implement the Health*SMART* clinical ICT system in four agencies, 'government approval for this reduction in scope was neither sought nor given'.

2.4.2 Inadequate financial management oversight

DH is not able to definitively advise how much has been paid to the vendor against the approved contract cap. It also does not know how much the four Health*SMART* health services have directly paid to the vendor.

DH has not appropriately recorded expenditure for the Health*SMART* clinical ICT system and cannot demonstrate that it is aware of relevant details of project costs. In response to this audit, DH provided three different figures for the total amount it paid to the vendor—with significant discrepancies in each set of figures.

This inadequate financial oversight practice gives little assurance that publicly reported project expenditure figures are accurate. It also does not provide assurance that payments to the vendor are within the agreed cap as stipulated in the original March 2006 contract.

Further, DH is not aware of how much non-participating health services have spent on their own clinical ICT systems.

Project costs

VAGO calculates that the clinical ICT system component of the Health*SMART* program has cost $145.3 million, or an average of $36.3 million for each of the four health services involved in the implementation.

This is $87 million more than the original approved budget of $58.3 million.

DH estimates that the incremental cost of additional deployments would be in the order of $10 000 to $15 000 per bed or $10 million to $15 million at a 1 000 bed facility.

In 2008, the Auditor-General recommended that 'DH should record all hospital costs related to the implementation of Health*SMART* against the project'. This recommendation was not actioned by DH.

In 2012, DH advised the Public Accounts and Estimates Committee that total expenditure was $134.8 million. However, this amount does not include the four health services' own expenditure on their respective Health*SMART* clinical ICT systems, as DH does monitor this expenditure.

This audit found that the four health services have collectively received close to $60 million from DH for project costs, vendor fees for direct installation and implementation costs, as well as a refresh of hospital technology infrastructure and the purchase of point of care devices.

In addition, health services have collectively spent approximately $10.45 million of their own funds during the period 2009–10 to 2012–13. This includes recurrent costs, training, ICT system upgrades and computer purchases.

Figure 2A
Health*SMART* clinical ICT system:
DH funding and health services' own costs to 2012–13

Health*SMART* sites	Funding received from DH ($ million)	Health services' own costs ($ million)
Austin Health	17.47	4.60
Eastern Health	16.81	0.50
Peninsula Health	17.96	4.60
The Royal Victorian Eye and Ear Hospital	6.30	0.75
Total	**58.54**	**10.45**

Source: Victorian Auditor-General's Office analysis of Department of Health and health service data.

This puts the total expenditure for the Health*SMART* clinical program at more than $145 million ($134.8 million + $10.45 million) or an average of $36.3 million for each of the four health services.

Non-Health*SMART* site costs

In contrast, health services that implemented their own clinical ICT systems outside the Health*SMART* program have incurred significantly less expenditure.

Although these health services purchased their systems from other vendors, employ different hosting arrangements and have not yet implemented electronic medication management, they have functionalities that are highly regarded by their clinicians.

Figure 2B
Non-Health*SMART* sites expenditure

Health*SMART* sites	Total expenditure as at 30 June 2013 ($ million)	Date when clinical ICT system was first implemented
Barwon Health	2.2	2001
Peter MacCallum Cancer Centre	1.1	2005
The Royal Children's Hospital	1.8	1999
Alfred Health	No data available	1999

Note: This includes costs incurred by Barwon Health for its Scanned Medical Record. This cost is not included in figures for other health services.
Source: Victorian Auditor-General's Office analysis of health services' data.

These costs cover the period from when the systems were first installed until 2012–13. They include development and ongoing recurrent costs, but not costs related to technology refresh and systems upgrade.

Additional ICT infrastructure capital costs would only marginally increase the reported costs at non-Health*SMART* sites.

Alfred Health is unable to provide documentation on the cost of its clinical ICT system from the time it was first installed in 1999. Its most recent upgrade commenced in 2012 and is expected to cost $17 million in capital and operating costs over a seven-year period until 2019. This includes the cost of managing the system under a remote hosting arrangement.

In contrast to Alfred Health, the Health*SMART* clinical ICT system is hosted in-house by DH through its own Health Shared Services (HSS) business unit. Alfred Health explained that it decided to outsource hosting to the vendor because the vendor has greater expertise to perform this function. Alfred Health's analysis is that the vendor would provide better service with lower risk and lower cost than what it could provide itself.

Alfred Health explained that this model provides multiple benefits including reduced risk of disruptions, increased reliability and performance, and improved predictability and stability of costs to host the clinical ICT system.

Annual fees for hosting and software

HSS operates on a fee-for-service basis and is responsible for operational support and maintenance of the Health*SMART* clinical ICT system.

Health*SMART* sites pay HSS annual fees to support and maintain their clinical ICT systems. These fees are shown in Figure 2C and include:

- hosting of the application
- hosting of the 7/24 business continuity system
- application of support and development
- management of databases
- maintenance of the content of the system
- development of the functionality of the application
- report development and writing
- 24/7 service desk support
- business continuity framework
- management of the single sign on application and the clinical portal.

These costs do not include technology refresh, project team or training costs, which health services also need to fund to enable appropriate operation of their clinical ICT systems.

Figure 2C
Average annual fees to DH Health Shared Services for 2013–14 to 2015–16

Austin Health ($ million)	Eastern Health ($ million)	Peninsula Health ($ million)	RVEEH ($ million)
1.44	1.42	0.97	0.47

Source: Victorian Auditor-General's Office analysis of Department of Health data.

These annual HSS fees are significantly higher than the fees paid by non-Health*SMART* sites to their clinical ICT system providers for support and maintenance.

On average, The Royal Children's Hospital (RCH), the Peter MacCallum Cancer Centre and Barwon Health each spend $130 000 on annual recurrent fees.

Alfred Health's annual recurrent cost is substantially more than these three non-Health*SMART* sites but is less than Austin Health, which is of a similar size, and uses software from the same vendor. This reflects the fact that Alfred Health has a substantially different 'remote hosting' arrangement where it leases hardware capacity and purchases infrastructure hosting and management services from the vendor.

2.4.3 Change from a panel to a single vendor

The 2003 Health*SMART* funding submission showed that DH's procurement strategy was to develop a panel of preferred products for each of the core Health*SMART* components, including the clinical ICT system.

The original approach envisioned voluntary participation by health services, with an expectation that a pre-approved panel of two or three products for each program stream would be made available for health services to choose from.

However, the Health*SMART* clinical ICT system tender process selected only one pre-qualified vendor. This meant that, in effect, only one clinical ICT system was selected for implementation by the Victorian public health sector with little regard for varied specialty workflow requirements in individual health services.

DH's decision to shift from a panel of vendors approach to a 'one size fits all' procurement model has been heavily criticised by clinicians.

One size fits all

All the ICT strategic plans of all eight health services examined refer to an electronic medical record strategy. The health services are convinced that working towards an integrated electronic medical record for the patient is the best way forward in the provision of quality and effective patient care.

Stakeholder consultations conducted by the audit team revealed that health services across the state are convinced that the current situation of heavy reliance on paper records is not efficient, effective or sustainable. However, since 2006, DH's participation policy has required all health services to purchase the Health*SMART* clinical ICT system to implement their strategies.

This is problematic because the Health*SMART* vendor product:

- is very expensive to purchase and maintain
- continues to have significant ongoing issues as it has not yet been sufficiently refined to fit particular health services' requirements.

Because the Health*SMART* clinical ICT system footprint only includes limited components of the vendor's solution, Austin Health, Peninsula Health and Eastern Health would need to allocate significant capital and operating budget to purchase more Health*SMART* vendor products in the future.

By taking this path, DH has in effect 'locked-in' the Victorian public health sector to the clinical ICT system products of only one vendor.

The experience of RVEEH shows that the Health*SMART* vendor products are unable to meet its specialty requirements. Moreover, the Health*SMART* clinical ICT system has had significant challenges in being effectively integrated or interfaced with existing clinical applications at health services. For example, the Health*SMART* clinical ICT system is unable to address breaks in the data flow between the non-vendor emergency department and patient administration clinical ICT systems.

This means that installed configurations of the Health*SMART* clinical ICT system do not allow for emergent 'best of breed' clinical ICT systems to be appropriately integrated.

2.4.4 The Royal Children's Hospital procurement of scanned medical records

In 2010, RCH released a request for tender for the provision of electronic scanning of medical records. Shortly after selecting a preferred vendor in August 2010, RCH cancelled the tender and awarded the contract to the Health*SMART* clinical ICT system vendor.

When cancelling the tender, RCH informed prospective vendors that 'as a result of the participation policy of the Department of Health and with due consideration for the overall architecture, RCH will be at risk of funding to provide a medical scanning software solution if it does not comply with the policy and proceed to appoint [the Health*SMART* clinical ICT system vendor]'.

The letter explained that 'the Department of Health has indicated to the RCH that funding for the scanning component of the new IT platform will be contingent upon RCH following the Health*SMART* strategy' and that 'as a consequence, RCH will not be able to financially afford to license any medical scanning software other than [the Health*SMART* clinical ICT system vendor]'.

The contract was consequently awarded to the Health*SMART* clinical ICT system vendor whose product received the lowest score from the tender evaluation committee. This product was also the most expensive. RCH clinicians told the audit team that the purchased software was difficult and complex to use when all they wanted was a simple viewer of scanned patient records.

RCH informed the audit team that although it sent the letter to tenderers as quoted above, it decided to cease the tender because it was seeking DH approval for its clinical ICT system business case at that time. RCH believed that pursuant to the participation policy, it would be required to use [the Health*SMART* clinical ICT system vendor] product, and therefore it was logical to use the same vendor's scanned medical record for integration and transition.

DH explained that it 'is not able to confirm that a directive under the participation policy was made regarding the RCH project,' although 'conversations were held regarding whether an integrated system was likely to be a better outcome'.

DH further asserts that it 'has no record of RCH requesting an exemption from the participation policy'. This statement, however, contradicts DH's previous advice to the audit team that scanned medical record systems are not part of the participation policy and an exemption is not required.

Other health services' scanned medical records procurement

Before and after RCH's tender for a scanned medical record, other health services were allowed to purchase products from different vendors.

In these cases, DH took the position that products other than those offered by the Health*SMART* clinical ICT system vendor could be procured because the scanned medical record functionality is not included in the Health*SMART*-built clinical ICT system.

These health services completed their tender processes and purchased the same product that RCH had initially chosen before cancelling its tender.

2.4.5 Action on previous recommendations

DH has not sufficiently actioned previous recommendations from relevant reviews conducted by this office in 2008 and the Ombudsman in 2011.

Figure 2D shows that DH has consistently failed to implement recommendations from relevant external reviews. These signify missed opportunities for DH to carefully review its practices and make improvements to the Health*SMART* rollout.

