

Design, service and infrastructure plan for Victoria's cardiac system



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Authorised and published by the Victorian Government, 1 Treasury Place, Melbourne.

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ISBN 978-0-7311-6950-4

Available at www.health.vic.gov.au/hospitals-and-health-services/health-system-design-planning

(1512012)



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From the steering committee

On behalf of the steering committee, I am very pleased to be able to present this *Design, service and infrastructure plan for Victoria's cardiac system*, which addresses the future design of the cardiac system in Victoria.

As Victorians, many of us are fortunate to have access to an excellent system of care, supported by dedicated and committed clinicians and professionals working to provide quality care. However, access is not equal for all, and the health system can never remain static. It must continue to evolve in response to changes in health conditions, improved models of care, new and emerging technology and to embrace new initiatives and opportunities.

This plan responds to these challenges for cardiac care. It contains three components, beginning with a snapshot of where the cardiac service system is currently placed. The second component identifies priority themes for reform, each with defined aims or objectives. The third essential component provides the way forward through a detailed implementation plan.

I would like to thank the Minister for Health for the opportunity to contribute to reforming the cardiac service system. The Minister, the cardiac service sector and the department are to be commended on their commitment to review and to look for opportunities to move forward in this area of healthcare, which is so critical to the wellbeing of all Victorians.

This is an exciting time to be involved with health reform as the government looks to respond to challenges with a new approach and a commitment to do things differently. I believe the approach and key themes adopted in this plan provide a template that can be applied more broadly to achieve improved system design and configuration across many areas.

I would like to thank all members of the steering committee for their input and advice. I also wish to thank all those from public and private health services and the individuals who took the time to participate in consultation forums and provide input to contribute to development of priorities and actions.

I recommend this plan to the Minister and look forward to seeing the identified priorities contribute to ongoing reform of the Victorian cardiac system of care.



Fran Thorn

Chair, Steering Committee,
Victorian Cardiac Plan

Executive summary

The *Design, service and infrastructure plan for Victoria's cardiac system* (the cardiac plan) provides a clear picture of the future of the cardiac system of care across the state. It proposes continuing reform to ensure people with heart disease achieve the best possible outcomes, with a health system that is efficient and of high quality. The plan builds on reform of the cardiac service system already underway, but also recognises the opportunity for system improvement presented by the government's commitment to build a stand-alone cardiac centre of excellence – the Victorian Heart Hospital.

The vision of the cardiac plan is improved care and outcomes for Victorians with, or at risk of, heart disease, which means person-centred care from early diagnosis of heart disease in the community to end of life care. This will be supported through developing new models of clinical engagement that promote collaboration, and through encouraging health service partnerships and relationships based on the needs of patients. The future cardiac system of care will be viewed and supported as a system, rather than a collection of individual agencies. This will support a more area-based service approach to better address the access needs of vulnerable groups and areas of disadvantage.

The plan describes three priority themes for driving change in the way care is provided. Figure 1 summarises these priorities, with clear objectives defined for each.

Figure 1: Priorities for system reform

Better patient access, experience and outcomes

1. People at risk of heart disease are better identified and managed in primary care.
2. People experiencing an acute event receive the right care as quickly as possible.
3. Patients needing specialist care are transferred at the right time, based on clinical need.
4. Continuous improvement embeds innovative models of care across all services.

A Coordinated cardiac system of care

1. Health services recognise roles and responsibilities within a coordinated system of care.
2. Designated specialist services take a lead role in coordination of cardiac care.
3. Complex cardiac care is consolidated to fewer facilities, with general cardiac care distributed to support the right care in the right place.
4. The Victorian heart hospital makes a significant contribution to the cardiac system of care.
5. Opportunities for partnerships between the public and private sectors are maximised.

Effective and innovative cardiac services

1. Designated specialist cardiac services provide clinical leadership across the system.
2. Continuous service improvement is driven by monitoring of performance and outcomes.
3. Better access to clinical information benefits both patients and providers.
4. Clinical practice is improved through ongoing medical research.
5. The cardiac workforce is supported to provide quality care.

To ensure accountability and measurement of progress against the priorities, a detailed implementation plan has been developed. This will support collaboration between the Department of Health and Human Services, the Victorian Cardiac Clinical Network, health services and other key stakeholders. This strong clinical and sector engagement will ensure reform is led by those best placed to drive change across the cardiac system of care.

Introduction

We are fortunate in Victoria to have a world-class cardiac service system. However, increasing demand and community expectations, evolving models of care and new technology means the system must constantly evolve to meet changing circumstances.

The cardiac plan provides a way forward for the cardiac system across Victoria. It describes priorities and objectives of system reform, recommends actions in accordance with these objectives and, importantly, outlines a clear plan to implement the actions. The focus of the plan is the public health system, while recognising the significant contribution the private sector makes to the provision of a comprehensive system of care. The plan also recognises the significant opportunity to refocus the cardiac system presented by the Victorian Government's commitment to develop the Victorian Heart Hospital (VHH). This will be Australia's first specialist heart hospital and will provide a centre of excellence for cardiac patient care, research and education.

The plan builds on and continues the evolution of the cardiac system outlined in *Heart Health: improved services and better outcomes for Victorians (Heart Health)*¹ released by the department in 2014. *Heart Health* was developed with input from the Victorian Cardiac Clinical Network (VCCN) and the health sector and provided a five-year plan for cardiac service development. It recognised the importance of prevention and early intervention in managing heart disease, and addressed care along the full continuum from early intervention to rehabilitation, long-term care of those with progressive heart failure and end-of-life care. It also recognised the importance of patient outcomes and the need to focus efforts on not only improving outcomes but also maintaining health in people living with chronic heart disease. Many of the actions and projects recommended by *Heart Health* are still ongoing and will continue, albeit with increased focus and energy.

Development of this cardiac system design plan has been led by a steering committee, which has brought together representatives of major public health services providing cardiac care, the clinical network, the Heart Foundation, Monash University and other relevant stakeholders. Membership of the steering committee is provided at **Appendix 1**.

Development of the plan has also been informed by extensive consultation with clinicians and community stakeholders representing health services, consumers and professional groups.

The process was managed by an independent consultant and was conducted through targeted interviews, small group discussions and a public forum. The department also consulted directly with health services and other stakeholders.

A vision for the cardiac system

The vision of the cardiac plan is improved care and outcomes for Victorians with, or at risk of, heart disease. This means person-centred care from early diagnosis of heart disease in the community to care at end of life so that intervention can prevent further deterioration; local access to the best possible treatment in an emergency is reliable; evidence-based and high-quality care in specialist cardiac centres is available when required; and care for ongoing management of heart disease is well coordinated.

This will be supported by developing new models of clinical engagement that promote collaboration, and through encouraging health service partnerships and relationships based on the needs of patients. The future cardiac system of care will be viewed and supported as a system, rather than a collection of individual agencies. This will support a more area-based service approach to better address the access needs of vulnerable groups and areas of disadvantage.

‘The building blocks alone do not constitute a system, any more that a pile of bricks constitutes a functioning building. It is the multiple relationships and interactions among the blocks – how one affects and influences the others, and is in turn affected by them – that convert these blocks into a system.’

de Savigny D, Taghreed A (eds) 2009, Systems thinking for health systems strengthening, Alliance for Health Policy and Systems Research, World Health Organization, Geneva

Where we are now

The burden of disease

Cardiovascular disease (CVD) remains a leading cause of death and a major contributor to the illness burden of Victorians, and is therefore one of the greatest cost burdens on the healthcare system. In addition to costs associated with acute care for patients with cardiac disease, millions more are spent on emergency care and related services and treatment.

In 2013 coronary heart disease and related conditions was the underlying cause of death for almost 7,500 Victorians,² which equates to 21 per cent of all deaths. This actually represents a decrease in the proportion of deaths over the past 10 years from 24 per cent (7,852) in 2004. In addition to being a leading underlying cause of death, heart disease is also a contributing factor in deaths from other causes. From 1997 to 2007, heart disease was a leading contributory cause for all Australian deaths involving selected chronic diseases, including 47 per cent of deaths involving diabetes and 39 per cent involving chronic and unspecified kidney failure.³

Much of the decline in the death rate from heart disease can be attributed to improved interventions in primary care, such as pharmacological control of blood pressure and lipid disorders, as well as improved acute hospital interventions. Medications to manage risk factors for heart disease, reduce cholesterol and lower blood pressure are now some of the most commonly used medicines in Australia.

While the death rate from heart disease is declining, the prevalence of disease in the community continues to grow. This is the result of a number of factors, including the significant number of people surviving acute events but then living longer with ongoing chronic heart conditions, and the growing prevalence of cardiac disease associated with both ageing and with other chronic conditions. For example, the prevalence of aortic stenosis, atrial fibrillation and chronic heart failure increases with the proportion of people 65 years of age or older. As a result, significant numbers of adult Victorians are now living with heart disease, reducing their quality of life and increasing their risk of a further life-threatening cardiac event or stroke.

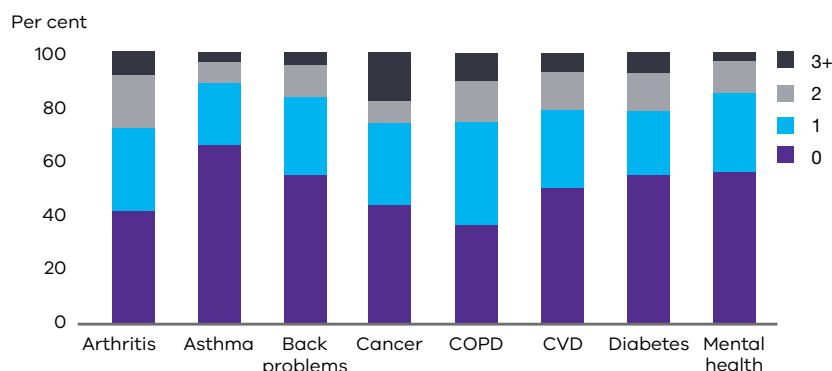
Impact of comorbidity

Self-reported data from the Australian Bureau of Statistics 2011–12 Australian Health Survey provides information on the prevalence of comorbidity among the Australian population.⁴

Comorbidity refers to any two or more diseases that occur in one person at the same time. This may occur simply by chance, but diseases often occur together because there is some association between them. In some cases diseases share risk factors such as smoking, or one disease may actually be a risk factor for another. For example, diabetes is a well-known risk factor for CVD, possibly due to diabetes increasing atherosclerosis, which is the underlying cause of most CVD in Australia. Ageing also has a particularly strong association with comorbidity. As older people are more vulnerable to the onset of many diseases, an increased life expectancy in Australia leads to greater opportunity for multiple conditions to arise.