Figure 2D
Department of Health action on previous recommendations

Recommendation	Action
Victorian Auditor General, April 2008 performance audit, *Delivering HealthSMART - Victoria's whole of health ICT Strategy*	
Health*SMART* and its component portfolio projects should be subjected to timely Gateway reviews.	Three Gateway reviews were conducted on the Health*SMART* program after the 2008 VAGO audit: • Program Review, December 2008 (overall rating amber) • Gateway Review 5 Readiness for Service Report, July 2009 (overall rating amber) • Gateway Review 6 Benefits Evaluation Report, May 2010 (overall rating amber). However, the findings and recommendations from these reviews were not actioned by DH. DH advised that it merely 'noted the reports and the respective recommendations'.

Figure 2D
Department of Health action on previous recommendations – *continued*

Recommendation	Action
Victorian Auditor General, April 2008 performance audit, *Delivering HealthSMART - Victoria's whole of health ICT Strategy – continued*	
DH should review the benefits received from the implementation of Health*SMART*, focusing on determining whether: • the application and ICT infrastructure is operating as planned • benefits are being realised • ICT systems and infrastructure are providing the expected functionality, without negative impacts.	DH did not action this recommendation. While DH developed a benefits realisation framework in June 2010, it did not progress work to monitor whether benefits are being realised. Consequently, DH is not yet able to report on benefits realised from the Health*SMART* clinical ICT system. DH delegated the task of identifying benefits realisation to health services even though: • health services were not directly funded to do this • most of the benefits identified by the framework are either difficult to quantify and/or were not measured prior to implementation, and therefore would be difficult to assess and compare.
DH should adopt a whole-of-life asset management approach to ICT investment in the Victorian public health sector, so that agencies are able both to address obsolescence and to develop as appropriate their ICT capabilities and infrastructure with more certainty than the current funding models allow.	DH has not actioned this recommendation.
DH should record all hospital costs related to the implementation of Health*SMART* against the project.	DH did not undertake this costing exercise and does not know the full cost of implementation for clinical ICT systems at the four Health*SMART* sites.
DH should conduct regular internal audits of aspects of the Health*SMART* program given the high levels of risk and expenditure involved.	DH did not action this recommendation. DH advised government in 2010 that 'the complex and specific nature of the program is better reviewed via the expertise brought via Gateway reviews and other specialist groups'. However, as noted above, DH did not action recommendations from Gateway reviews.
Ombudsman, November 2011 report, *Own motion investigation into ICT-enabled projects*	
DH should complete the implementation at four Health*SMART* clinical applications that it had commenced.	To date, the implementation at four health services is not complete. While implementation at Austin Health was completed in May 2013, both Eastern Health and Peninsula Health will continue their implementations in 2013–14. RVEEH has decided to cease any further implementation of the Health*SMART* clinical ICT system.
DH should review the functionality and usefulness of all of the Health*SMART* applications prior to committing any new funding to the project.	In January 2013, the Minister for Health established an expert review panel to: • conduct a high level review of the usefulness of all Health*SMART* applications • confirm the cost of the Health*SMART* program to date • provide advice on future directions for Victorian health sector ICT, including an approach to allocate the government's $100 million innovation and ICT fund. A report provided by the expert panel in May 2013 is currently being reviewed by the office of the Minister for Health.

Source: Victorian Auditor-General's Office.

2.4.6 Governance arrangements

Tripartite arrangement

The complexities of having three parties involved in the development and ongoing administration of the clinical ICT implementation have caused a number of issues.

DH documentation shows that concerns were raised about this cumbersome approach with its confused roles, responsibilities and accountabilities, and DH, the vendor and health services 'working in silos without a common cause'.

Project management

Under the Health*SMART* clinical ICT system arrangement, the vendor was given overall project management responsibility. However, a vendor is unlikely to be the most appropriate resource to act as project manager.

A project manager's responsibility is to deliver and implement a functional solution that meets clients' needs. In contrast, a vendor's key imperative is to implement their product. Designating the vendor as project manager leads to a natural conflict in roles and responsibilities.

DH's documentation from 2010 expressed strong concerns about the vendor's ability to manage and deliver the project. In particular, DH noted that the vendor staff initially assigned to the project lacked both the authority to drive the project and the experience to deliver projects of this magnitude.

Ineffective vendor performance management

DH contract management processes were not effective in addressing the vendor's performance issues. DH documentation of March 2010 notes that 'the contract contained limited options for redress and the financial considerations of available contractual sanctions were unlikely to substantially affect [the vendor's] behaviour'.

DH documentation states that the vendor's performance was a critical factor in the Health*SMART* program's delay and budget overrun.

In March and July 2010, the Secretary of the Department of Health was briefed about the vendor's late and poor quality deliverables, incomplete responses to information requests and a lack of clear communication.

DH documentation shows that in addition to significantly delaying the rollout, the vendor's performance was going to substantially increase the cost of the Health*SMART* clinical ICT system implementation for both DH and health services.

DH's confidence in the vendor's ability to deliver the project was diminished to the point that it questioned the viability of the project. Options submitted to the Secretary of the Department of Health in March 2010 included 'terminating the project, or restructuring the implementation scope to address a smaller number of agencies'. However, enforcing the available contractual penalty clauses was not included in options to be considered.

DH documentation from July 2010 shows that the secretary's personal intervention with the vendor resulted in 'some change in [the vendor]'s demeanour but the holistic change necessary to improve the situation and give greater certainty about implementation dates has not occurred'.

Configuration to match the needs of health services

The selected vendor's clinical ICT system product was described as a commercial off the shelf solution. However, it still required significant configuration to fit the requirements of Victoria's health services.

Although DH involved clinicians from many Victorian health services in the configuration process, some clinicians from the four Health*SMART* sites said that they considered that those called upon to assist did not have the required experience or expertise to make complex design decisions or to fully appreciate the impact of these decisions in relation to actual clinical workflows.

Consequently, many decisions did not appropriately consider the impact on hospital work processes. This meant that the resulting Health*SMART* clinical ICT system was not able to be implemented without significant modifications.

In addition, the vendor's standard medication catalogue is based on the United States of America's model which is significantly different to an Australian medication catalogue.

As a result, extensive work was required to develop the Australian Medicines Terminology (AMT) for the medication management component of the Health*SMART* clinical ICT system to ensure that it would comply with Pharmaceutical Benefits Scheme rules.

This catalogue is a 'live' resource and was continuing to be updated by DH and Health*SMART* project teams at the time of the audit.

The Health*SMART* clinical ICT system implementation approach did not capitalise on the vendor's product being used at other sites within Australia. As a result, health services have been learning from their own mistakes rather than from the implementation experience of other health services.

Agreement process for configuration changes

The disconnect between the vendor's system and Victoria's clinical workflows meant that a significant number of change requests were raised, even before implementation commenced. Austin Health alone raised more than 250 change requests.

Although the majority of these were only local configuration changes, DH's change request process was onerous and bureaucratic. Proposed amendments to fit a health service's requirements had to be consulted with DH, and all implementing health services were required to agree to the proposed change—even if they weren't going to implement it—adding to delays.

Health services had no access to basic tools to make any changes to the Health*SMART* clinical ICT system, and DH relied upon the vendor to make any changes, as this expertise was not available within the department.

The change request process was improved in early 2011. The new approach included regular meetings and the release of a limited number of tools to enable health services to make minor local changes. This was a significant improvement as it previously took weeks, or sometimes months, of effort to get a minor change made.

Changes to the Health*SMART* state build configuration and pharmacy catalogues are still centrally processed through DH.

Recommendations

That the Department of Health:

1. develop a comprehensive strategic plan for the ongoing development of electronic medical record or clinical ICT systems across the Victorian public health sector
2. conduct a review of its procurement, contract management and financial oversight practices for major ICT projects so that it can more effectively:
   - align functionality and usability of selected products with end user needs
   - manage the timeliness and quality of vendor performance
   - monitor expenditure against achievement of deliverables and functionality, and approved budgets
   - embed benefits realisation and evaluation into the project life cycle.
3. establish guidelines so that government-approved budgets, scope and schedules are followed and that any exceptions or revisions are documented and presented back to government for appropriate consideration.

That the Department of Health and health services:

4. follow Department of Treasury and Finance guidance for future clinical ICT investments and require comprehensive business cases, relevant and measurable performance indicators and clearly articulated benefits and outcomes
5. align any future clinical ICT procurements to the key principles of Victoria's ICT strategy
6. ensure expertise is available to plan and implement future clinical ICT development and change projects, particularly in the areas of clinical engagement and leadership, socio-technical systems analysis, health informatics and benefits realisation.

3 Clinical ICT systems' functionality

At a glance

Background

A clinical ICT system should be configured to support clinicians to effectively deliver patient care, with all users adequately trained in how to competently use the system.

Conclusion

The audit observed a number of potential clinical risks arising from the configuration of the Health*SMART* clinical ICT system, as well as some cases of insufficient training of system users. These risks relate to continuity of patient treatment information when a patient is moved from one hospital department to another as well as confusion arising from the management of some complex prescriptions. In the absence of appropriate controls and mitigation, these issues could pose patient safety concerns.

Finding

The current configuration of the Health*SMART* clinical ICT system has introduced a number of potential patient safety risks in some hospitals. These include:

- the 'encounter' issue, whereby the clinical ICT system considers the patient as having been discharged, even though they may still be in the same hospital
- the complex prescription issue whereby clinicians face difficulties using the clinical ICT system
- printed prescriptions being hand-amended with different medications.

Recommendations

- That the Department of Health conduct a standards-based assessment of clinical ICT system functionalities across the Victorian public health sector.
- That the Department of Health and relevant Health*SMART* sites urgently work to appropriately and effectively resolve the 'encounter', complex prescriptions, pre-prepared discharge summaries and hand-amended prescription issues.
- That health services expedite mandatory and ongoing training for clinicians in the use of clinical ICT systems.

3.1 Introduction

Clinical ICT systems implementations are complex and like any other transformational ICT project, unexpected and unforeseen issues can often emerge.

In medicine, prescribing medications is a complex clinical activity, with many 'native risks', such as human error. This could lead to adverse patient events from incorrect dosages, and allergic reactions to certain medications.

Managing these risks effectively means that clinicians need to be intensively trained and supervised, irrespective of whether the medications ordering and dispensing approach is paper-based or ICT-based.

In the case of Health*SMART*, the introduction of electronic medication ordering and management has been the most difficult and complex component of the overall clinical ICT system program.

3.2 Conclusion

At all the audited health services it is clear that project teams, clinical staff and senior management have worked hard to implement clinical ICT systems over a number of years. Clinicians at all the visited sites are using clinical ICT systems and experiencing their practical benefits. This audit found evidence at three of the audited sites of a number of potential clinical risks. These risks have arisen due to configuration and usage of the Health*SMART* clinical ICT system, as well as from insufficient training of system users in some specific cases.

The potential risks observed at two Health*SMART* sites relate to a discontinuity of patient treatment information during a hospital stay, and the ordering and dispensing of complex prescriptions. In the absence of appropriate controls and effective mitigations, these issues could pose safety risks to patients.

Similar risks were not observed at the other two Health*SMART* sites as well as the four non-Health*SMART* sites that we examined because they have not yet (or have only partly) introduced electronic medications management, similar risks were not observed at the other two Health*SMART* sites as well as the four non-Health*SMART* sites that we examined.

While the two health services in question have put some manual workarounds in place to reduce these risks, they are not fail-safe, increase inefficiency in the short term, and do not provide a long-term solution to the identified problem.

As a result of this, there is a continuing potential risk to patient safety that needs to be closely monitored by both the Department of Health (DH) and the relevant health services.

At a third Health*SMART* site, it was identified that due to the voluminous medication list from which they have to make selections, doctors sometimes print out an incorrect prescription and then manually 'overwrite' it. This practice results in an inaccurate electronic patient record unless pharmacists at the hospital dispense the medication and change the record to reflect the correct hand-amended prescription.

3.3 Functionality of clinical ICT systems

A complete clinical ICT system typically includes a suite of clinical modules covering the continuum of patient care from admission to discharge, including clinical progress notes and specialist modules such as cardiology, intensive care and oncology.

Although the vendor offers most of these modules, the Health*SMART* clinical ICT system installed in Victoria only includes the functionalities shown in Figure 3A.

Figure 3A
Health*SMART* clinical ICT system functionalities

Functionality	Description
Ordering of pathology and radiology tests	An electronic ordering system allowing clinicians to order pathology and radiology tests
Viewing of pathology and radiology results	Enables electronic viewing of clinical results
Discharge prescription of medication	Electronic process of prescribing and dispensing discharge medications with clinical decision support
Inpatient medication prescription	Electronic inpatient medication order entry with clinical decision support
Discharge summaries	Information contained in the electronic discharge summary is securely shared with the patient's general practitioner to support the continued care of the patient once they are discharged from hospital

Source: Victorian Auditor-General's Office.

All of these functionalities have been implemented at three Health*SMART* sites.

However, one hospital decided not to implement the inpatient medication functionality because it does not meet its specialty hospital requirements. The ordering of pathology and radiology tests and the viewing of results functionalities were also not implemented due to the hospital's outsourcing arrangements for these services.

It has also decided that it is not likely to purchase further clinical modules and functionality from the Health*SMART* clinical ICT system vendor because 'the overall benefit of the product does not match associated maintenance costs'.

3.3.1 Core clinical ICT system functionalities

Figure 3B shows the functionalities of the core clinical ICT systems examined for this audit. It presents a basic assessment of whether or not a health service's clinical ICT system includes these functionalities, and should be seen as a starting point for a comprehensive and standards-based assessment of clinical ICT system functionalities across the Victorian public health sector.

Figure 3B
Observed functionalities of clinical ICT systems

	HealthSMART sites				Non-HealthSMART sites			
Functionality	Austin Health 2011	Eastern Health 2009	Peninsula Health 2011	Royal Victorian Eye and Ear Hospital 2010	Royal Children's Hospital 1999	Peter MacCallum Cancer Centre 2005	Barwon Health 2001	Alfred Health 1999
e-Ordering pathology	Yes	Yes	Yes	No	No	No	Underway	Yes
e-Ordering radiology	Yes	Yes	Yes	No	No	No	Yes	Yes
Radiology and pathology results viewing	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Discharge medication	Yes	Yes	Yes	Yes	No	Some capability	Yes	No
Inpatient medication	Yes	Yes	Yes	No	No	Some capability	Under development	No
Discharge summary	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clinical decision support: allergies and alerts	Yes	Yes	Yes	Yes	No	Yes	Partially implemented	Partially implemented
Advanced clinical documentation*	Partially implemented	No	No	No	No	Some capability	Yes	Some capability
Scanned medical records*	Yes	Yes	Yes	Underway	Yes	Underway	Yes	Yes
Secure messaging*	Yes	Yes	Yes	Yes	Underway	Underway	Yes	No
Data warehousing*	Some capability	No	No	No	Some capability	No	Yes	Some capability

Note: * Not part of the Health*SMART* clinical ICT system build.
Source: Victorian Auditor-General's Office analysis of Department of Health and health service data.

As shown in Figure 3B, none of the four non-Health*SMART* sites have inpatient medication functionality. However, these health services do have some limited ability to electronically prescribe medication for outpatients and have some functionality that is not included in the Health*SMART* state build, such as data warehousing and advanced clinical documentation.

Barwon Health and the Peter MacCallum Cancer Centre (Peter Mac) advise that it is not a priority to implement electronic inpatient medication at this stage. Their strategy is to mature other electronic functionalities before embarking on the more complex inpatient medication module.

Due to the limited functionalities of their current clinical ICT system, The Royal Children's Hospital is currently in the market for a more extensive clinical ICT system.

Austin Health has decided to augment its Health*SMART* clinical ICT system with additional functionalities such as the advanced clinical documentation module. This was part of the original scope and was intended to be rolled out as Release 3, however, it was de-scoped by DH.

Austin Health also intends to rollout an emergency department (ED) clinical ICT system module. DH documentation notes the critical need for clinical information to be available at the point of care in the ED and the ED system to fully integrate with Health*SMART* to achieve increased patient safety. However, this module was not part of the original Health*SMART* scope.

3.4 Effective use of clinical ICT systems

3.4.1 Health*SMART* sites

It is clear that the project teams and senior management staff of the four Health*SMART* sites have worked hard to make the system fit for purpose for their respective clinical workflows.

At Eastern Health and Peninsula Health, lead clinicians have taken the initiative to reconfigure and de-clutter the amount of information that appears in the work screen for the Health*SMART* clinical ICT system. For example, a pre-populated list of the most often prescribed drugs has been made available to facilitate electronic prescribing of medications.

An early morning clinical round was directly observed by the audit team at Box Hill Hospital Intensive Care Unit where the Health*SMART* clinical ICT system is used as a single source of data for all relevant patient information. Doctors, nurses and allied health professionals gather before a high resolution screen where the Health*SMART* clinical ICT system displays relevant patient information such as pathology and radiology reports, and previous clinical history.

High resolution x-rays or other relevant images are also projected on screen. This projected data is then discussed by the multidisciplinary clinical team. This conference results in either a patient's transfer to an acute ward or the confirmation of an intensive care treatment plan for the day.

The head of the Intensive Care Unit explained that this approach allows all clinicians coming on shift to efficiently monitor patient condition and receive critical information before they physically see the patient. Prior to Health*SMART*, they had to use numerous paper files and charts and wait for hard copies of pathology and radiology results to be completed and made available.

The Health*SMART* clinical ICT system is being similarly used by nurses at Peninsula Health's mental health ward for their shift handover. Nurses gather before a data projector and discuss their patients' condition, drugs to be administered, response to pain medication, as well as pathology and radiology results and other tests waiting to be completed.

Nurses at Austin Health are keen to use the Health*SMART* clinical ICT system. At the Heidelberg Hospital, most ward nurses are each given a computer-on-wheels for the duration of their shift. These nurses say that the Health*SMART* clinical ICT system assists them to efficiently manage their responsibilities.

In Austin Health, Eastern Health and Peninsula Health, preparations before and during implementation, as well as remediation measures after rollout have meant that the Health*SMART* clinical ICT system has been increasingly utilised as part of normal daily clinical routines.

3.4.2 Non-Health*SMART* sites

Clinical ICT systems at non-Health*SMART* sites Barwon Health, Peter Mac and Alfred Health, and to a lesser extent The Royal Children's Hospital, are widely accepted and used as part of normal daily clinical routines.

Although none of these systems include inpatient medication functionality, systems at Barwon Health, Peter Mac and Alfred Health have functionality that the Health*SMART* clinical ICT system does not have.

Barwon Health

Barwon Health is currently reaping the benefits from a fit for purpose clinical ICT system that has been incrementally developed over the past decade.

Early in 2000, a group of Geelong Hospital clinicians actively engaged with an ICT firm to develop a clinical ICT system. Some components of this system were built in-house while others were developed in direct consultation with commercial suppliers.

Barwon Health's clinical ICT system was first rolled out at Geelong Hospital in 2001. More functionality has since been developed and rolled out, and the system is currently installed at all 21 Barwon Health sites. The clinical ICT system is widely accepted and supported across all medical officer levels.

Although Barwon Health's clinical ICT system does not include inpatient medication functionality as deployed in the Health*SMART* state build, it is the most extensive clinical ICT system installed in the eight health services examined for this audit.

In addition to the Health*SMART* state build functionality, it includes:

- admission risk screening tools (nursing) with automated allied health referrals
- advanced clinical documentation, for example, medical officer handover notes, operation notes, outpatient letters, e-forms
- patient précis page (patient summary data) for rapid patient overview and multidisciplinary care, being trialled with selected clinical units
- Palliative Care Management System module for care plans and nursing information at the point of care providing a complete system of internal referrals and triage and electronic transfer of information to general practitioners
- data warehousing.

Barwon Health's use of the clinical ICT system across its 21 sites has earned it the highest accreditation rating of 'OA' (outstanding achievement) for criterion 2.3.4 of the Australian Council on Healthcare Standards. No other Victorian hospital or health service has yet received the OA rating for this criterion.

Leveraging Barwon Health's efforts, several other Victorian health services have implemented the same clinical ICT system. These include Ballarat Health Service, Western Health, Gippsland Health Alliance, and Albury/Wodonga Health. However, this audit did not examine the ICT installations at these sites.

The audit team notes that, before fully rolling out a new functionality or enhancement, Barwon Health first conducts a pilot to iron out known and unknown user issues. This approach has resulted in products that users are able and willing to use.

Barwon Health regularly consults with clinicians for feedback, and these drive future remediation and/or upgrades to the system. An inpatient medication module is currently being planned for future development and implementation.

Peter MacCullum Cancer Centre

In July 2006, Peter Mac decided to defer participation in the Health*SMART* clinical ICT system program because at that time, the selected product did not have a specialist oncology module.

Peter Mac's clinical ICT system was developed in-house by clinicians in the 1990s. When it was commercialised in 2005, Peter Mac paid $24 000 for a perpetual licence. The annual recurrent support costs for the system are $172 000.

Unlike Barwon Health's clinical ICT system and the Health*SMART* clinical ICT system, the system at Peter Mac is not an electronic medical record but a clinical viewer. This allows access to patient information through a single screen view, although there are a number of systems and applications from different vendors where source data resides.

The hospital collects detailed information during the course of cancer diagnosis and treatment, and the system enables clinicians to get an overview of a particular patient when needed. The system fetches information from over 20 systems and presents this information to support prompt clinical decisions.

Similar to Barwon Health, because Peter Mac's clinical ICT system has been developed in-house and incrementally developed, it enjoys wide acceptance and support from users. It is used extensively by all doctors and is well-integrated into day-to-day clinical practice. Because of this, records on 90 per cent of Peter Mac's outpatient clinic encounters (the majority of its activity) are electronic.

The hospital's ICT Plan for 2012–15 states that its core clinical ICT system will continue to be developed to meet local needs. Beyond that, it is anticipated that significant integration will be required with systems at the new Victorian Comprehensive Cancer Centre.