The following two figures show the proportion of multiple chronic diseases for people with one of eight identified chronic diseases. Figure 2 shows the age group 0–44 years and Figure 3 the proportion for those over 45 years of age.

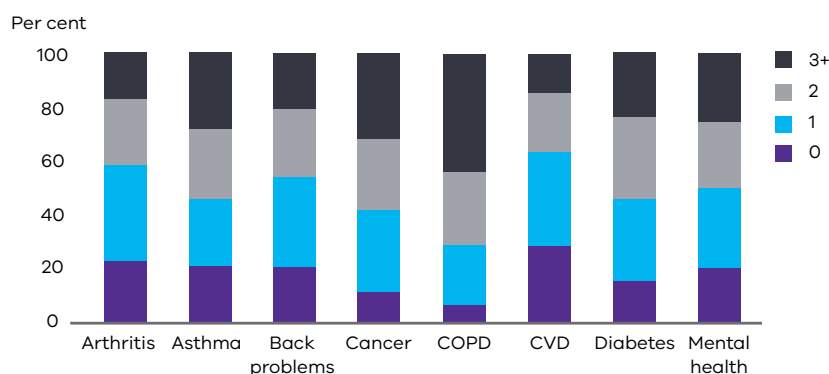
Figure 2: Proportion of people with additional chronic diseases (none, 1, 2 and 3 or more) among those with select chronic diseases, 0–44 years of age, 2011–12



Source: ABS Australian Health Survey 2011–12 (National Health Survey component)

People aged 45 or older are more likely than those aged 0–44 to have comorbidities across all eight chronic diseases.

Figure 3: Proportion of people with additional chronic diseases (none, 1, 2 and 3 or more) among those with select chronic diseases, 44 years of age or older, 2011–12



Source: ABS Australian Health Survey 2011–12 (National Health Survey component)

A 2015 report released by the Organisation for Economic Co-operation and Development (OECD)⁵ contends that while mortality from cardiovascular disease has dropped over the last few decades faster than mortality from other causes, prospects for making further inroads are now threatened by rising levels of obesity and by the lack of adherence to recommended treatments.

The report focused on cardiovascular disease and diabetes and contends that simply allocating more resources to acute care is not enough to deliver good outcomes and reduce unacceptable variation in performance. Both cardiovascular disease and diabetes are complex diseases to manage and treat effectively. Good primary care and early diagnosis is needed to manage risk factors such as high blood pressure and cholesterol and to avoid unnecessary long-term damage caused by the diseases. Both require timely services from the onset of disease through to later stages when specialist and hospital treatment is necessary. Both also require continuity and integration of services across the entire clinical pathway.

Therefore, the majority of patients with multiple morbidities require multidisciplinary care and access to the full range of specialist services, preferably close to home.

The current service system

To appropriately manage people with, or at risk of, heart disease requires all parts of the healthcare system to work together to contribute to provision of comprehensive care aimed at improving outcomes.

The recognised roles of healthcare providers vary across sectors and along the continuum of care and include: management of risk factors in primary care; emergency management of acute events in the pre-hospital environment; urgent care in emergency departments; acute care in public and private health services; long-term management of the effects of chronic disease and support for end-of-life care in both hospitals and primary care.

Inpatient cardiac care is currently provided by almost every public hospital in Victoria, but the range and extent of service delivery varies considerably. The highest level of specialist cardiac services for adult patients is provided by six services: The Alfred, Austin Hospital, University Hospital Geelong, Monash Health Clayton, The Royal Melbourne Hospital and St Vincent's Hospital. The Royal Children's Hospital is the major provider for paediatrics and adolescents.

An additional six public health services have cardiac catheterisation laboratories that provide emergency and elective interventions. There are also nine private hospitals performing cardiac surgery and 19 with cardiac catheterisation laboratories providing a mix of urgent and elective procedures, primarily in the metropolitan area.

In many cases cardiac services have developed independently within agencies, resulting in some service inconsistency and lack of clarity about roles. There also remains disparity across Victoria in both rates of potentially avoidable coronary heart disease and mortality from heart disease, with significantly higher rates in rural and regional areas compared with metropolitan areas. This is demonstrated through the Victorian Heart Maps,⁶ developed by the Heart Foundation in partnership with the cardiac network. These show that the highest rates for heart attack and cardiac arrest are in regional areas, so it is essential that strategies to improve referral are continued.

Planning is currently underway to build new cardiac catheterisation laboratories and expand services at Sunshine Hospital, Albury–Wodonga Health, Ballarat Health Services and Latrobe Regional Hospital.

Further details of public and private health service provision, by facility, are provided in **Appendix 2**.

Ambulance Victoria (AV) plays a pivotal role in the emergency response, pre-hospital care and interhospital transfer of acute patients across the public and private system, including when a cardiac condition is suspected. AV also supports timely access to pre-hospital reperfusion therapy for patients having a heart attack in regional areas of Victoria, with thrombolysis now administered by trained paramedics.

AV operates Adult Retrieval Victoria (ARV), which is responsible for coordinating interhospital transfers of critically ill and time-critical adult patients, and access to critical care beds. In 2013–14 cardiac patients comprised the single largest clinical case type for ARV, being 1,085 cases or 26 per cent of total cases.

Activity

For the six-month period from January 2015 to June 2015 Ambulance Victoria attended more than 25,000 patients presenting with cardiac problems as determined by attending paramedics. This represents approximately 10 per cent of AV's emergency workload for the period, and includes patients with chest pain, acute coronary syndrome, angina, arrhythmia, acute myocardial infarction (AMI), hypertension and other cardiac problems. AV also attended about 2,700 patients in cardiac arrest and more than 6,000 patients presenting with shortness of breath.

In 2013–14 there were about 126,700 separations from public and private hospitals defined by major clinical related groups (MCRG) as cardiac, with 69 per cent of this activity occurring in public hospitals (see Table 1). Private hospitals are also major providers of cardiac care, particularly interventional cardiology and cardiac surgery.

For the purpose of this plan, service activity is described in three broad categories of care:

- cardiothoracic surgery – bypass, valve and other surgery
- interventional cardiology – percutaneous coronary intervention, insertion and management of internal cardiac defibrillators and pacemakers, invasive cardiac procedures and intracardiac electrophysiology study (EPS)
- clinical or medical cardiology – investigation, diagnosis and management of AMI, arrhythmia, conduction disorders and atypical chest pain, and management of congenital heart disease.

Table 1: Public and private cardiac separations by major category, 2013–14

	Private	Public	Total	% Total	% Public
Cardiothoracic surgery	3,291	4,647	7,938	6.3%	58.5%
Interventional cardiology	21,021	18,138	39,159	30.9%	46.3%
Clinical cardiology	15,047	64,606	79,653	62.8%	81.1%
Total	39,359	87,391	126,750	100.0%	68.9%

Source: VAED mapped to MCRG/CRG groups (excludes Albury, NSW and heart/heart lung transplants)

Cardiothoracic surgery and interventional cardiology are specialist services requiring clinical input from staff trained in cardiac procedures, working in defined facilities. Together these represent just over one-third of all cardiac-related admissions.

International comparisons can show levels of intervention, to indicate an appropriate rate. The Australian rate of total revascularisation procedures is comparable to that of many other OECD countries at 226 per 100,000 people, which is only slightly higher than the group average of 221 per 100,000 people. Comparison of coronary angioplasty with the OECD average shows that Australia is slightly below average for the group, with angioplasty accounting for 75 per cent of all activity compared with an average of 78 per cent. The growth in coronary angioplasty between 2000 and 2011 coincided with a period of growth in graduates of cardiac procedural training, but the rate still remains below average for the group.

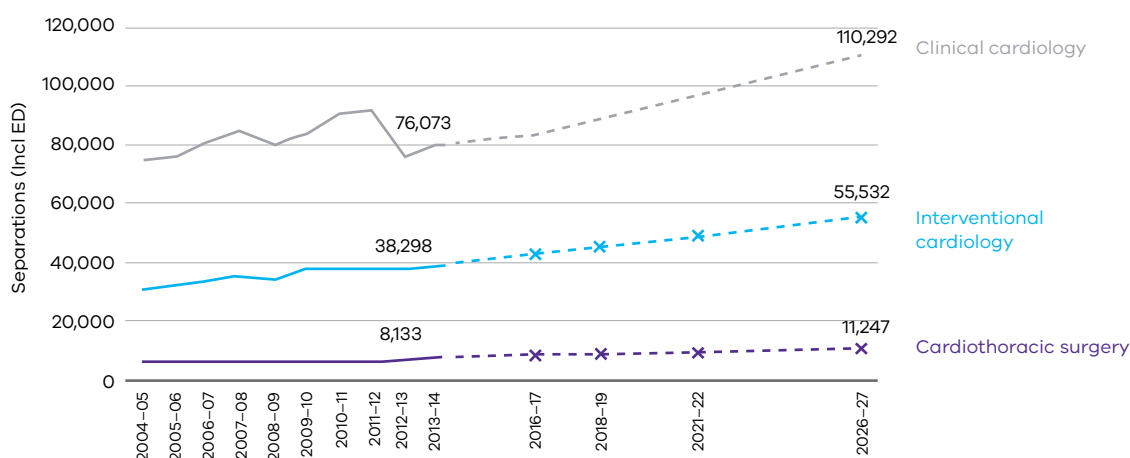
Details of OECD comparisons of revascularisation procedures are provided in **Appendix 3**.

By far the largest group of people are those admitted for medical treatment of cardiac conditions, including those identified with complex chronic disease. A significant percentage of these patients have all their care managed within public emergency departments, particularly in short stay units.

Projected growth in demand

Victoria uses demand projection modelling to forecast trends in hospital activity over the medium term. While recognising limitations of methodology, it is possible to see likely trends in cardiac activity. Figure 4 identifies the projected growth in inpatient activity for the three patient cohorts identified – cardiothoracic surgery, interventional cardiology and clinical or medical cardiology.

Figure 4: Historic and projected public and private separations by cardiac MCRGs



Note: The apparent decline in clinical cardiology in 2012-13 reflects a change in emergency department admission policy, where patients managed exclusively within an emergency department are no longer included as an admission.