Peter Mac has also introduced a secure access protocol for relevant staff at its partner hospitals: Bendigo Health, Southern Health, Eastern Health and Western Health. This means that clinicians who take over the care of Peter Mac patients are easily able to access relevant information.

This has greatly reduced clinical risks for these patients, particularly for patients presenting at EDs at other health services.

3.5 Challenges arising from implementations

Clinicians at both Health*SMART* and non-Health*SMART* sites are increasingly using the installed clinical ICT systems.

However, due to the current configuration of the Health*SMART* clinical ICT system a number of potential patient safety risks have arisen that are yet to be satisfactorily resolved by DH or the relevant health services.

3.5.1 Usability

Usability refers to the ease of use and 'learn-ability' of a system.

Clinicians across the four Health*SMART* sites were initially critical of its usability. They found that work screens were unintuitive and difficult to navigate. In particular, doctors said that it took longer to use the system—rather than manual paper-based processes—to perform routine tasks such as prescribing medication, ordering pathology and radiology tests, or completing discharge summaries.

These types of complaints have now reduced considerably at Austin Health, Eastern Health and Peninsula Health as doctors and nurses are increasingly trained and supported to use the new system.

Conversely at The Royal Victorian Eye and Ear Hospital (RVEEH), clinicians continue to comment on difficulties they face when using the Health*SMART* clinical ICT system. These continuing challenges relate to the current system configuration, which does not meet the specialty nature of RVEEH.

For example, the fast pace of outpatient clinics, where 93 per cent of patients are seen, means that difficulties in navigating the complex clinical ICT system can be magnified for already time-pressured clinicians.

Clinicians also raised concerns about generating discharge summaries which are configured for a general hospital and are not suited to RVEEH's specialist requirements.

3.5.2 Accessibility

Accessibility refers to the ability of clinicians to freely access a computer terminal or device to use the system as required.

Initially, some clinicians raised concerns that there were too few computers at their Health*SMART* site, with nurses having to line up or manually record their notes while waiting for their turn to electronically encode patient records.

This issue had been addressed to a large extent at all Health*SMART* clinical ICT system sites by providing additional devices—i.e. tablets, computers-on-wheels, or desktop PCs.

Complaints were also recorded about the length of time needed to log on to the Health*SMART* clinical ICT system, as well as a requirement to log on to the system each time a clinician moves from room to room.

Nurses have noted that they have found themselves locked out of the system and unable to log on because they did not log off from a previous device. This is particularly problematic if they are required at another section or floor of the hospital and then need to return to log off from the previous computer.

3.5.3 Potential clinical risks

While health services have been addressing concerns about usability and accessibility, there are other ongoing issues relating to the ability of the Health*SMART* clinical ICT system to support clinical activities.

These are yet to be satisfactorily addressed by DH and the relevant Health*SMART* sites. The 'encounter' and complex prescription issues in particular have potential serious consequences for patient safety and need immediate attention.

Hospitals have well-established clinical risk systems and procedures in place to resolve the potential patient safety risks arising from the clinical ICT system. However, more focussed action is required to analyse and effectively mitigate these risks in the short term.

'Encounter' issue

The 'encounter' issue was first identified by the Board of Health Information Services in 2010 before the electronic medication management functionality was rolled out. The 'encounter' issue is described in Figure 3C.

It has been raised by clinicians as the most serious problem with the current configuration of the Health*SMART* clinical ICT system. This issue could put patients at risk of either not receiving their prescribed medication or not receiving a correct dose at the correct time.

Figure 3C
What is the 'encounter' issue?

The 'encounter' issue arises because the clinical ICT system recognises a patient's stay in each ward, including the ED, as a stand-alone episode of care or 'encounter'.

The clinical ICT system considers the patient to have been discharged once they leave a ward or department, even though they are still a patient in the hospital. This is because under the Victorian funding model, an emergency episode of care is treated as a separate admission and discharge even when the patient is subsequently transferred from the ED to an inpatient bed in the same hospital.

This means that when a patient is transferred from the ED to the ward or from one ward to another, previously prescribed medication, pathology and radiology orders become inactive at the receiving ward.

These orders then need to be re-prescribed and re-requested by a doctor in the receiving ward to be actionable by nurses. However, it could take a lengthy period of time before a medical officer is available for these tasks.

Another consequence of this delay is that a patient's required medication may be missed.

Source: Victorian Auditor-General's Office.

DH documentation from May 2011 states that the Health*SMART* clinical ICT system was designed on the assumption that patients have one 'encounter' across their hospital stay only.

The same document acknowledges that the requirement for doctors to re-prescribe medications due to the 'encounter' issue 'adds additional workload and introduces the potential for medication errors'.

The DH documentation set a deadline for August 2011 to test and deliver a software solution to fix the problem. This deadline was not met and, to date, no solution has been delivered.

DH advises that it gave the health services implementing the Health*SMART* clinical ICT system 'the option regarding adoption of medication management in ED, based on their own local assessments, on whether it is better to utilise the system as it stands or use paper medication charts until the issue is resolved.'

Two of the Health*SMART* clinical ICT system sites decided to adopt the medications management module in their EDs. These hospitals assert that they are appropriately managing this potential clinical risk by employing workaround processes.

For example, at one site the ED ward clerk is notified of an impending discharge from ED to the inpatient ward. Just prior to the discharge, the clerk prints out the electronic drug chart so that it will accompany the patient to the ward.

The other hospital uses a manual 'copy and paste' function to copy orders across to the new 'encounter'. However in its own documents, this workaround is described as 'prone to error' with 'no tolerance for anyone missing a step'.

Incident reports at these two health services have recorded a considerable number of instances where pain relief, antibiotics and other medication were given twice or not at all due to this issue.

Whether clinicians on duty appropriately respond to the 'encounter' issue risks is highly dependent on their level of training and awareness of the issue. Workaround processes create an increased administrative and efficiency burden, and defeat the fundamental purpose of introducing electronic prescribing systems, as these workarounds require the generation of back-up paper-based drug charts.

One of these two health services proposes to resolve the 'encounter' issue by redesigning the integration engine for the clinical ICT system. It aims to implement a software change related to episodes so that the patient's hospital stay is read by the clinical ICT system as one continuous episode. These changes are being tested and are expected to operational toward the end of 2013 if technical and system requirements are met.

DH is separately coordinating a resolution of the 'encounter' issue, but has advised that a technical solution to the 'encounter' issue is not immediately available because the Health*SMART* health services have installed different clinical, ED and patient administration systems.

The Health*SMART* clinical ICT state build did not include the ED and patient administration system modules available from the vendor, making it more difficult to achieve data integration between three separate systems in each health service.

Complex prescription issue

Another significant issue that potentially puts patients at risk arises from a difficulty in using the Health*SMART* clinical ICT system for complex prescriptions—both at the point where doctors encode a prescription in the system and when nurses administer the medication to patients.

This issue is described in Figure 3D and was identified in the 'RiskMan' incident reports at two of the Health*SMART* sites.

Figure 3D
What is the complex prescription issue?

This issue is related to difficulties clinicians face when using the clinical ICT system to manage complex prescriptions; for doctors when encoding the prescription in the system and for nurses when giving medication to patients.

Health service documentation shows that in addition to nurses and doctors being confused about these complex prescriptions, pharmacists are also finding it 'tedious and time consuming' to verify orders.

Examples include:

- **When a doctor prescribes a STAT (i.e. *statim* or immediately) medication**—unless this is done in the precise sentence order that the clinical ICT system will accept, the medication remains as an ongoing order in the clinical ICT system and the patient is at risk of getting more doses than the doctor intended.

Figure 3D
What is the complex prescription issue? – *continued*

- **Medication that is administered in several ways to a patient**—for example, oral, suppository, by injection, and/or intravenous. Clinicians advise that because these are recorded as the same drug, the Health*SMART* clinical ICT system displays the medication as having been administered even though only one form has in fact been administered. This causes confusion for clinicians as it is difficult to work out whether a patient has actually received the required medication, and by what route.
- **When a prescription of a particular drug, for example, 60 mg of x, is entered in the Health*SMART* clinical ICT system as two orders**—one for 40mg and one for 20mg both with order comments that the total dose is 60mg. When one of these orders is discontinued and the other comment is not updated, nurses can become confused about the correct dose that needs to be given to the patient.
- **Medication given at various frequencies**—for example PRN (i.e. *pro re nata* or when necessary), or every x number of days. Similar to the STAT issue, unless the precise order sequence is encoded in the clinical ICT system, medication appears as a daily task for nurses and might be incorrectly administered to a patient more often than required.
- **Particular drugs requiring variable dosing regimens based on pathology results**—for example warfarin, insulin, gentamicin. The state build software design for the prescription of these drugs in the clinical ICT system requires multiple restrictions, which are complex to enter for an insufficiently trained clinician. The risk is that required doses could be missed due to the complex system ordering requirements.

Source: Victorian Auditor-General's Office.

One of the hospitals affected by this issue has advised that it has scheduled an enhancement in October 2013 to address risks from STAT and PRN doses. However, at the time of finalising this report the new enhancement had not yet been implemented and so this audit could not assess the extent to which it is effective in addressing the issue.

Inaccurate patient medical records

At a different hospital from the previous two, clinicians advised that because of the protracted amount of time it takes to complete discharge summaries and discharge medication, senior doctors/consultants require junior doctors and registrars to complete discharge summaries before the surgery or procedure is performed.

They said that this practice occurs routinely at the hospital and the practice was in place prior to the Health*SMART* system.

This practice could pose a risk to patient safety if there are complications during surgery and different or additional medication needs to be prescribed for the patient.

Doctors said that due to the high number of procedures that they usually have to perform within a limited time frame, they are sometimes unable to revise the discharge summary or the discharge medication, and therefore:

- the patient information recorded in the Health*SMART* clinical ICT system may not reflect the actual outcome of the procedure and the prescribed medication
- the patient could be discharged without receiving the required additional or appropriate medication.

They also said that—due to the voluminous system-generated medication list that doctors have to make a selection from—they sometimes knowingly print out an incorrect prescription and then manually overwrite it with the correct medication and dosage on the paper print-out. Unless pharmacists at the hospital change the record to reflect the correct hand-amended prescription this practice results in an inaccurate electronic patient record.

Doctors at this health service also advised that they sometimes use their personal paper prescription pads so that they can avoid using the Health*SMART* clinical ICT system to prescribe medication.

This health service asserts that there are appropriate clinical quality and safety processes in place to minimise these potential patient safety risks. It advised that:

- prepopulated discharge summaries are not sent to the patient's general practitioner until 24 hours after discharge, and clinicians have an opportunity to provide further details regarding the operative procedure and to update the discharge summary and discharge medications as required
- it is the clinical and professional responsibility of the treating doctor to approve an accurate and complete discharge summary prior to its despatch
- on-duty pharmacists at the hospital are able to change the patient's electronic record to reflect the correct handwritten medication prescription, after telephone verification with the prescribing clinician
- the medication list is updated upon each presentation of a patient at high risk.

Although these quality control measures are likely to minimise clinical risk to patients, the issues identified during the audit highlight the importance of ongoing training to make sure that electronic patient data is kept accurate and reliable throughout all phases of care.

Reduction in medication errors

Peer-reviewed medical literature and research studies indicate that reduction in medication errors has occurred with the introduction of electronic medications management.

There is some data to support the claim that, in general, electronic medication management is effective at reducing minor medication errors by improving the legibility of prescriptions. However, the question of whether the electronic system is effective at reducing errors of greater severity is not yet definitively resolved in the relevant medical literature.

Some literature reports that errors have increased, and that new errors have been introduced by implementation of clinical ICT systems. These include:

- selection of an inappropriate dosage or a required route
- selection of an inappropriate product
- incorrect default dosing, or frequency of formulation
- inappropriate use of decision support
- inappropriate duplication of STAT and PRN orders.

The Health*SMART* clinical ICT system's 'encounter' and complex prescription issues have resulted in more than a hundred reported clinical incidents of missed or nearly missed medication, as well as medicines being administered at a higher dose than prescribed.

Despite this, it is difficult to ascertain whether the Health*SMART* clinical ICT system is creating more incidents or is simply recording and capturing these more effectively.

3.6 Training

The Health*SMART* clinical ICT system is an electronic work tool and is no substitute for clinicians' medical knowledge and judgement. Relevant and ongoing training for clinicians is critical if the Health*SMART* clinical ICT system is to be used appropriately.

Given the complexity of the Health*SMART* clinical ICT system and the patient risks associated with its use, training should be mandatory and ongoing for all users.

Austin Health, Eastern Health, Peninsula Health, and RVEEH have all made training on the system mandatory for nurses and doctors. However, the health services find it difficult to get senior doctors and visiting medical officers to attend training.

Austin Health nurses are required to achieve competency in order to use the system. Peninsula Health stated that all its nurses, including bank, pool and agency nurses have been trained to use the Health*SMART* clinical ICT system.

Peninsula Health, Eastern Health and Austin Health have purchased an online training system that allows clinicians to train in their own time. Clinicians consulted at Austin Health and Peninsula Health said that they found the online training more useful for their learning than classroom training.

Recommendations

7. That the Department of Health conduct a comprehensive and standards-based assessment of clinical ICT system functionalities across the Victorian public health sector.

That the Department of Health and relevant Health*SMART* sites urgently:

8. resolve the 'encounter', complex prescriptions, pre-prepared discharge summary and hand-amended prescription issues identified by this audit
9. address identified potential patient safety risks arising from clinical ICT system installations through software upgrades, configuration changes and the redesign of clinical treatment workflows, as appropriate
10. monitor and, as required, conduct root cause analysis of clinical incidents in health services which are attributable to these known issues.

That health services:

11. expedite mandatory and ongoing training for clinicians in the use of clinical ICT systems. Priority should be given to the appropriate prescribing and administration of medication, and any workarounds needed for known issues
12. develop or review internal guidelines to make sure that electronic patient data is kept accurate and reliable throughout all phases of patient care.

4 Outcomes and benefits

At a glance

Background

In order to understand the true value of a transformative ICT investment, there needs to be effective identification and monitoring of benefits after installation, including both expected and unexpected benefits.

Conclusion

The Department of Health (DH) has not established processes to oversee the performance of installed clinical ICT systems for Health*SMART* and non-Health*SMART* sites.

Apart from anecdotal statements and some minor preliminary studies conducted by health services, DH and health services are currently unable to report on the delivery of intended benefits or outcomes from clinical ICT systems. Consequently, DH is unable to evaluate the benefits and value for money of one system versus others.

The installed clinical ICT systems do not currently deliver interoperability across the Victorian public health sector. Health*SMART* and non-Health*SMART* clinical ICT systems do not enable patient data to be shared across Victoria's public hospitals.

Findings

- Limited outcome and benefits realisation reviews have been undertaken to date.
- Some hospitals are now preparing to undertake benefits realisation measurement based on documented benefits plans.
- Isolated islands of data continue to exist among Victoria's health services, and health services only have limited capability to share electronic data with other sites, or within the same site.

Recommendations

That the Department of Health:

- report on the costs and benefits of the Health*SMART* system program
- seek a Gateway program review of the Health*SMART* system rollout
- identify options for health services to share relevant patient information.

4.1 Conclusion

The Department of Health (DH) has not established processes to oversee the performance of installed clinical ICT systems for Health*SMART* and non-Health*SMART* sites.

Apart from some anecdotal statements and minor preliminary studies conducted by health services, DH and health services are currently unable to report on the delivery of intended benefits or outcomes from clinical ICT systems. Consequently, DH is unable to evaluate the benefits and value for money of one system versus others.

The installed clinical ICT systems do not currently deliver interoperability across the Victorian public health sector. Health*SMART* and non-Health*SMART* clinical ICT systems do not enable patient data to be shared across Victoria's public hospitals.

This means that for the most part, when Victorian patients are admitted in a Victorian public hospital, their previous patient records from another Victorian public hospital are unable to be electronically accessed by attending clinicians. These records need to be either faxed or printed if they are to be used at another hospital.

4.2 Health*SMART* sites

Despite flaws in the planning and implementation of the Health*SMART* clinical ICT system, there have been a number of positive outcomes from the program:

- the clinical ICT system is now allowing clinicians within the same health service to simultaneously access electronic patient data, which is a major advance over paper files
- the system has also enabled the four Health*SMART* sites to securely forward patient discharge summaries to general practitioners (GPs), with Barwon Health, a non-Health*SMART* site, also having this functionality
- the development of the Australian Medication Terminology catalogue which is now available for other Australian health services to use in their clinical ICT system implementations.

Beyond these readily observable outcomes, DH is not monitoring achievement of other desired outcomes and is yet to report on any benefits realised from the program. Apart from some anecdotal statements and preliminary studies by health services, DH is not currently able to report on the delivery of intended outcomes.

DH claims that resource and funding limitations are significant barriers for health services to measure and report on benefits. However, these limitations arise because DH did not allocate funding to assess the achievement of intended benefits as part of the program budget.

Although the funding agreement with health services required them to complete a benefits realisation plan prior to program implementation and to report on this before and after clinical ICT system implementation, funding was not allocated to assess the achievement of purported benefits.

Further, DH has not studied the performance of clinical ICT systems at non-Health*SMART* sites so that it could evaluate the benefits of the Health*SMART* clinical ICT system compared to other systems.

Consequently, DH is unable to evaluate the benefits and value for money of one system versus others.

4.2.1 Intended benefits

Intended project benefits were not clearly defined in the 2003 funding submission.

In July 2007, DH identified these intended benefits. However, the health services found that most of these were neither relevant nor measurable and that it was difficult to accurately assess the success of the project or whether intended benefits could be achieved and by when.

Figure 4A
Department of Health Health*SMART* benefits identified in 2007

Expected benefits
• More effective use of clinical resources
• Reduced time and cost
• More effective use of ward clerk and nursing resources
• Reduced time for discharge medication processes
• Effective discharge processes
• Migration from multiple health service centric clinical ICT systems across the Victorian public health sector to a standard system
• Provide the foundation for a future patient-centric electronic health record across the health service
• Achieve economies of scale by bulk purchase of goods and services via statewide procurement process
• Improved accountability for the review of results
• Improved recording of patient allergies
• Improved communication of inpatient episodes to GPs
• Improved clinical satisfaction
• Improved recording of medication history

Source: Victorian Auditor-General's Office from Department of Health data.

Eastern Health and the Royal Victorian Eye and Ear Hospital (RVEEH) conducted post implementation reviews for the first phase of the implementation process. Eastern Health has been conducting initial evaluations on junior doctor efficiency and the impact of electronic medication, and includes Health*SMART* clinical ICT system measures in its monthly Board and Executive Scorecard.

RVEEH has noted that it was not able to collect baseline data for many of the measures prior to project implementation, and therefore a comparison before and after could not be established other than via anecdotal reviews.

Austin Health and Peninsula Health have not assessed the expected benefits identified by DH, and have recently reviewed their benefit realisation plans. These health services have emphasised that this is because their efforts have been focused on implementing the Health*SMART* clinical ICT system.

Austin Health completed implementation work in May 2013 and has advised that it is on track to complete its benefits realisation report by May 2015.

Austin Health has also been conducting initial performance evaluations of junior doctor efficiency, the impact of electronic prescribing on outpatient medication, and the impact of electronic orders on workflows in pathology and radiology departments. The Health*SMART* clinical ICT system's reporting functionality is now slowly being delivered by DH to the health services.

However, its usefulness is significantly limited by the fact that Eastern Health data cannot be separated from RVEEH and the same is true for Austin Health and Peninsula Health data.

This is because the Health*SMART* clinical ICT system is hosted on a 'domain' basis—which effectively pools the data from two services into one database—to save costs.

Eastern Health noted in August 2011 that the inability of the Health*SMART* clinical ICT system to generate reports is a serious obstacle to benefits realisation efforts. For example, user uptake and workflow gaps cannot be electronically measured.

4.2.2 Emerging benefits

Some of the emerging benefits Eastern Health, Peninsula Health and Austin Health believe will be realised or are already being realised include:

- potential reduction in pharmacy interventions due to improved legibility of prescriptions
- potential increase in transparency and accountability in medication administration as there is now a documented record of what has occurred
- potential reduction in time spent ordering pathology and radiology tests
- potential improved efficiency in scheduling of radiology exams
- fast-tracking of palliative care patients out of the emergency department
- ability to monitor allergy documentation
- ability to monitor whether a venous thromboembolism assessment is completed on every patient.

4.3 Non-Health*SMART* sites

Peter MacCallum Cancer Centre (Peter Mac), The Royal Children's Hospital (RCH) and Alfred Health have not evaluated the performance of their clinical ICT systems.

These health services have had their systems in place since the 1990s and they acknowledge that they have not seen a need to formally assess whether intended benefits are being realised. They state that this is because they use these systems every day and that they are confident of the efficiencies that they bring to the delivery of patient care.

They are also made aware of system limitations via user feedback, and are continuing to use these comments to further enhance and expand functionalities.

4.3.1 Emerging benefits

Barwon Health

In 2007, Barwon Health identified its objectives for the application, developed measures to assess their achievement, and collected baseline data prior to implementing its scanned medical record.

Barwon Health's post implementation review found that its scanned medical record system had achieved all intended benefits. Floor space has been released at Geelong Hospital and the McKellar Centre as it is no longer necessary to store active paper records. This has led to the redevelopment of these sites for other, more valuable uses.

Clinicians have also saved time formerly used to locate paper file records as patient information has become readily available on many types of devices.

In one example, paper files were previously sent from the emergency department to the ward when a patient was transferred. Often, these paper files would go missing which resulted in the absence of information and the potential need to repeat tests and other clinical work.