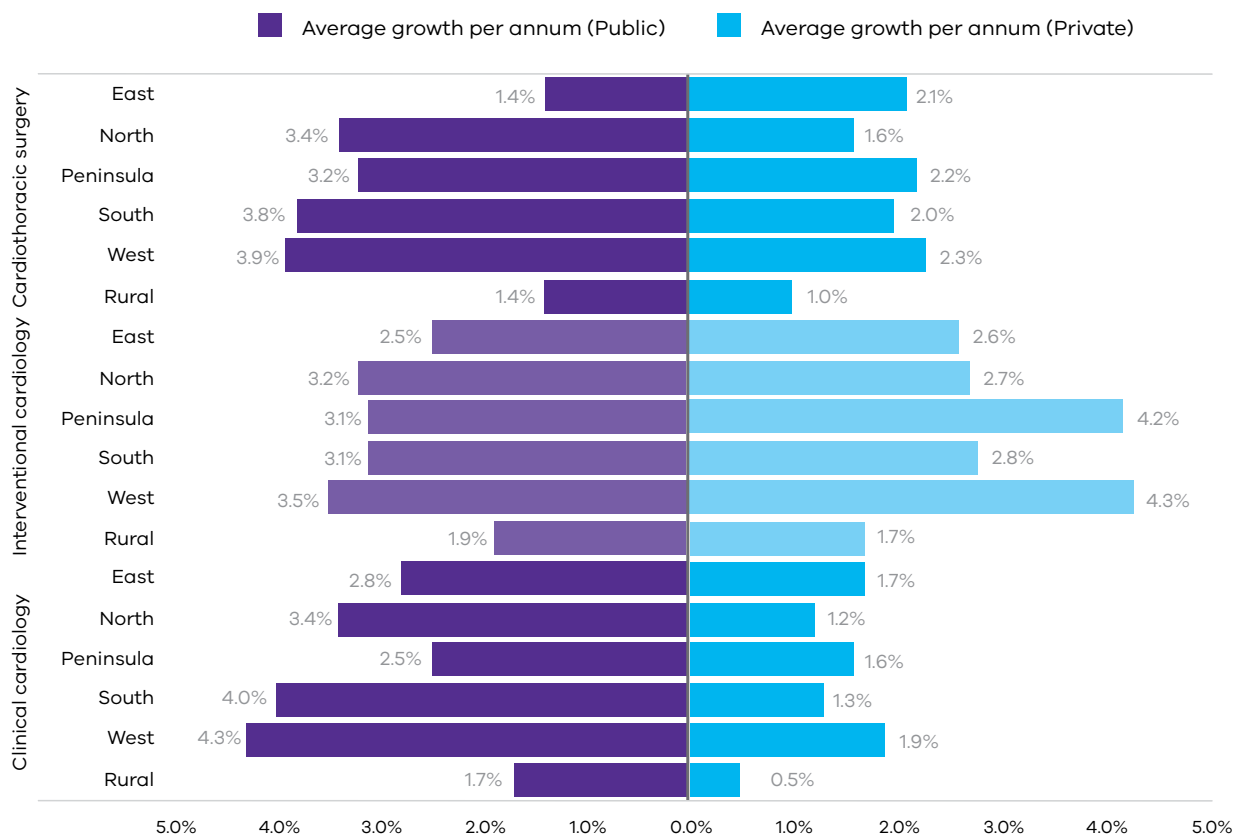
These projections indicate a number of impacts for the cardiac service system:

- There is modest growth projected in cardiac surgery, with thoracic surgery and valve surgery representing the two areas of highest growth.
- There is significant growth projected in interventional cardiology. The largest proportion of this work is angiography and invasive procedures without AMI. A growing trend in cardiac catheterisation laboratory activity is management of rhythm disorders, including through EPS. In 2013-14 this represented only 6 per cent of total catheterisation laboratory activity but is expected to increase as technology improves.
- The area with the greatest projected growth is clinical or medical cardiology, where management of heart disease may be only one element of the patient's chronic and complex care needs. This area of cardiology is most often managed by general physicians within a general acute hospital setting. Approximately 35 per cent of this patient activity is managed entirely within public emergency department short stay units.

As ongoing research demonstrates the effectiveness of techniques and drug therapies, this may affect demand for various types of cardiac procedures and interventions. One example of this impact is recent research suggesting that treating cardiac patients who also have diabetes through surgical intervention rather than PCI significantly improved patient outcomes and reduced the risk of death at five years by one-third.^{7,8,9,10} The implication of this finding is that the demand for interventions may reduce and demand for surgery increase as the number of patients with a comorbidity of diabetes increases.

From a planning perspective, it is important to consider the expected geographic dispersal of growth. As Figure 5 highlights, the areas of most significant growth in public service demand over the next 10–12 years will be the west and south metropolitan growth corridors, followed by the north metropolitan area.

Figure 5: Average percentage per annum growth for all public and private separations by area of residence, 2012–13 to 2016–17



It is important to recognise that other factors may influence or alter the projections, including developments or advances in medical technology or treatment and increased rates of comorbidities and other risk factors in the community. However, the key indicators are central to consideration of how the system should develop to better meet future demand and respond to advances in care and treatment models.

What has been achieved

Since the release of *Heart Health* in 2014, the commitment of the clinical network, the department and health services to implement the recommendations has seen improvement across the continuum of care for people with, or at risk of, cardiac disease. There has been significant investment in cardiac services to improve care options, increase system efficiency and deliver better patient outcomes.

Part of this commitment has been to develop models of care for both heart failure and cardiac rehabilitation that address service gaps and better meet people's needs. While projects are still ongoing, there have already been improvements to date. These include:

- introduction of rapid access to pre-hospital thrombolysis for people experiencing a heart attack in rural areas, administered by AV paramedics
- development of innovative models of care based on evidence of best practice to improve outcomes for people living with heart failure. Programs have improved clinical education and patient health literacy, mapped the patient experience and improved models of service delivery to target high-risk groups
- secondary prevention through improved models of care for cardiac rehabilitation, with a focus on increased participation
- development of specialist education programs for clinical staff in rural and regional communities, with linkage opportunities to support work with colleagues in metropolitan centres
- expansion of monitoring of cardiac interventions and outcome measurement through collection of statewide clinical performance data.

Work to date has engaged health professionals and helped raise awareness about the need to improve coordination between primary and acute care providers and the benefits of collaboration with key stakeholders such as Ambulance Victoria and the Heart Foundation. Collectively these initiatives are contributing to improvement in the system of care for people wherever they live in Victoria.

What we could do better

The cardiac plan provides an opportunity to continue to review and redesign the service system to provide more coordinated and efficient care for patients. The priorities and objectives described are also consistent with broader healthcare reform.

Health 2040: A discussion paper on the future of healthcare in Victoria,¹¹ was released in 2015 to start the conversation on future directions for the Victorian health system.

The subsequent Victorian Health Reform Summit identified ten key principles to guide future reform:

1. **Person-centred care with equitable access:** We need to move to person-centred and person-directed care, valuing and respecting patients and their preferences, taking into account the whole person and what is important to the individual. We also need to address disparities in access and outcomes for individuals and communities across the state.
2. **Integration:** While the system is made up of many individual services – public and private – we need to get better at ensuring that the patient experiences this as one system.
3. **Prevention and early intervention:** We need to invest in prevention, acknowledging that the payoff is long-term rather than short-term, and ensure that when treatment is needed, it is provided early.
4. **Technology and data:** We need to reduce the barriers to sharing information across providers, make better use of information to improve services and utilise new technologies to improve patient care and outcomes.
5. **Workforce:** We need to make better use of the skills of our health care workforce if we are to provide better services.
6. **Transparency and accountability:** Greater transparency about system performance and accountability of all health service providers for the outcomes they deliver will drive system improvement and improvements in care.
7. **Evidence-based care:** We need to ensure interventions are evidence-based, reduce low-value and futile care, and commit to ongoing and rapid translation of new evidence into service delivery.
8. **Sustainable:** We need to ensure that our health system remains affordable for both taxpayers and individual patients.
9. **Innovation:** There is strong support for a new systemic approach to innovation, to ensure that we make best use of the great ideas developed by individuals working across our health system.
10. **Medical Research:** We need to strengthen medical research, and support the translation of new discoveries into practical treatments, technologies and tools to improve patient care and outcomes.

Using these principles to focus on the cardiac system of care identifies a number of areas where we could do better:

- People must always be at the centre of system design, with care at the right time and in the right place.
- Better education in the community could avoid disease progression and better risk assessment in primary care could improve early intervention.
- Access to time-critical and specialist care could be improved, particularly in rural and outer metropolitan areas. Rural and regional clinicians would be better able to manage suspected cardiac patients if they could access specialist advice and support, with appropriate timely transfer when required.
- Better management of ongoing heart failure would reduce the number of people who return to hospital for unnecessary, unplanned admissions. This should involve well-planned and coordinated disease management programs, with appropriate linkages between primary and specialist care.
- Referral pathways need to be formalised while strengthening the important regional relationships that currently exist.
- Provision of cardiac care should be based on best practice guidelines developed to address time-critical care, coronary angiography and intervention, and patient referral for both complex care and cardiac rehabilitation.
- Care provision should involve delivery of well-planned, multidisciplinary and coordinated disease management programs, with strong linkages between primary care and specialist services to support the full cardiac care continuum, including cardiac rehabilitation.
- A more coordinated cardiac system of care, with health service roles and responsibilities better defined, would support services to work collaboratively with others. This requires the department to take a more active role in system-level planning, including how and where services are provided.
- Clinical leadership can drive improvements across the system. Change should be clinically led, guideline-driven and implemented collaboratively, with community input.
- The relationship between volume, quality and service efficiency needs to be recognised, along with the implications this has for service configuration.
- Cardiac rehabilitation supports people to manage their health following an acute episode and is an essential component of care. Improved access to comprehensive cardiac rehabilitation tailored to the identified needs of patients would improve patient outcomes.
- Data should be used to drive quality and to hold services accountable for patient outcomes.
- E-health solutions are needed to allow sharing of patient information across multidisciplinary healthcare teams.
- Improved access to services should retain rates of procedural intervention that are comparable with other countries in the OECD.
- Investment in specialist equipment and infrastructure should be planned to ensure appropriate patient access, balanced with return on investment. New developments should be evidence-based, with equal consideration given to the issue of disinvestment in services for which no evidence base exists.

Priorities for system reform

The plan identifies three key priorities for system reform, along with clear objectives and actions required to deliver them. Responsibility for progress of these actions will rest with the department and the clinical network, in partnership with health services at all levels of the system.

Priority 1: Better patient access, experience and outcomes

Why this is important

It is always better to prevent rather than treat disease, so work with the primary care sector remains an important driver of continuing reform. Adoption of consistent risk assessment processes and tools can support these prevention efforts.

To enhance the patient experience and support high-quality patient outcomes, it is important that care be coordinated, with clear patient referral pathways to avoid delays in providing care. Timely access to the right care at the right time and in the right place is an objective of all service reform. In the case of cardiac care this can be either rapid access to intervention such as reperfusion or surgery for people experiencing a heart attack, or improving access to complex cardiac intervention or surgery for a patient considered stable but still requiring timely access to definitive care.