With the scanned medical record system, this information is now provided to clinicians at the receiving ward prior to the patient arriving. Similarly, patients' mental health information, including crisis plans and medications, have now become available in real-time across all Barwon Health sites.

An unintended benefit was also realised. The scanned medical record program helped improve Weighted Inlier Equivalent Separations revenue to a level that resulted in payback of investment within the first 12 months of operation, including covering a modest overrun in capital costs.

Barwon Health advised that it intends to make the benefits realisation process a standard component of future enhancements of its clinical ICT system.

Alfred Health

Alfred Health notes that the introduction of its clinical ICT system has resulted in a significant reduction in outpatient appointment cancellations due to missing patient records. Because patient health records have become electronically available and accessible, clinicians no longer need to physically locate patient's paper records prior to the appointment.

The health service explained that previous cancellations were mainly due to the inability of clinicians to locate patient paper records across the health service.

4.4 Interoperability

Interoperability refers to the ability of clinical ICT systems to work together within and across organisational boundaries to advance the effective delivery of patient healthcare.

The 2003 Health*SMART* funding submission stated that by 2013 'paper will fundamentally be a thing of the past in the delivery of healthcare', and 'the health system as a whole will be an integrated, cohesive and effective system' in which patient records will be 'transparently available to all providers involved in their care'.

The current situation at the four Health*SMART* sites is nowhere close to this expectation. They are all still highly reliant on paper records, and are unable to directly access patient information held at other health services.

While the Health*SMART* program has fallen short of achieving its aspiration, it has achieved automated dispatch of patient discharge summaries via secure messaging to GPs.

Similarly, Barwon Health's clinical ICT system allows for the automated dispatch of discharge summaries to GPs.

Peter Mac, another non-Health*SMART* site, is able to electronically share patient clinical records through secure messaging protocols with other health services providing care for their patients. This means that Peter Mac is able to electronically share patient records with a clinician at another health service who may be caring for a Peter Mac patient.

4.4.1 Health*SMART* sites

The original promise of the Health*SMART* clinical ICT system was 'to deliver ICT that is well integrated and actively used in clinical practice'. It is clear that this has not yet been fully achieved. This is because DH has not developed a secure messaging system for patient data to be appropriately shared between and among health services.

Patient data continues to exist in isolated islands among the four Health*SMART* sites, among sites of the same health service, and even within departments at each site.

A patient's clinical information at a Health*SMART* site cannot be seen by a clinician at another Health*SMART* site. For the latter to obtain this information, the first hospital would need to print the data and either fax or post the hard copy to the other hospital.

Sending the information via email is not possible as there is currently no secure messaging facility used between Victorian health services.

Availability of information may not be seamless among sites of the same health service. For example, a patient's clinical information at Frankston Hospital may not necessarily be available when required at Rosebud Hospital because paper records may not yet be scanned into the electronic record.

Within the same hospital, a patient's medication list prescribed at the emergency department will not appear on the patient's record when transferred to a ward, due to the 'encounter' issue discussed previously in this report.

Because the Health*SMART* clinical ICT system is not being regularly used in outpatient clinics, a patient's visit to a specialist is not likely to be included in the patient's record until paper records have been scanned and uploaded into the clinical ICT system.

Secure discharge summaries to GPs

A positive outcome from the Health*SMART* clinical ICT system is that it has enabled the four health services to have a secure messaging facility for patient discharge summaries to be quickly and securely forwarded to patients' GPs.

This is a good outcome as the majority in the Victorian public health sector continue to fax and/or post discharge summaries to GPs.

4.4.2 Non-Health*SMART* sites

The audit found that because of the functionality offered in their clinical ICT systems, doctors across departments at Barwon Health, Peter Mac and Alfred Health are using clinical ICT systems as a matter of course and as part of their day-to-day clinical work.

However, there is no integration of electronic patient information among these health services—a patient's clinical information at Alfred Health is neither visible nor accessible to clinicians at Barwon Health.

Of the four non-Health*SMART* sites examined in the audit, only Barwon Health had a secure messaging facility to send discharge summaries to GPs.

For RCH, Alfred Health and Peter Mac, discharge summaries are currently being faxed or posted to GPs. However, Peter Mac has recently completed the process to purchase secure messaging capability which should be operational later in 2013. RCH has also advised that it will soon trial a similar functionality.

4.4.3 Personally Controlled Electronic Health Record

In July 2012, the Commonwealth Government launched its Personally Controlled Electronic Health Record (PCEHR) initiative which aims to electronically store and manage summary consumer health information, which, with a patient's consent, can be made available to health providers.

Depending on uptake across Australia, the Commonwealth Government's initiative potentially achieves the aspiration of making a summary of patient clinical information 'transparently available to all health providers involved in a patient's care' more so than the Health*SMART* program.

In practice, this could mean that when a patient presents at any Victorian hospital, a clinician would be able to access, through PCEHR, health information—such as allergies—and a shared health summary generated from a trusted source that is timely, accurate and reliable. Previous hospital episodes, vaccinations received, and medication prescribed and administered, could also be included.

Of the eight health services examined by this audit, only Barwon Health and Eastern Health have progressed the adoption and implementation of PCEHR.

Barwon Health worked on developing a national medications repository for participating consumers' prescribed and dispensed medication. The hospital intends to transition this repository to operate as a PCEHR information database. This means that patient information will be made available in a patient's PCEHR. This in turn will allow primary care clinicians to make informed decisions regarding the treatment of their patients.

Barwon Health is also working with DH to develop an implementation planning study to upload patient discharge summaries to PCEHR.

Eastern Health is one of three lead implementation sites chosen by the Commonwealth Government to test and implement a local shared health summary system compatible with PCEHR. Alfred Health is also working on making sure that their electronic health record is compatible with PCEHR.

4.4.4 Interoperability with future clinical ICT applications

Interoperability is a critical issue in clinical ICT systems.

To achieve this, standardisation must be achieved across three dimensions:

- how messages are sent and received
- structure and format of information
- terms used within these messages.

The Health*SMART* clinical ICT system has some capability to be interoperable with other systems that use a similar HL7 data messaging protocol. HL7 stands for Health Level 7 and is a proxy international standard that enables disparate healthcare applications to exchange clinical and administrative data.

However, the reality is that current ICT health enterprise solutions, such as the Health*SMART* vendor's software, are not designed to be interoperable with competing software. Integration with a non-Health*SMART* vendor product is often complex and costly.

For example, although the Health*SMART* clinical ICT system is able to read and use patient demographic information from the patient administration system, data encoded in the Health*SMART* clinical ICT system is not able to be used by the patient administration system.

Consequently, for future clinical applications, Eastern Health is considering purchasing corresponding modules from the Health*SMART* vendor to provide it with quick implementation turn-around and consistent integration.

Recommendations

That the Department of Health:

13. comprehensively review and publicly report on the costs and benefits of the Health*SMART* clinical ICT system program
14. seek a Gateway program review of the Health*SMART* clinical ICT system rollout to understand what value for money and other outcomes have been achieved since 2003
15. identify options for health services to effectively and appropriately share relevant patient information by developing a secure data exchange or messaging network.

Appendix A.

Audit Act 1994 section 16—submissions and comments

Introduction

In accordance with section 16(3) of the *Audit Act 1994* a copy of this report was provided to the following agencies:

- Alfred Health
- Austin Health
- Barwon Health
- Department of Health
- Eastern Health
- Peninsula Health
- Peter MacCallum Cancer Centre
- The Royal Children's Hospital
- The Royal Victorian Eye and Ear Hospital.

The submissions and comments provided are not subject to audit nor the evidentiary standards required to reach an audit conclusion. Responsibility for the accuracy, fairness and balance of those comments rests solely with the agency head.

RESPONSE provided by the Acting Chief Executive Officer, Alfred Health

18 October 2013

AlfredHealth

55 Commercial Road
PO Box 315 Prahran
Victoria 3181 Australia
Telephone 03 9076 2000
www.alfred.org.au

Office of the Chief Deputy Chief Executive and Operating Officer
Andrew Stripp

EA Eliza Kerle
t +61 3 9076 2826
e E.Kerle@alfred.org.au

Mr John Doyle
Auditor-General
Victorian Auditor-General's Office
Level 24, 35 Collins Street
MELBOURNE VIC 3000

Dear Auditor-General

Proposed performance Audit Report – Clinical ICT Systems in the Victorian Public Health Sector

We refer to your letter dated 26 September 2013. The Board Chair has asked me to respond on her behalf.

Alfred Health has reviewed the report "Clinical ICT Systems in the Victorian Public Health Sector" received under cover of your letter dated 26 September 2013. Statements in the report related to Alfred Health are an accurate reflection of the current status and history of Clinical ICT at Alfred Health. We also note that no recommendations are specifically addressed to Alfred Health.

Thank you for the opportunity to comment.

Yours sincerely

Andrew Stripp
Acting Chief Executive Officer

Alfred Health incorporates
The Alfred
Caulfield General Medical Centre and
Sandringham & District Memorial Hospital
ABN 27 318 956 319

RESPONSE provided by the Board Chair, Austin Health

Austin Hospital

145 Studley Road
P O Box 5555 Heidelberg
Victoria Australia 3084
Telephone 03 9496 5363
Facsimile 03 9496 3176

RECEIVED
21 OCT 2013
VICTORIAN AUDITOR-GENERAL'S OFFICE

1st October 2013

Mr John Doyle
Auditor General
Level 23, 35 Collins Street
Melbourne 3000

Dear Mr Doyle

Performance Audit Report – Clinical ICT systems in the Victorian Public Health Sector

Austin Health is pleased to comment on this report.
Austin Health is extremely proud of the successful implementation of an extensive clinical information system at all of our sites, including arguably the most complex and potentially beneficial function of fully closed loop medication administration. We believe that we have now what is recognised as one of the most advanced clinical information systems in the country and have done substantial work for the nation on the Australian Medication Terminology, for others to use.

The scale and complexity of the Clinical IT implementation at Austin Health was huge and delivered over a relatively compressed time line. Like all such implementations, transitional issues and change management challenges have arisen and required transparent reporting and appropriate addressing. The life cycle of such implementations is such that full acceptance and benefits realisation requires a stable system for some time, as we only now are starting to experience. We believe it was unfortunate that the timing of the Review occurred just at the end of the roll of out the system at Austin Health, where a number of transitional and change elements were still active. Austin Health is confident that the benefits realisation work, currently underway, will reveal that our implementation has been, by international benchmarks, a cost effective investment which has resulted in significant improvement in patient safety and in the work of our clinical staff.

Austin Health accepts that some issues remain to be resolved, particularly the 'encounter issue', for which a definitive solution is currently in development. We believe that, at all times, we have appropriately managed any risks associated with this issue and have a clear path to resolution.

In relation to the specific recommendations in the Report, our response to the relevant recommendations is as follows:

- Recommendation 1-3. Not relevant to Austin Health
- Recommendation 4 & 5. These recommendations are accepted.
- Recommendation 6. Accepted, noting that Austin Health believes it has been compliant with this recommendation throughout the clinical systems project.