This care should be provided in accordance with clinical guidelines and protocols for safe and effective practice, where these exist. This ensures clinical evidence drives the way healthcare services are delivered, including the way services are organised and coordinated, the timeliness of care and the processes by which outcomes are monitored.

What this would look like

People will continue to be encouraged to protect the health of their hearts through programs to support healthy living and reduce risk factors. For those with risk factors or early signs of disease, thorough assessment will support earlier primary care intervention and early referral to specialist support, where this is appropriate. Information available in service directories and databases such as that maintained by the Australian Cardiovascular Health and Rehabilitation Association¹² can help people locate the services they need within their local areas.

For people experiencing an acute cardiac event the service system will respond with an appropriate level of care as quickly as possible, and when patients need referral to specialist services for complex care or surgery the coordinated cardiac system will allow this to occur without delay.

Patients throughout the state will benefit from a system of continuous improvement, with introduction of proven innovative processes and models of care.

1.1 People at risk of heart disease are better identified and managed in primary care

The onset of CVD can be delayed or prevented through reduction of risk factors such as lowering cholesterol, managing blood pressure, following a healthy diet and avoiding smoking.

Better risk assessment will help people maintain healthy hearts

This priority builds on the recommendations of *Heart Health* to promote healthy living and improve detection of the early stages of heart disease to avoid progression. With up to 80 per cent of heart disease preventable, there is a clear rationale to develop systematic risk assessment and risk reduction programs that will reduce the number of people going on to have a heart attack.

The system needs to evolve from reviewing risk factors in isolation (relative risk) to a model of absolute risk, which considers the synergistic effect of multiple risk factors.

An absolute risk approach is able to predict the percentage probability of a heart attack or stroke occurring in a five-year period based on a person's risk factors. This approach enables meaningful risk stratification of individuals into low, moderate or high-risk categories, as described in Table 2, and allows prevention approaches to be matched based on this risk profile. This means prevention programs and resources can be directed to those people who have the most to benefit.

One option is to adopt the National Health and Medical Research Council (NHMRC) endorsed *Guidelines for the management of absolute cardiovascular disease risk 2012*, which provides a framework for reducing heart attack and stroke risk in the population. If this was to be implemented, all Victorians over the age of 45 (35 for Aboriginal and Torres Strait islander people) would receive a heart health check in general practice and be linked to appropriate risk reduction programs based on their level of risk. This would bring Victoria into line with international best practice and ensure that resources are focused on those people who are at the highest level of risk.

Table 2: Recommended approach for intervention following assessment of risk

Intervention type	Low (< 10 per cent)	Moderate (10–15 per cent)	High (> 15 per cent)
Lifestyle	Appropriate advice	Enrolment in risk modification programs	Intensive support to manage lifestyle risk factors
Pharmacotherapy	Not routinely recommended	Pharmacotherapy only if 3–6 months of lifestyle change does not reduce risk	Pharmacotherapy to be commenced concurrently with lifestyle support
		Aspirin is <i>not</i> routinely recommended	
Review	2 years	6–12 months	According to clinical context

Source: Heart Foundation

Management of risk in primary care also includes recognition of the risk of subsequent events once an acute event has occurred. Recovery from acute events and ongoing patient management with secondary prevention strategies is a key part of the care continuum and will improve patient outcomes.

As part of their role in improving the health of the communities they serve, health services will be expected to work with community health services and primary care to support patient management. This will include introduction of absolute risk assessment and management as a key platform for primary prevention and a strengthened focus on secondary prevention strategies to manage ongoing heart disease.

This will facilitate better assessment of people at risk of heart disease and also support appropriate management processes and referral pathways. Partners with health services will include Primary Care Partnerships (PCPs), local Primary Health Networks (PHNs), community health services, Aboriginal health services and local government agencies.

1.2 People experiencing an acute event receive the right care as quickly as possible

A complex pathway of services is involved in emergency care for patients suffering a heart attack or cardiac emergency, with a well-functioning pathway or chain of events essential from the moment the person suffers a cardiac event. A well-functioning chain is one where: people recognise early signs and call for immediate assistance; bystanders recognise symptoms and take action; first medical responders are on the scene in the fastest possible time and provide appropriate diagnosis, care and transport; and, once in hospital, the patient receives the right care at the right time provided by the right clinical staff.¹³

This chain of events has already been supported in Victoria with the increased number of defibrillators now available in community agencies and facilities, including sporting clubs, and the provision of pre-hospital thrombolysis by Ambulance Victoria paramedics in rural areas, in accordance with treatment protocols.

Emergency calls to triple zero are often the first point of care for those presenting with a cardiac emergency and for patients with exacerbation of existing disease. The identification of patient needs, immediate treatment and management and transport to the most appropriate facility is the primary function of Ambulance Victoria. Paramedic-based assessment, decision making and care must always be evidence-based and linked seamlessly to the remainder of the health system.

Transport of patients requiring hospital care should be to the most appropriate facility capable of meeting the patient's needs. At times this will mean bypassing a local facility for an appropriate specialist centre based on agreed guidelines. Improved links to service providers offering alternate cardiac care pathways where ambulance transport is not necessary is an ongoing priority for the future. Ambulance Victoria will also continue to partner with the broader system in research to ensure patients receive contemporary care.

A process for improving provision of clinical advice will be included in the development of specialist cardiac services aligned to geographical areas.

**Rapid
response to
emergencies
will save lives**

Quality care in the right place at the right time

1.3 Patients needing specialist care are transferred at the right time, based on clinical need

Existing retrieval services work to both facilitate timely transfer of patients and to provide expert advice and clinical guidance to health service staff. For adult patients Ambulance Victoria provides advice, referral and transport for patients where clinical management is beyond the resource or clinical capacity of the managing health service. Where urgent transfer to a specialist hospital is required Adult Retrieval Victoria will coordinate patient transport in accordance with defined cardiac transfer guidelines.¹⁴ Retrieval will occur through either air- or road-based transport and with paramedics or doctors providing care as determined by the patient's condition.

However, there remain instances where patients considered non-urgent wait longer than optimal times for transfer to specialist services, often from regional or outer metropolitan areas. In many cases these patients are in hospital waiting for transfer but are waiting in hospitals not appropriate to their needs. This can result in unacceptable patient delays and poorer outcomes.

The Integrated Cardiac Care Pathway project began in 2014, under the auspices of the clinical network. The project is ongoing and is working to improve cardiac care pathways and escalation protocols. While recognising this work, the cardiac plan recommends that further action be taken to develop default referral pathways for all patients requiring access to a higher level of care. These referral pathways would not necessarily replace the important existing network of clinical relationships; however, they would provide a default pathway to enhance the existing relationships and help to provide increased access in a timely manner. The development of specialist cardiac centres will provide the opportunity for this, but the work can commence in advance of these centres being established, based on existing service configuration.

This will involve the following:

- Each local hospital will be linked to a regional health service that will coordinate care for all patients from that region.
- Each regional health service will be formally linked to a defined tertiary centre or designated specialist cardiac centre.
- The defined specialist centre will be required to provide advice and consultation to all patients from its associated regional health services, and will accept all patients referred to it by that regional service, subject to clinical assessment, within the prescribed timeframe.
- The regional health service and local hospital will agree to accept patients back from the specialist centre within the prescribed timeframe.
- No centre will refuse a patient requiring advice or admission for a higher level of care based on bed availability. This principle will be a vital element to removing the existing delays that often occur. All patients and organisations should benefit from the improved flow that this will generate.

1.4 Continuous improvement embeds innovative models of care across all services

Recent targeted investment in cardiac services has supported projects to develop new models of care, improve service delivery, increase system efficiency and deliver better patient outcomes. This work has particularly supported the program of pre-hospital thrombolysis in rural Victoria and development of improved models of care for chronic heart failure and cardiac rehabilitation.

For the significant group of patients with heart failure, programs have developed innovative models of care to improve service delivery and involve patients in their own ongoing care. Cardiac rehabilitation and other secondary prevention programs have benefited by better targeting of packages to meet people's needs and provision of information to patients before discharge has been improved, to better empower patients and families.

Another example of innovative development was work begun by the Heart Research Centre to create a forum for ongoing support and motivation for heart attack patients to make lifestyle changes and to reduce stress, anxiety and depression through social connection. This increased focus on wellness programs and peer support in managing chronic conditions may be a valuable part of the recovery pathway for heart disease.

The next phase of work is to ensure that where projects can demonstrate improved outcomes, these innovative services and models are disseminated and made available system-wide to benefit all Victorians, regardless of location. The process must be ongoing for all new developments, so must be built into future project processes and evaluation.

This will ensure successful developments are systematised and applied broadly, rather than occurring in isolation within specific organisations.

Priority 1: Summary of actions

1. Encourage health services to work in partnership with primary care and other stakeholders to promote better assessment of people at risk of heart disease and support appropriate management processes and referral pathways.
2. Review arrangements for providing clinical advice and patient retrieval for time-critical care as part of establishing designated specialist cardiac services.
3. Develop default referral pathways for all patients requiring access to a higher level of care. These default referral pathways would operate regardless of bed status.
 - Regional health services and designated specialist cardiac services take a lead role in coordinating patient referrals between services and disseminating proven models of care within their recognised areas.
 - Develop agreed time-based metrics for transferring patients to and from tertiary or specialist centres, and monitor performance against these standards.
4. Accelerate programs to embed innovative new models of care into routine service delivery and achieve benefit across the whole system:
 - Entrench the delivery of pre-hospital thrombolysis as routine practice across Victoria.
 - Implement quality statewide models of care for those admitted for medical treatment of complex and chronic cardiac conditions.
 - Develop a system-wide plan for improved cardiac rehabilitation and other secondary prevention programs. This will ensure all patients have access to information and services in a format that will meet their needs.
 - Establish a cardiac wellness program and models of care that focus on patient wellbeing and the psychological and psychosocial aspects of living with ongoing heart disease.

Priority 2: A coordinated cardiac system of care

Why this is important

Health services and providers can only provide person-centred care when they recognise they are part of a larger system of care and work together to reduce fragmentation and provide people with integrated care across the continuum. People need clear pathways to ensure their care is provided within the right timelines and in the most appropriate setting to meet their needs. Where this is not provided, delays in treatment and inefficient patient management can lead to poor outcomes for people and for the health system.

Cardiac care is currently widely dispersed across health services. This supports care close to home for clinical cardiology, care for those with multiple chronic diseases and to support timely response in an emergency, but potentially leads to service duplication and inefficiency for more complex, low volume surgical procedures and interventions. Quality of outcomes may also be compromised in low volume settings.

A more coordinated, area-based approach based on partnerships and collaboration will support effective service provision across all levels of care, from local services to regional and specialist services. Improved system coordination will also change the current ad hoc nature of patient referrals to one that better aligns service partners within the same geographic areas or zones, and supports patients to access timely care.

This approach is not designed to remove autonomy from service providers or limit capacity to respond to the needs of their communities, but to support services to recognise their role within a coordinated system that supports appropriate care and accountability for patient outcomes.

This includes a responsibility to provide an effective pathway through the health system.

What this would look like

A more coordinated system would improve services for people, as appropriate care would then be provided in the right place, with specialist support available as required through recognised patient pathways. Patients and care providers would recognise the system of cardiac care in their area and be able to navigate through the system more clearly and effectively. This approach would encourage collaboration between all elements of the system.

A major change from the current service configuration will be identification of a limited number of specialist cardiac services or formal collaboratives to build clinical leadership, coordinate care, drive improvement in research and expand innovative models of care to benefit all Victorians.

The new Victorian Heart Hospital will be established as the specialist centre for the southern and eastern areas, noting the ongoing role of The Alfred in transplantation services. Further detailed work will consider the best model for a specialist centre or collaborative for northern and western parts of the state.

A cardiac system of care

These specialist cardiac services will have a role in both direct provision of complex care and in support for other service providers and the community within their areas. This will support a population health approach and contribute to improvement in community health and wellbeing.

System coordination and collaboration will be improved for all agencies, with greater clarity of health service capability, roles and responsibilities within the cardiac system of care.

2.1 Health services recognise roles and responsibilities within a coordinated system of care

Cardiac service providers will have their roles and responsibilities redefined into a more organised system of care. Delineation of roles will improve coordination and ensure patients receive the right care in the most appropriate setting to meet their needs. Better role clarity will help increase service effectiveness by ensuring high-complexity, low-volume procedures are provided efficiently while supporting timely interventions and ongoing clinical care in the community.

The commitment to develop a specialist heart hospital as a centre of excellence in cardiac care provides a renewed opportunity to assess the current provision of services and refine service roles. Clear delineation of roles will ultimately result in some changes to service configuration, particularly for specialist cardiac services, but will also improve system collaboration through strengthened agency partnerships and improved patient referral within and across geographic areas.

To take this forward the plan proposes a system design framework be developed and implemented for Victoria, based on delineation of roles and service capability. The framework will define levels of capability and determine the range of services to be provided at each level, based on clear assessment of patient characteristics and risk. The framework will address issues such as relationships, resources, infrastructure and support services required to safely and sustainably deliver care at varying levels of complexity. The framework will also address service linkages, quality standards and roles in education, training and research. This will support the provision of integrated services across Victoria based on a consistent approach and understanding of health service capability.

This approach is consistent with and informed by work in other jurisdictions,^{15, 16, 17, 18} The National Heart Foundation has recently released a capability framework for acute coronary syndromes,¹⁹ so this will also inform development.

A draft high-level system design framework defining five levels of cardiac care is provided in **Appendix 4**.

When the detail of the system design framework has been completed, further work will be undertaken by the department, in conjunction with the clinical network and service providers, to determine the role of individual health services and agencies within the framework. This will include development of regional and subregional cardiac plans to recognise roles and relationships within and across areas.

Development of cardiac services will be undertaken in conjunction with the 20-year service and infrastructure plan arising from the Travis Review.²⁰ This plan will help to prioritise capital and recurrent investment over the next two decades to ensure the health system is better able to meet future demand.

2.2 Designated specialist services take a lead role in coordination of cardiac care

Within the system design framework, two to four specialist cardiac centres or collaboratives will be designated the highest level of care. One of these specialist cardiac centres will be the new heart hospital, which will focus on the south-east of Victoria.

Cardiac services from the northern and western areas will be supported to work together to determine the best configuration for those areas, noting that planning data identifies the north and west as major areas for population and activity growth. The designated specialist collaborative for the north and west will be delivered through a partnership model and not be reliant on new infrastructure. There is no expectation that a second stand-alone cardiac centre will be developed.

2.3 Complex cardiac care is consolidated to fewer facilities, with general cardiac care distributed to support the right care in the right place

With clearer roles and responsibilities for each health service, it follows that some service reconfiguration will be necessary. Improved delineation of roles will promote consolidation of complex services to a smaller number of services but wide distribution of general cardiology and re-vascularisation services.

Complex care

The establishment of two to four designated specialist cardiac centres will, over time, result in complex cardiac interventions and surgery being directed to these sites, based on international benchmarks reflecting the relationship between volume, quality and patient outcomes. This will increase volume at each specialist centre and support improved efficiency, as well the ability to raise clinical standards and provide more opportunities for training and clinical education.

Complex services currently considered for consolidation can be identified, but with continuing development these may become 'routine' over time, so ongoing review and adaptation will be necessary.

The current range of services identified as appropriate for consolidation include:

- cardiac surgery, particularly complex surgery such as percutaneous valve repair and replacement or transcatheter aortic valve implantation (TAVI).
- electrophysiology studies
- arrhythmia services
- specialised lipid, hypertension and diabetes clinics.

The recommendation to consolidate specialist, low volume services is supported by international benchmarks and practice. Table 3 outlines the current, widely recognised benchmarks for the volume of procedures that an agency should perform in order to be regarded as a specialist centre for teaching and training purposes.

Clinical leadership will support coordination

Table 3: Facility volume recommendations

Source	Coronary artery bypass graft	Percutaneous coronary intervention (PCI)	Primary PCI	Adult electrophysiology studies
CSANZ	>200 per year	<ul style="list-style-type: none"> 75+ elective per year for each individual. 200+ elective per year for the centre It is not ideal that low volume operators (<100 PCI per year) perform PCI in low volume centres (<400 PCI per year)	Outcomes appear to be optimal when the centre is treating more than 36 STEMI with primary PCI per year (>11 cases per year per operator)	120-150 per year for training requirements
RACS	-	-	-	-
Leapfrog Group	>450 per year	>400 per year		
USA: ACC/AHA ACCF/AHA	Programs with <125 CABG per year be affiliated with high-volume tertiary centres		>200 total and >36 primary PCI procedures per year	
Europe: ESC and EACTS	Institutional volume of >200 per year	Operator >75 per year at institutions performing >400 PCI per year with an established 24/7 service for ACS		

Analysis of admitted activity shows that not all current cardiac service providers achieve these benchmarks, highlighting the opportunity that exists for change.

However, not all complex care can be or needs to be directed to defined specialist centres. Complex care for some specific groups will remain as it is, including the Royal Children’s Hospital as the primary service provider for paediatric patients and The Alfred as the statewide provider of heart transplantation.

The clinical network will take a lead role in review and agreement of protocols or standards to define what complex care should be consolidated to a limited number of specialist sites for Victoria. This will include confirmation of quality of care standards, service benchmarks and patient volume thresholds. The methodology should be consistent with that used by the state trauma system, including guideline education and compliance monitoring through a central registry.

General care

General specialty cardiology and routine interventional services will remain widely distributed and locally accessible so patients are able to access this care as close to home as possible. Acute coronary syndromes, especially ST elevated myocardial infarction (STEMI) are time-critical, with the outcome depending on how soon effective thrombolysis or primary coronary angioplasty is administered. Current guidelines²¹ recommend that treatment for STEMI should ideally be instigated within one hour from onset of symptoms. Therefore, interventional cardiology and non-complex procedures performed in cardiac catheterisation laboratories need to remain distributed across the state to support patient access within defined timelines.

Clarification of agency roles will mean increasing development of specialist cardiology services in regional areas, with regional health services taking more of a leadership role in coordinating the cardiac service system within their geographic areas. The department is supporting regional health services through programs such as the Strengthening our Regional Hospitals initiative,²² which is focused on supporting outer metropolitan, rural and regional health services to actively work together to deliver more sustainable services to local communities. Clarification of agency roles supports the development of service partnerships within regional areas and more coordinated patient pathways to improve access to appropriate care for people living in rural and regional Victoria.

The government has committed to developments in Albury–Wodonga, Ballarat and Latrobe health services to further enhance response capability, which is consistent with this approach.

Many patients with chronic heart disease also have other chronic and complex conditions requiring management and treatment. The interdependencies of these conditions is best managed through multispecialty and multidisciplinary care, so these patients will continue to receive their care in a general acute hospital closer to home, with access to the full range of specialist services.

Non-admitted services and support will remain distributed, with improved coordination and collaboration between services. Secondary prevention and cardiac rehabilitation services must also be widely distributed to support easy access close to home.

2.4 The Victorian Heart Hospital makes a significant contribution to the cardiac system of care

Establishment of the Victorian heart hospital is a significant development for the cardiac service system in Victoria and will be the first such facility in Australia. The development will benefit all Victorians with, or at risk of, heart disease as it provides an opportunity to: strengthen clinical leadership; build on the existing cardiac system of care; improve research and clinical education; and expand innovative models of care for cardiac conditions, including use of new technology. This new facility will raise the profile of cardiovascular disease treatment and prevention both locally and internationally, and play a key role at the national level in cardiac research, teaching and training.

The heart hospital will expand existing cardiac service capacity, with an innovative facility design that will be patient-centred and service-oriented to enhance both patient experience and seamless patient flow.

The hospital will be a stand-alone centre on the grounds of Monash University. The model of a stand-alone cardiac service is in place internationally, where services have proven able to function effectively with strong relationships with acute service providers and clear agreement of roles and responsibilities between services.

The system design framework will ensure the addition of the heart hospital strengthens the existing cardiac service system, builds targeted research capacity and promotes innovation that can contribute to better patient outcomes for all Victorians.

Service profile

In order to benefit the cardiac system of care and support patient safety, the heart hospital will have a clearly defined service profile. The following profile is proposed, and will be confirmed as the facility is further developed:

- It will be developed as the specialist cardiac centre for the south-east of Melbourne and Victoria, with the exception of transplantation services. Care provided will be up to the highest level of complexity to the adult population, consistent with roles defined by the delineation framework.
- It will provide a clinical leadership role, including care coordination to enhance patient referral, remote consultations and provision of 24/7 specialist advice for clinicians, including general practitioners (GPs).
- It will be developed as a centre of excellence for both the state and nationally in the areas of research, teaching and training. This will be collaborative, multiagency and include a focus on new technology, improving population health outcomes and translation.
- It will provide leadership, in collaboration with others, in promoting research and clinical practice developments that will improve population health outcomes related to heart disease.
- It will undertake private activity. This will be both local and international, with the option of providing cardiac procedures such as bypass and valve replacement to residents of countries within the region.
- It will support the current distribution of general cardiac services to ensure timely local access for people across Victoria.
- The emergency service at the heart hospital will need to be designed by the governing body to ensure appropriate access to specialist care, mindful of the risks associated with operating an emergency service remote from a general acute hospital. The final model will depend in part on the hospital staffing profile, and the emergency model of care may well evolve over time. As a starting point, the governing body should consider a model that involves the establishment of an acute cardiac assessment service, but one which may not include direct self-referral by patients. Such a model would include:
 - short stay beds to support rapid stabilisation and treatment and early discharge (patient length of stay would be up to 48 hours)
 - a secondary referral service accepting referrals only in accordance with specified agreed criteria, with referral sources potentially to include:

- Ambulance Victoria paramedics for patients with clear ST segment changes consistent with heart attack and potentially ventricular arrhythmias or complete heart block
- the Monash emergency department, where criteria are met
- regional and other hospitals with high-risk non-ST elevation acute coronary syndrome
- private cardiologists, directly from rooms
- GPs, in accordance with specified criteria
 - support for the major patient groups of heart attack, high-risk chest pain considered to be cardiac, cardiac failure and selected arrhythmias

The final emergency service model should not impact on the large cohort of patients who present to emergency departments across the state with chest pain and are successfully managed through short stay models of care.