RESPONSE provided by the Board Chair, Austin Health – continued

- Recommendation 7. Not relevant to Austin Health
- Recommendation 8. Austin Health accepts that the encounter issue needs to be resolved and has a clear plan to achieve this.
- Recommendation 9. Accept. We believe that any potential safety issues (principally the encounter issue) already has active and appropriate mitigation.
- Recommendation 10. Accept. This has been and continues to be Austin Health practice if such incidents occur.
- Recommendation 11. Accept. This is in place at Austin Health.
- Recommendation 12. Accept. We have such guidelines and they are regularly reviewed by internal audit and other bodies.
- Recommendation 13 – 15. Not relevant to Austin Health.

Yours sincerely

The Hon Judith Troeth AM
Board Chair

RESPONSE provided by the Chief Executive, Barwon Health

Barwon Health

Corporate Office
Ryrie Street
Geelong, 3220
PO Box 281
Geelong, 3220
T 03 4215 0000
ABN 45 877 249 165

RECEIVED
17 OCT 2013
VICTORIAN AUDITOR-GENERAL'S OFFICE

17th October 2013

John Doyle
Auditor General
Level 24, 35 Collins Street
Melbourne VIC 3000

Dear Mr Doyle,

Re: Proposed Performance Audit Report - Clinical ICT Systems in the Victorian Public Health Sector

The draft report findings have been received and read by the Barwon Health nominated audit contact officer Ms Ann Larkins, CIO/Director Information Services.

As there are no specific recommendations in relation to Barwon Health within the report, in reference to the recommendation relating to health services generally;

No.	Recommendation	Barwon Health Comment
4.	Follow DTF guidance for future clinical ICT investments and require comprehensive business cases, relevant and measureable performance indicators and clearly articulated benefits and outcomes	Acknowledge and agree with the requirement for ICT investment to be backed by sound business practices as described.
5.	Align any future clinical ICT procurements to the key principles of Victoria's ICT strategy.	Understand and support the principles of Victorian ICT strategy.
6.	Ensure expertise is available to plan and implement future clinical ICT development and change projects, particularly in the areas of clinical engagement and leadership, socio-technical systems analysis, health informatics and benefits realisation.	Acknowledge and support the requirement to maintain a skilled workforce to work with clinical teams to change systems and practice using the methods described.
11.	Expedite mandatory and ongoing training for clinicians in the use of clinical ICT systems. Priority should be given to the appropriate prescribing and administration of medication, and any workarounds needed for known issues.	Acknowledge and are actively working on facilitating mandatory ongoing online training for clinical staff in use of ICT systems.
12.	Develop or review internal guidelines to make sure that electronic patient data is kept accurate and reliable throughout all phases of patient care.	Support that continuous improvement for high level of compliance to data integrity principles, is critical throughout all phases of patient care.

Thank you again for the opportunity to participate in this audit process and make comment on the recommendations before tabling in Parliament this month.

We look forward to the report being published and the positive reflections within it of our health service and strategy.

Yours sincerely,

Professor David Ashbridge
Chief Executive

OUR VALUES / RESPECT / COMPASSION / COMMITMENT / ACCOUNTABILITY / INNOVATION

RESPONSE provided by the Secretary, Department of Health

Department of Health
Secretary

50 Lonsdale Street
Melbourne
Victoria 3000
GPO Box 4541
Melbourne
Victoria 3001
Telephone: 1300 253 942
Facsimile: 1300 253 964
www.health.vic.gov.au
DX 210311

RECEIVED
10 OCT 2013
VICTORIAN AUDITOR-GENERAL'S OFFICE

e3226379

Mr John Doyle
Auditor-General
Victorian Auditor-General's Office
Level 24, 35 Collins Street
MELBOURNE VIC 3000

Dear Mr Doyle

The Department thanks the audit office for its evaluation of clinical ICT systems.

The Department accepts the findings that the program had many challenges and that the complex systems deployed have issues that require continued attention.

The future approach to sector ICT will be different from the past. Work is well progressed as a result of the work of the Ministerial Review Panel on Health Sector ICT that was commissioned by the Minister for Health.

The Department would also like to affirm its support to the health services undertaking lead work in system improvements seeking to improve patient care. The Department will continue to support lead adopters and ensure that the lessons learnt are available to all.

The Department accepts all recommendations made by audit and, where these pertain to the health services, will assist if required or as requested.

Yours sincerely

Dr Pradeep Philip
Secretary

Enc. Response provided by Secretary, Department of Health

RESPONSE provided by the Secretary, Department of Health – continued

Department of Health response to recommendations provided to the department in the performance audit on *Clinical ICT systems in the Victorian Public Health Sector*.

General

The department and the four health services in partnership have undertaken a major transformation project in moving from manual paper-based systems to electronic systems for medication management with sophisticated decision-support while assisting to develop, and adopt new Australian standards in this specialised field. This shift has only been achieved in a few places in the world.

The Department acknowledges that the original plan and budget underestimated the scope and complexity of the task leading to time and costs exceeding the original budget.

The Department also believes that valuable improvements have also been made and the department and key stakeholders continue to believe that investment in electronic medical record (EMR) systems is one of the key ways to drive better patient outcomes and efficiency into the future.

Recommendations

The department notes that recommendations 11 and 12 are matters for the health services to address. With respect to the recommendations specifically addressed to the department, the following response is provided.

Recommendation 1: that the department develop a comprehensive strategic plan for the ongoing development of electronic medical record or clinical systems across the Victorian public health sector.

Accepted

The work of the Ministerial Review Panel on Health Sector ICT will also be of great benefit in undertaking this task.

Recommendation 2: that the department conduct a review of its procurement, contract and financial oversight practices for major ICT projects so that it can more effectively:

- *align functionality and usability of selected products with end user needs*
- *manage the timeliness and quality of vendor performance*
- *monitor expenditure against achievement of deliverables and functionality and approved budgets*
- *embed benefits realisation and evaluation into the project lifecycle*

Accepted

Recommendation 3: that the department establish guidelines that government-approved budgets, scope and schedules are followed and that any exceptions or revisions are documented and presented back to government for appropriate consideration.

Accepted

Recommendations 4: that the department follow DTF guidelines for future clinical ICT investments and require comprehensive business cases, relevant and measureable performance indicators and clearly articulated benefits and outcomes.

Accepted

Recommendation 5: that the department align any future clinical ICT procurement to the key principles of Victoria's ICT strategy.

Accepted

RESPONSE provided by the Secretary, Department of Health – continued

Recommendation 6: that the department ensure expertise is available to plan and implement future clinical ICT development and change projects, particularly in the areas of clinical engagement and leadership, socio-technical systems analysis, health informatics and benefits realisation.

Accepted in principle

The department considers this is an issue to be directly addressed by health services and their executive teams but remains committed to assisting in such initiatives when requested.

Recommendation 7: that the department conduct a comprehensive and standards-based assessment of clinical system functionalities across the health sector.

Accepted

The department is currently undertaking this review using the international HIMSS model.

Recommendation 8: that the department resolve the 'encounter', 'complex prescriptions', pre-prepared discharge summaries and hand-amended prescriptions issues identified by the audit.

Accepted, noting that these issues are known to the department and the partner health services, with the latter having implemented risk mitigation strategies while permanent solutions are determined. These issues are not unexpected with implementation of new systems.

Recommendation 9: that the department address identified potential safety risks arising from the clinical ICT system installations through software upgrades, configuration changes and redesign of clinical treatment workflows, as appropriate.

Accepted, noting the comments above (Recommendation 8)

Recommendation 10: that the department monitor and, as required, conduct root cause analysis of clinical incidents in health services which are attributable to these known issues.

Accepted

The department and health services have well developed processes to assess all clinical incidents including the use of root cause analysis.

Recommendation 13: that the department comprehensively review and publicly report on the costs and benefits of the HealthSMART clinical system program.

Accepted

Recommendation 14: that the department seek a Gateway program review of the HealthSMART clinical ICT system rollout to understand what value for money and other outcomes have been achieved since 2003.

Accepted

Recommendation 15: that the department identify options for health services to effectively and appropriately share relevant patient information by developing a secure data exchange or messaging network.

Accepted

As part of the central program of work, the department has provided a secure data network (HealthNET) and secure messaging.

Page 3

RESPONSE provided by the Chief Executive, Eastern Health

easternhealth
GREAT HEALTH AND WELLBEING

5 Arnold Street, Box Hill
Victoria 3128 Australia
PO Box 94, Box Hill 3128
Tel (03) 9895 3281
Fax (03) 9895 4896
ABN 68 223 819 017

www.easternhealth.org.au

18 October 2013

RECEIVED
18 OCT 2013
VICTORIAN AUDITOR-GENERAL'S OFFICE

Mr John Doyle Auditor General
Victorian Auditor-General's Office
Level 24, 35 Collins Street
Melbourne VIC 3000

Dear Mr Doyle

Proposed Performance Audit Report – Clinical ICT systems in the Victorian Public Health System

Thank you for providing a copy of the proposed performance audit report on *Clinical ICT systems in the Victorian Public Health Sector*. You have invited Eastern Health to provide submissions and comments to be included in the report and for Eastern Health to indicate whether the organisation proposes to take action in relation to each of the relevant recommendations. Accordingly, Eastern Health's response is outlined below.

Submission and Comments Relating to the Report

Eastern Health notes the draft report and thanks you for providing your attributed response to earlier feedback. Further to your recent communication, Eastern Health notes that the updated report has undergone independent medical review and comments provided by Eastern Health in relation to the use of a standard based assessment of clinical system functionalities to enhance comparisons of clinical systems have been acknowledged.

Eastern Health has no further comments on the report.

Victorian Auditor-General's Office (VAGO) Report Recommendations

In relation to the Report's recommendations, the report makes 15 recommendations, of which 8 are relevant to health services. These are outlined as follows:

That the Department of Health, and health services:

4 *follow DTF guidance for future clinical investments and require comprehensive business cases, relevant and measurable performance indicators and clearly articulated benefits and outcomes.*
5 *align any future clinical ICT procurements to the key principles of Victoria's ICT strategy.*
6 *ensure expertise is available to plan and implement future clinical ICT development and change projects, particularly in the areas of clinical engagement and leadership, socio-technical systems analysis, health informatics and benefits realisation.*

That the Department of Health and relevant HealthSMART sites urgently:

8 *resolve the 'encounter', 'complex prescriptions', pre-prepared discharge summaries and hand-amended prescriptions issues identified by this audit.*
9 *address identified potential safety risks arising from clinical ICT system installations through software upgrades, configuration changes and redesign of clinical treatment workflows, as appropriate.*

RESPONSE provided by the Chief Executive, Eastern Health – continued

10 monitor and, as required, conduct root cause analysis of clinical incidents in health services which are attributable to these known issues.

That health services:

11 expedite mandatory and ongoing training for clinicians in the use of clinical ICT systems. Priority should be given to the appropriate prescribing and administration of medication, and any workarounds needed for known issues.
12 develop or review internal guidelines to make sure that electronic patient data is kept accurate and reliable throughout all phases of patient care.