- The range of services provided will be consistent with those able to be safely provided in a stand-alone cardiac site, and is therefore not envisaged to include:
 - heart and heart/lung transplants, given the requirement for a large respiratory service, intensive care, nephrology, immunology and other specialties. However, further work should be undertaken in the future, after the heart hospital is established, to consider the rationale and impact of not having transplant services located at the specialist hospital
 - trauma services and general emergency care
 - care for neonatal or complex paediatric patients.

Facility development

The development of the heart hospital infrastructure will be based on the government's election commitment, aligned to the capital funding strategy.

Indicative projections of future activity for the heart hospital have been based on the service profile, which will inform the capital business case. Projections have been based on a number of assumptions:

- The hospital will not provide general cardiology and routine interventional services currently provided by other local services.
- Cardiac activity will include transfer of cardiac surgery and interventional cardiology services from Monash Health and Jessie McPherson Private Hospital.
- Continued growth from the south and eastern areas of Victoria will be directed to the heart hospital.
- The heart hospital will target expanded private activity, including growth in international activity.

These projections clarify the proportion of public cardiac activity the heart hospital will provide, to assist in planning what capacity the hospital will have available for private activity, and for teaching and research purposes.

The heart hospital will be a catalyst for consolidation only in respect of complex interventional and cardiac surgical services. In regard to cardiac surgery, it is clear from the projections that a strong case exists for consolidating activity for the south and east of Victoria at the heart hospital. Without this, the volume of surgery may not be optimal for clinical outcomes. However, with transplantation services remaining at The Alfred, it is essential that sufficient activity is retained at that site to support the maintenance of skills and experience necessary to perform the transplantation activity.

Further consideration may be given to transplantation services in five to 10 years, after the heart hospital has been established, to determine optimal future service arrangements.

Research, teaching and training

The heart hospital will be a driving force for innovation and research at both statewide and national levels. A vision for research, teaching and training has been developed by the partners involved in developing the hospital, being Monash University, Baker IDI and Monash Health. This vision will be pursued through the hospital's development, in order to benefit the whole of Victoria and Australia.

For clinical education, the Monash Health and Monash University partnership will provide training options for undergraduate and postgraduate medical, nursing and science students, subspecialty training for cardiologists and cardiac surgeons, an export business for the education of international health professionals and provision of PhD and masters placements for doctors, nurses, cardiac technologists and allied health professionals.

The research component of the hospital will bring together existing research expertise and provide capacity to expand activities and projects to include clinical trials, contact research, registries, research partnerships and translational research.

In order to achieve a statewide benefit, the hospital will work within the following principles:

- The cardiac research strategy is 'inclusive' and not 'place-based'. This means researchers from other locations should be connected to the hospital in order to achieve critical mass and to best promote Victoria as a centre of excellence for cardiac research.
- Further consideration is given to the role of the Advanced Health Research and Translation Centres, notably Monash Partners, in promoting strong, statewide collaboration in cardiac research.
- The hospital is a major centre for the teaching and training of all cardiac professional staff including:
 - postgraduate medical trainees
 - cardiac technologists
 - cardiac nurses
 - allied health staff

- The hospital will function as a 'hub' for the training and development of staff from across all disciplines, ensuring the development of skilled staff for the whole of Victoria.
- The hospital will lead research across the full range of cardiac conditions, including reducing the incidence of heart failure.
- The hospital will be a central repository for cardiac clinical data to assist with research and improved understanding of clinical outcomes, with the ability to disseminate this data to all relevant parties.

2.5 Opportunities for partnerships between public and private sectors are maximised

The private sector is a major contributor and provider of cardiac care, particularly cardiothoracic surgery and interventional cardiology. Increased collaboration and partnership arrangements between the public and private sectors would bring benefits to both patients and clinicians so will be supported to increase system effectiveness.

Opportunities for partnerships between public and private sector agencies for activities such as research and training could also be further developed so that all Victorians have the opportunity to benefit from innovative developments.

Priority 2: Summary of actions

1. Define the roles and responsibilities of all cardiac service providers. This will be supported by development of a system design framework, based on role and capability, completed in collaboration with the clinical network, health services and other stakeholders. The impact and role of primary care will be considered in the development of the framework.

Detailed regional and subregional cardiac plans will then be developed to recognise roles and relationships within areas.

2. Confirm two to four designated specialist cardiac centres or collaboratives, with one of these being the Victorian Heart Hospital. Partners from across the northern and western areas will be supported to work together to determine the best configuration of services in those areas.
3. Develop protocols to define complex care for consolidation to limited specialist sites. This will be in conjunction with confirmation of quality of care standards and benchmarks for use in Victoria.
 - Assess available guidelines and literature to confirm service benchmarks and patient volume thresholds required to safely and sustainably deliver procedural work.
4. Confirm the role and scope of the Victorian Heart Hospital, to be built as a stand-alone specialist hospital. The department will work with the governing body to confirm the detailed model of care, consistent with the principles and system role defined in this plan.
5. Explore opportunities for greater collaboration and partnering with the private sector in all aspects of care, including prevention and cardiac rehabilitation, to ensure all patients have access to quality services.

Priority 3: Effective and innovative cardiac services

Why this is important

The previous two priorities have focused on improvements to the cardiac system of care.

To provide comprehensive care the system also needs effective leadership driving continuous quality improvement. These related areas are key to enabling and supporting overall system development and reform.

What this would look like

Effective and innovative cardiac services will capitalise on opportunities to continuously improve how services are provided. Designated specialist services will provide clinical leadership in care and support for services across geographical areas through partnerships and innovative models of care.

Patients will be provided with care that is evidence-based, and services held accountable for care provided and outcomes achieved. Ongoing research and service development will improve care provided, as new technology and new methods of care are adopted into clinical practice. Finally, the essential cardiac workforce will be supported and developed to respond to growing demand and continue to provide quality care to all Victorians.

3.1 Designated specialist cardiac services provide clinical leadership across the system

Driving change across the cardiac system of care will require system leadership, with development of partnerships between specialist cardiac services and other cardiac service providers. The defined system leaders will be those services at the highest level of capability, including the heart hospital for the south-east and the arrangement for the north-west area defined through the development of a coordinated system of cardiac care described in Priority 2.

These specialist cardiac centres will then take a lead role in developing partnerships with service providers at other levels of capability. Together they will provide care at the highest level of complexity and lead improvement of cardiac services across the continuum of care.

Specific clinical leadership will achieve the following:

- It will improve access to specialist expertise and clinical advice, using telehealth, to support clinicians in rural areas without local access to cardiologists. This is intended to strengthen local decision making to risk-stratify suspected cardiac patients and determine appropriate treatment pathways. This will enhance access to up-to-date, evidence-based clinical care across regional areas and build on established systems that already reach all providers, such as Trauma Victoria.²³
- It will help improve triage, referral pathways and care coordination based on objective assessment of risk, with guaranteed access to specialist cardiac interventional services, including surgery as required.
- It will support education and training of cardiac clinicians and support staff, in collaboration with partners.

- It will help maintain skills and expertise in regional and rural services through innovative solutions such as combined education programs, joint appointments and staff rotations.
- It will provide oversight of services to make sure care is evidence-based, with encouragement for expansion of services with a solid evidence base of positive patient outcomes. Equal consideration should be given to disinvestment in services for which no evidence base exists. Linkages to the Choosing Wisely²⁴ initiative, which is aimed at reducing unnecessary procedures, should be developed.

The development of cardiac centres or defined collaboratives to drive improvement in cardiac service provision and patient outcomes will mean these services will be held accountable for the patient outcomes within their recognised areas, which will require a broader focus than just their own caseload and immediate catchment population.

The role of regional health services will be strengthened to provide clinical leadership, oversight and coordination within their regional areas.

3.2 Continuous service improvement is driven by monitoring of performance and outcomes

Monitoring of clinical performance measures the effectiveness of the system in improving health outcomes, improving system efficiency and providing clinically and cost-effective care. To effectively integrate evidence-based recommendations into practice and lift overall standards of care it is important to measure and compare service activity and improve benchmarking of hospital performance. This can reduce variability in quality and improve patient outcomes.

To achieve this there must be improvement in the way data is collected and monitored. One specific example includes reviewing compliance with the coronary care unit component of the bed status website to provide visibility of hospital capacity and potential expansion to include cardiac catheterisation laboratory availability and capability.

Key performance indicators (KPIs) measure system performance and allow comparisons between services to measure system improvement. Improved data collection and analysis will support development of a suite of KPIs for regular monitoring, such as:

- time from contact to thrombolysis, where this is clinically appropriate treatment
- door-to-balloon time
- percentage of patients discharged on aspirin/beta-blockers
- mortality/complication rates
- unplanned readmission rates for patients with heart failure
- the percentage of patients participating in cardiac rehabilitation
- patient outcome measures to determine performance and effectiveness of care provided.

**Data will drive
continuous
service
improvement**

In addition to these indicators, others will be developed for the designated specialist centres to monitor the effectiveness of referral processes and clinical leadership. These could include:

- the percentage of patients from an identified referral zone accepted for treatment within defined times
- the percentage of patients referred back to local health services for ongoing management
- the percentage of patients accepted back by the referring hospital within defined times
- population health measures for heart disease.

The Australian Commission on Safety and Quality in Health Care have developed a suite of clinical care standards for acute coronary syndromes,²⁵ which will inform the development of Victorian performance indicators.

3.3 Better access to clinical information benefits both patients and providers

Better patient data collection and information systems would contribute to benefits across the system. For patients, sharing of up-to-date data between providers through developments such as standardised or patient-held electronic health records would support coordinated service delivery and reduce duplication. For health services better access to data would improve capacity to measure patient outcomes and monitor and compare performance. For the system as a whole, improved data would improve capacity for research and improve understanding of patient outcomes and trends.

The healthcare system already collects a large amount of patient-related data, with multiple stakeholders collecting data related to the incidence, prevention and treatment of cardiovascular disease. However, this is often maintained in separate databases and not readily available beyond the individual agency.

The development of clinical registries such as the Victorian Cardiac Outcomes Registry (VCOR) has helped collect a range of health data. VCOR currently collects data about PCI procedures performed by all public and private providers and will be gradually expanded to include outcomes in other areas such as thrombolysis, implantable electronic devices and anticoagulation therapy for atrial fibrillation.

As the VCOR database continues to develop it will allow healthcare providers to benchmark their performance against services provided both nationally and internationally. Better linkages between new and existing data collections and registries will further increase the value of the available information, provide an evidence base for research and model of care development and improve the effectiveness of service performance monitoring.

The clinical network is working with stakeholders on initiatives to improve data collection and to strengthen the capacity of researchers to access data. This includes options to develop a data collaborative as a way of providing expertise, coordination and leadership in data collection.

A collaborative could lead development of a coordinated approach to data collection, support integration and data linkages and improve clinician access to meaningful data.

Research and innovation will address changing needs

3.4 Clinical practice is improved through ongoing medical research

Development of a number of specialist cardiac centres for cardiac research and specialist workforce development will improve the capacity for research across multiple services and the translation of this into ongoing change in clinical practice.

This additional capacity will build on innovative work to date, particularly with new technology. Potential also exists to explore tissue engineering, smart drugs, nanotechnology and new biomaterials. There is potential to support targeting of those at increased risk through genetic testing to facilitate access to personalised medicine therapies.

New service models and treatment regimens have the capacity to improve quality of life for those with chronic heart failure and heart disease in the aged, and therefore to reduce unplanned readmissions to hospital. This is a clinical group with scope for service improvement through applying new technology and innovation in treatment modalities.

There is also scope for further development of models of care to support patient wellbeing and increase the focus on psychological and psychosocial aspects of living with heart disease.

The specialist heart hospital will provide an opportunity to enhance and develop cardiac research, and to establish Victoria as a national leader in this field. Other universities, institutes and research groups will also have key roles to play, with organisations such as the Baker IDI central to the future of cardiac research in Victoria, given their established expertise. A prerequisite for Baker IDI to maintain its contribution to cardiovascular health is maintaining a reasonable size and broad range of clinical cardiology activity at The Alfred hospital campus.

Research at the heart hospital will benefit from proximity to some major research infrastructure on the Monash Clayton campus and nearby. Strong basic science, bioengineering, medicine and related faculties will have the opportunity to extend their findings into the clinical domain. This will require a new workforce of clinical academics experienced in translational research and commercialisation.

The clinical network is currently supporting development of the Victorian Cardiovascular Clinical Trials Accelerator to facilitate the coordination and expansion of cardiovascular clinical research capacity and participation across Victoria. The increasing burden of cardiovascular disease in the community presents a strong case to establish a coordinated approach to clinical trials. At present there is fragmented practice across cardiology units and lack of a critical mass in terms of patient recruitment and economic viability. As a result there are few opportunities for hospitals to run cardiovascular clinical trials.

There is also limited access for rural patients and community clinicians to participate in research. This means there is an untapped and underdeveloped market of patients and clinicians available to support cardiovascular clinical trial activity. Studies in ambulatory patients, such as those with hypertension, lipid disorders and heart failure, are increasingly difficult to manage from hospital departments as fewer of these patients are treated in the hospital setting, and there is a lack of suitable infrastructure.

The creation of the clinical trials accelerator will address the need for a coordinated approach to cardiovascular clinical trials in Victoria. The objectives of the project are to:

- develop coordinated processes, infrastructure and governance arrangements to support cardiovascular clinical trials activity
- centralise the cardiovascular clinical trials process to increase access and participation
- position Victoria as a world-leading location to conduct high-quality independent clinical trials
- increase engagement of the cardiovascular clinical community to participate and support clinical trials
- develop a network to facilitate collaborative projects between groups and facilitate strong and robust interactions with the community, primary care and rural clinical researchers
- develop a critical mass of clinical research activity that focuses on international competitiveness
- significantly increase international clinical trial activity, with several multinational pharmaceutical companies indicating such an initiative would increase the likelihood of partnership with Victoria.

3.5 The cardiac workforce is supported to provide quality care

An adequately trained and available workforce is critical to providing a comprehensive cardiac system of care. Victoria's health workforce is facing challenges, with increasing demand for services and demographic change resulting in relative shortages in some traditional groups. For cardiac care this is particularly evident in rural and regional Victoria.

Responding to the changing nature of demand creates opportunities for a different workforce mix or for innovative ways in which services can be provided. Continuing development of telehealth models of care is one element, with other options including expansion of alternative roles such as nurse practitioners, general practitioners upskilled in managing heart disease and the potential for a greater contribution to monitoring and risk assessment by community pharmacists.

Increasing development of technology such as imaging will lead to increasing demand for radiologists and cardiac technicians. Concurrent development of specialist cardiac centres, redistribution of services and expansion of cardiac services in regional areas will require changes to roles and redistribution of the workforce over time. It should encourage the development of models that better support availability of a skilled workforce in regional areas such as joint appointments, co-operative models and other forms of close collaboration with specialist centres.

With the projected increase in demand for cardiac services, an increase in numbers of training places in interventional cardiology would be expected to ensure the delivery of high-quality healthcare. However, as mentioned earlier in this plan, Australia is providing a level of cardiac intervention comparable to other OECD countries, so this level of overall activity should be maintained. It is important that increasing training places for interventional cardiologists does not in itself encourage an increase in levels of intervention in excess of that currently provided, without clear evidence of patient need.

Estimation of the total medical workforce required to meet increasing demand and best practice guidelines must take into consideration quality and safety related to minimum patient volumes per centre. Minimum activity volumes have been defined by the Australian and New Zealand Society of Cardiac and Thoracic Surgeons and the Cardiac Society of Australia and New Zealand and will impact on both the number of catheterisation laboratories in Victoria and the workforce required to manage the activity. As described in Priority 2, the clinical network will take a lead role in confirming benchmarks and volume thresholds for Victoria.

The cardiac plan does not include a detailed workforce plan but recognises the impact changing service models will have on the current and future workforce. Further analysis of the impact of change will be considered as the priority areas recommended by the plan are actioned.

Priority 3: Summary of actions

1. Develop a coordinated cardiac system to support improved clinical leadership, with specialist cardiac centres or collaboratives to take this leadership role. This will affect a number of elements:
 - It will support the establishment of partnerships between services in defined areas. The first will be the southern and eastern areas of Victoria, based around the Victorian Heart Hospital.
 - It will improve access to specialist cardiac advice to support clinicians in areas without local access to cardiologists.
 - It will reinforce the role of regional health services in providing clinical leadership, oversight and co-ordination.
2. Review compliance with the coronary care unit component of the bed status website to provide visibility of hospital capacity. Explore potential expansion to include cardiac catheterisation laboratory availability and capability.
3. Improve data collection across the continuum of care and develop KPIs to monitor service effectiveness and the ongoing impact of new practice initiatives:
 - KPIs will include measures relevant to both patient experience and outcomes and system performance.
 - KPIs will be regularly monitored to ensure agency adherence to best practice, with benchmarking between hospitals to drive service improvement.
4. Improve data collection systems to strengthen the capacity of researchers to access useful data:
 - Continue to expand datasets such as the VCOR and improve linkages with other relevant data collections.
 - Work with VCOR and other datasets to identify opportunities to use the data available to support research, innovation and improvements in practice across the care continuum.
 - Improve data collection and strengthen the capacity of researchers to access data collected. This will include options to develop a data collaborative as a way of providing expertise, coordination and leadership in data collection.
5. Support increased focus on research and effective translation into clinical practice for new treatments, technologies and models of care by:
 - Developing the Victorian Cardiovascular Clinical Trials Accelerator to facilitate expansion of cardiovascular clinical research capacity and participation in clinical trials.
 - Focusing on particular aspects of care such as genetic testing to facilitate access to personalised medicine therapies and heart failure and heart disease in the aged.
 - Using the research program to benefit the broader health sector, including private services, primary care providers and the community.
6. Identify and develop innovative service arrangements and partnerships to maximise utilisation of the existing workforce. This may include joint appointments or other co-operative arrangements.

Implementation plan

Development and implementation of the priorities and actions described in the cardiac plan will improve provision of services for all Victorians, but the vision will only be realised if the plan is supported by all those involved in providing cardiac care.

Instead of supporting incremental change in services and service mix, this plan forecasts a significant commitment to reforming the cardiac care system. These changes will require action and alignment at all levels of the system, aimed at supporting clinicians to provide the best possible service for Victorians with, or at risk of, heart disease.

The department will be responsible for leading and coordinating implementation of the cardiac plan, and will marshal appropriate resources to support implementation over the life of the plan. The department will work in conjunction with the clinical network, health services and other key stakeholders as part of the implementation. Clinician engagement is essential in realising the vision for cardiac services in Victoria, and the clinical network will be the point through which engagement is achieved. Making the change happen will require a change in approach by both the department and by health services.

The actions committed to in this cardiac plan include tasks that will drive significant change, as well as development opportunities for longer term and ongoing system improvement. To begin the process of change and to achieve real system improvement significant tasks will be tackled first, with action beginning in 2016. The continuing development of the Victorian Heart Hospital will sit outside of this, to be managed by the governing body and the department as per the established process for major capital developments.

The following table identifies the project lead and partners for each identified action or task, with a timeline to indicate the order of work to be undertaken.