Eastern Health's Response to the Recommendations

Eastern Health notes the recommendations and offers the following response:

VAGO Recommendation 4:

Follow DTF guidance for future clinical investments and require comprehensive business cases, relevant and measurable performance indicators and clearly articulated benefits and outcomes.

Eastern Health response to recommendation 4:

Eastern Health's practice for developing clinical ICT investment business cases follows DTF guidelines. By 30 June 2014 Eastern Health will review its practice to ensure that its approach is fully up to date and to ensure that its future clinical ICT business cases continue to clearly target achievement of outcomes and realisation of benefits.

VAGO Recommendation 5:

Align any future clinical ICT procurements to the key principles of Victoria's ICT strategy.

Eastern Health response to recommendation 5:

Eastern Health's current clinical ICT procurement practices generally align with the key principles of Victoria's ICT strategy. By 30 June 2014 Eastern Health will update the relevant sections of its ICT procurement process documentation to ensure that any future clinical ICT procurements are explicitly aligned to the key principles of Victoria's ICT strategy.

VAGO Recommendation 6:

Ensure expertise is available to plan and implement future clinical ICT development and change projects, particularly in the areas of clinical engagement and leadership, socio-technical systems analysis, health informatics and benefits realisation.

Eastern Health response to recommendation 6:

Eastern Health has a strong internal team, consisting of an ICT Program Manager with experience in the development of clinical ICT and a clinical application ICT implementation team with a proven record of successful implementations.

Clinical and non-clinical leaders and stakeholders are significantly involved right through clinical ICT development and change projects, from the design, selection and configuration of the clinical ICT systems to the implementation planning, and system deployment to ensure that the implementation is successful.

Other Members of Eastern Health

ngliss Hospital)3) 9764 6111	Box Hill Hospital (03) 9895 3333	Healesville & District Hospital (03) 5962 4300	Maroondah Hospital (03) 9871 3333	Peter James Centre (03) 9881 1888	Turning Point Alcohol & Drug Centre (03) 8413 8413	Wantima Health (03) 9955 1200	Yarra Ranges Health (03) 9091 8888	Yarra Valley Community Health 1300 130 381

RESPONSE provided by the Chief Executive, Eastern Health – continued

Eastern Health contracts industry-leading providers to augment the internal team as required, as evidenced by the recent engagement of a leading external consultancy to review and augment a business case for clinical ICT currently under consideration.

VAGO Recommendation 8:

Resolve the 'encounter', 'complex prescriptions', pre-prepared discharge summaries and hand-amended prescriptions issues identified by this audit.

Eastern Health response to recommendation 8:

Eastern Health will continue to apply its risk management and clinical workflow change methods to ensure patient risk is minimised, consistent with the approach demonstrated to the VAGO audit team.

VAGO Recommendation 9:

Address identified potential safety risks arising from clinical ICT system installations through software upgrades, configuration changes and redesign of clinical treatment workflows, as appropriate.

Eastern Health response to recommendation 9:

Eastern Health proactively analyses and addresses potential safety risks through its comprehensive risk management and quality improvement programs.

VAGO Recommendation 10:

Monitor and, as required, conduct root cause analysis of clinical incidents in health services which are attributable to these known issues.

Eastern Health response to recommendation 10:

Eastern Health proactively analyses and addresses potential safety risks and conducts in depth case reviews and/or root cause analysis when necessary as part of project governance and the broader organisation's approach to risk management and quality improvement.

VAGO Recommendation 11:

Expedite mandatory and ongoing training for clinicians in the use of clinical ICT systems. Priority should be given to the appropriate prescribing and administration of medication, and any workarounds needed for known issues.

Eastern Health response to recommendation 11:

Eastern Health has implemented a training program for clinicians, which includes an extensive e-learning program.

VAGO Recommendation 12:

Develop or review internal guidelines to make sure that electronic patient data is kept accurate and reliable throughout all phases of patient care.

RESPONSE provided by the Chief Executive, Eastern Health – continued

Eastern Health response to recommendation 12:

> Eastern Health has implemented appropriate internal systems, guidelines and practices to ensure that electronic patient data is kept accurate and reliable throughout all phases of patient care.

Thank you for providing Eastern Health with the opportunity to comment and respond to the recommendations of the report.

Should you have any further queries, please contact Zoltan Kokai, Executive Director, Corporate Projects & Sustainability on (03) 9895-3868.

Yours sincerely

ALAN LILLY
Chief Executive

cc Dr Joanna Flynn AM
Chair, Board of Directors, Eastern Health

Other Members of Eastern Health

ngliss Hospital	Box Hill Hospital	Healesville &	Maroondah Hospital	Peter James Centre	Turning Point	Wantima Health	Yarra Ranges Health	Yarra Valley
13) 9764 6111	(03) 9895 3333	District Hospital	(03) 9871 3333	(03) 9881 1888	Alcohol & Drug Centre	(03) 9955 1200	(03) 9091 8888	Community Health
		(03) 5962 4300			(03) 8413 8413			1300 130 381

RESPONSE provided by the Chief Executive, Peninsula Health

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Hastings Road
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Tel: 9784 8211
Fax: 9784 7134

Frankston Hospital

•

Rosebud Hospital

•

Mental Health Services

•

Aged Care, Rehabilitation & Palliative Care Services

•

Primary and Community Health

www.peninsulahealth.org.au

Peninsula Health

PO Box 52
Frankston Victoria 3199 Australia
Telephone 03 9784 7777

10 October 2013

Mr John Doyle
Auditor General
Victorian Auditor-General's Office
Level 24, 35 Collins Street
MELBOURNE VIC 3000

Dear Mr Doyle,

Re: Response from Peninsula Health to the Draft Confidential report on Clinical ICT systems in the Victorian Public Health Sector (October 2013)

Thank you for the opportunity to comment on the draft report.

Peninsula Health has reviewed the report and commits to implementing the recommendations, as they apply to Peninsula Health.

Yours sincerely,

Dr Sherene Devanesen
CHIEF EXECUTIVE

At Peninsula Health we value
Service Integrity Compassion Respect Excellence

RESPONSE provided by the Chief Executive, Peter MacCallum Cancer Centre

Peter MacCallum Cancer Centre
St Andrews Place
East Melbourne Victoria
Postal Address
Locked Bag 1 A'Beckett Street
Victoria 8006 Australia
Phone +61 3 9656 1111
Fax +61 3 9656 1400
ABN 42 100 504 883

www.petermac.org

Locations
East Melbourne
Bendigo
Box Hill
Moorabbin
Richmond [private centre]
Sunshine

Chief Executive
Phone: +61 3 9656 1044
Fax: +61 3 9656 1459
Email: Dale.Fisher@petermac.org

Monday 7 October 2013

John Doyle
Auditor-General
Victorian Auditor-General's Office
Level 24, 35 Collins Street
MELBOURNE VIC 3000

Dear Mr Doyle

Report – *Clinical ICT Systems in the Victorian Public Health Sector*

I am writing in relation to your letter of 26 September 2013 sent to Ms Wendy Harris SC: Chair, Board of Directors, Peter MacCallum Cancer Centre seeking comments on the Report – Clinical ICT Systems in the Victorian Public Health Sector.

I note the inclusion of suggested amendments to the Peter Mac Text from the provisional report.

Peter Mac endorses recommendations 4, 5 and 6, as we recognise the need to follow best practice guidelines in the implementation of Clinical ICT systems and always endeavour to do so. With respect to recommendation 12, we can reassure VAGO that we will continue our program of mandatory and on-going training for clinicians. With respect to recommendation 13, we will continue our internal audit program to ensure that patient data is kept accurate and reliable.

Yours sincerely

Dale Fisher
Chief Executive

Patron: The Honourable Alex Chernov, AO, QC – Governor of Victoria

RESPONSE provided by the Chief Executive Officer, The Royal Children's Hospital

Professor Christine Kilpatrick
Chief Executive Officer
50 Flemington Road
Parkville Victoria 3052 Australia
TELEPHONE +61 3 9345 4708
FACSIMILE +61 3 9345 5050
EMAIL christine.kilpatrick@rch.org.au
www.rch.org.au

The Royal Children's Hospital Melbourne

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VICTORIAN AUDITOR-GENERAL'S OFFICE

8th October 2013

Victorian Auditor-General's Office
Level 24, 35 Collins Street
MELBOURNE Vic 3000

Dear Sir/Madam

Re: Proposed Performance Audit Report – *Clinical ICT systems in the Victorian Public Health Sector*

The Royal Children's Hospital (RCH) wishes to advise that it has no changes to the provided report.

In addition we support the following recommendations for health services;

- The development of a comprehensive business case, relevant and measurable performance indicators and clearly articulated outcomes.
- Ensure expertise is available to plan and implement future clinical ICT development and change projects, particularly in the areas of clinical engagement and leadership, socio technical systems analysis, health informatics and benefit realisation.

We are unable to comment on the other recommendations as they relate to HealthSMART sites or the Department of Health.

Yours sincerely,

Christine Kilpatrick
Chief Executive Officer

Our Values Unity, Respect, Integrity, Excellence

The Children's Excellence in clinical care, research and education
The Royal Children's Hospital Melbourne
Murdoch Childrens Research Institute
The University of Melbourne

RESPONSE provided by the Executive Director Ambulatory and Medical Services and Chief Medical Officer, The Royal Victorian Eye and Ear Hospital

The Royal Victorian Eye & Ear Hospital
caring in every sense

150 years of caring in every sense.

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The Royal Victorian Eye and Ear Hospital

32 Gisborne Street
East Melbourne
Victoria 3002 Australia

Locked Bag 8
East Melbourne
Victoria 8002 Australia

T. +61 3 9929 8666
TTY. +61 3 9929 8052
F. +61 3 9663 7203

info@eyeandear.org.au
www.eyeandear.org.au

ABN 81 863 814 677

9 October 2013

Mr John Doyle
Auditor-General
Level 24, 35 Collins Street
Melbourne VIC 3000

Dear Mr Doyle

Re: Proposed Performance Audit Report – Clinical ICT systems in the Victorian Public Health Sector

I am writing in response to your letter of 25 September 2013 to Ms Jan Boxall, Board Chair enclosing the proposed report on Clinical ICT Systems in the Victorian Health Sector. We acknowledge the report, note the content and broadly agree with the recommendations. I have spoken to Mr Paul O'Connor in your office to advise that we do not wish to provide any further formal submission in relation to this report.

When publically available the report will be considered at the hospitals Internal Audit Committee.

Should you wish to discuss this further, please do not hesitate to contact me.

Kind regards

Dr Caroline Clarke
Executive Director Ambulatory & Medical Services and Chief Medical Officer

cc: Ms Jan Boxall, Board Chair

Ms Ann Clark, Chief Executive Officer

Ms Jenni Gratton-Vaughan, A/Chief Executive Office

Mr Paul O'Connor, Sector Director

Caring Excellence Integrity Teamwork

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