Priority theme	Actions	Year 1	Year 2	Ongoing	Project lead	Partners
1.1	Encourage health services to work in partnership with primary care and other stakeholders to promote better assessment of people at risk of heart disease and support appropriate management processes and referral pathways.	Work with partners and stakeholders to assess existing programs and agree approach	Develop implementation plan to introduce consistent, evidence-based risk assessment	Evidence-based risk assessment in primary care	DHHS	Health services PHN, PCP, CHS Aboriginal health services Local Government
1.2	Review arrangements for providing clinical advice and patient retrieval for time-critical care, as part of establishing specialist cardiac services. <i>(Development linked to coordinated cardiac system with improved clinical leadership by specialist cardiac centres.)</i>	Develop specifications for the advice service	Develop specialist advice service as component of role of Level 5 services	Specialist advice service available across the state	DHHS	VCCN Health services
1.3	Develop default referral pathways for all patients requiring access to a higher level of care. These default referral pathways would operate regardless of bed status. <ul style="list-style-type: none"> Regional health services and specialist cardiac services will take a lead role in coordinating patient referrals between services and disseminating proven models of care within their recognised areas. Develop agreed time-based metrics for transferring patients to and from tertiary or specialist centres, and monitor performance against these standards. 	Define default pathways and processes, in selected areas	Refine processes and implement agreed referral pathways across all areas	Standard agreed pathways in place across the state	VCCN	DHHS Health Services
1.4	Accelerate programs to embed innovative new models of care into routine service delivery and achieve benefit across the whole system: <ul style="list-style-type: none"> Entrench the delivery of pre-hospital thrombolysis as routine practice across Victoria. Implement quality statewide models of care for those admitted for medical treatment of complex and chronic cardiac conditions. Develop a system-wide plan for improved cardiac rehabilitation and other secondary prevention programs. This will ensure all patients have access to information and services in a format that will meet their needs. Establish a cardiac wellness program and models of care that focus on patient wellbeing and the psychological and psychosocial aspects of living with ongoing heart disease. 	Support development of programs at identified services		All Victorians benefit from new model of care developments	DHHS	VCCN Ambulance Victoria Health services

Priority theme	Actions	Year 1	Year 2	Ongoing	Project lead	Partners
2.1	Define the roles and responsibilities of all cardiac service providers. This will be supported by development of a system design framework, based on role and capability, completed in collaboration with the clinical network, health services and other stakeholders. The impact and role of primary care will be considered in the development of the framework.	Confirm framework based on levels of service capability	Develop detailed regional and subregional plans to recognise roles and relationships within areas	Health services will function in accordance with acknowledged roles and levels of service capability	DHHS	VCCN Health services Regional offices
2.2	Confirm two to four designated specialist cardiac centres or collaboratives, with one of these being the Victorian Heart Hospital. Partners from across the northern and western areas will be supported to work together to determine the best configuration of services in those areas.	Confirm heart hospital and partners for south-east Identify collaborative for north and west	Support services to develop and implement Level 5 role		DHHS	Health services
2.3	Develop protocols to define complex care for consolidation to limited specialist sites. This will be in conjunction with confirmation of quality of care standards and benchmarks for use in Victoria. – Assess available guidelines and literature to confirm service benchmarks and patient volume thresholds required to safely and sustainably deliver procedural work.	Review available guidelines to confirm service benchmarks and thresholds for procedural work in Victoria	Measure current services against confirmed benchmarks	Monitor throughput and activity	VCCN	ARV Health services DHHS
2.4	Confirm the role and scope of the Victorian Heart Hospital, to be built as a stand-alone specialist hospital. The department will work with the governing body to confirm the detailed model of care, consistent with the principles and system role defined in this plan.	Initial scope confirmed		Development of VHH	DHHS	VHH As per capital process
2.5	Explore opportunities for greater collaboration and partnering with the private sector in all aspects of care including prevention and cardiac rehabilitation, to ensure all patients have access to quality services.		Private providers considered in development of service areas		DHHS	Public and private health services

Priority theme	Actions	Year 1	Year 2	Ongoing	Project lead	Partners
3.1	<p>Develop a coordinated cardiac system to support improved clinical leadership, with specialist cardiac centres or collaborators to take this leadership role. This will affect a number of elements:</p> <ul style="list-style-type: none"> – It will support the establishment of partnerships between services in defined areas. The first will be the southern and eastern areas of Victoria, based around the Victorian Heart Hospital development. – It will improve access to specialist cardiac advice to support clinicians in areas without local access to cardiologists. – It will reinforce the role of regional health services in providing clinical leadership, oversight and co-ordination. 	Linked to system design framework			DHHS	VCCN Health services Emergency Care Clinical Network
3.2	<p>Review compliance with the coronary care unit component of the bed status website to provide visibility of hospital capacity.</p> <ul style="list-style-type: none"> – Explore potential expansion to include cardiac catheterisation laboratory availability and capability. 	Review existing data collection and identify options for improvement	Expand collection to include details of cath labs	Ongoing monitoring and review	DHHS	Health services VCCN
3.3	<p>Improve data collection across the continuum of care and develop KPIs to monitor service effectiveness and the ongoing impact of new practice initiatives:</p> <ul style="list-style-type: none"> – KPIs will include measures relevant to both patient experience and outcomes and system performance. – KPIs will be regularly monitored to ensure agency adherence to best practice, with benchmarking between hospitals to drive service improvement. 	Review existing data collections and identify options for expansion or improvement Agree range of cardiac KPIs	Trial monitoring and feedback of new indicators	Ongoing monitoring and review of performance according to KPIs	DHHS	Health services VCCN
3.4	<p>Improve data collection systems to strengthen the capacity of researchers to access useful data:</p> <ul style="list-style-type: none"> – Continue to expand VCOR and improve linkages with other relevant data collections. – Work with VCOR to identify opportunities to use the data available to support research, innovation and improvements in practice. – Improve data collection and strengthen the capacity of researchers to access data collected. This will include options to develop a data collaborative as a way of providing expertise, coordination and leadership in data collection. 	Continue work with VCOR		Continue to improve data collection systems to strengthen the capacity of researchers to access data	DHHS	VCOR Monash University VCCN

Priority theme	Actions	Year 1	Year 2	Ongoing	Project lead	Partners
3.5	<p>Support increased focus on research and effective translation into clinical practice for new treatments, technologies and models of care by:</p> <ul style="list-style-type: none"> - Developing the Victorian Cardiovascular Clinical Trials Accelerator to facilitate expansion of cardiovascular clinical research capacity and participation clinical trials. - Focusing on particular aspects of care such as genetic testing to facilitate access to personalised medicine therapies and heart failure and heart disease in the aged. - Using the research program to benefit the broader health sector, including private services, primary care providers and the community. 	<p>Scoping and preliminary work on a Victorian Cardiovascular Clinical Trials Accelerator</p> <p>Scoping and preliminary work on care model development priorities</p>	<p>Development of a Victorian Cardiovascular Clinical Trials Accelerator</p> <p>At least one evidence-based care model developed and documented (for either priority patient segment or process improvement)</p>	<p>Ongoing program of research and development</p> <p>Models of care developed and rolled out across the cardiac system</p>	DHHS	<p>Health services Universities Baker IDI VCCN</p>
3.6	<p>Identify and develop innovative service arrangements and partnerships to maximise utilisation of the existing workforce. This may include joint appointments or other co-operative arrangements.</p>		<p>Plans developed with identification of service areas and agency roles</p>		DHHS	Health services

Appendix 1: Victorian Cardiac Plan Steering Committee

A steering committee was established to coordinate the development of the plan, and to endorse the plan for submission to the Minister for Health.

The steering committee had an independent chairperson, with membership comprised of selected senior leaders representing health service, research and education agencies. Members were selected on the basis of their experience and ability to take a broad system perspective.

Chair: Ms Fran Thorn, Partner, Deloitte (former Secretary of the Department of Health)

Membership:

Professor David Ashbridge, Chief Executive Officer, Barwon Health

Dr Gareth Goodier, Chief Executive, Melbourne Health

Ms Diana Heggie, Chief Executive Officer, The National Heart Foundation (Victorian Division)

Professor Garry Jennings, Director, Baker IDI

Professor Christina Mitchell, Dean of Medicine, Monash University

Ms Shelly Park, Chief Executive, Monash Health

Associate Professor Tony Walker, Acting Chief Executive Officer, Ambulance Victoria

Associate Professor Andrew Way, Chief Executive, Alfred Health

Associate Professor Andrew Wilson, Chair, Victorian Cardiac Clinical Network

In attendance as advisors:

Ms Frances Diver, Deputy Secretary, Health System Performance and Programs, Department of Health and Human Services

Mr Adam Horsburgh, Director, Health System Planning, Department of Health and Human Services

Appendix 2: Victorian cardiac system

Public cardiac services

Campus type	Public health services	ED	ICU	CCU	Procedural services		Cardiac imaging CT/MRI	Cardiac rehab	Heart failure care
					Cath lab	Cardiac surgery			
Major	Alfred, The	✓ ⁽²⁾	✓	✓	✓	✓	✓	✓	✓
	Austin Hospital	✓	✓	✓	✓	✓	✓	✓	✓
	University Hospital Geelong	✓	✓	✓	✓	✓	✓	✓	✓
	Monash Clayton	✓	✓	✓	✓	✓	✓	✓	✓ ⁽¹⁾
	Royal Children's Hospital	✓ ⁽²⁾	✓		✓	✓	✓		
	Royal Melbourne Hospital	✓ ⁽²⁾	✓	✓	✓	✓	✓	✓	✓
	St Vincent's Hospital	✓	✓	✓	✓	✓	✓	✓	✓
Metro regional	Box Hill Hospital	✓	✓	✓	✓		✓	✓	✓
	Dandenong Hospital	✓	✓	✓				✓	✓
	Frankston Hospital	✓	✓	✓	✓		✓	✓	✓
	Northern Hospital	✓	✓	✓	✓			✓	✓
	Sunshine Hospital	✓	✓ New	✓ New	✓ New				
	Western Hospital	✓	✓	✓	✓			✓	✓
Metro local	Angliss Hospital	✓	Planned	✓					
	Casey Hospital	✓	Planned						
	Maroondah Hospital	✓	✓ ⁽³⁾						
	Mercy Werribee	✓	Planned ⁽³⁾						
	Rosebud Hospital	✓							
	Sandringham Hospital	✓							
	Williamstown Hospital	✓							
Rural regional	Albury Wodonga Health	✓	✓ ⁽³⁾		Planned			✓	✓
	Ballarat Health Services	✓	✓ ⁽³⁾		✓		CTCA	✓	✓
	Bendigo Hospital	✓	✓ ⁽³⁾		✓		✓	✓	✓
	Shepparton Hospital	✓	✓ ⁽³⁾					✓	✓
	Latrobe Regional Hospital	✓	✓ ⁽³⁾		Planned			✓	✓
	Wodonga Hospital	✓							

Campus type	Public health services	ED	ICU	CCU	Procedural services		Cardiac imaging CT/MRI	Cardiac rehab	Heart failure care
					Cath lab	Cardiac surgery			
Rural sub-regional	Bairnsdale Hospital	✓						✓	✓
	Sale Hospital	✓							
	Echuca Hospital	✓							
	Hamilton Hospital	✓	✓					✓	✓
	Mildura Base Hospital	✓	✓					✓	✓
	Wangaratta Hospital	✓	✓						
	Warrnambool Hospital	✓	✓					✓	✓
	Swan Hill Hospital	✓							
	Warragul Hospital	✓							
	Wonthaggi Hospital	✓							
	Horsham Hospital	✓	✓					✓	✓
	Other metropolitan public health and community services							26	10
	Other rural public health and community services							42	18

(1) Heart failure services provided at Dandenong and Casey hospitals

(2) Statewide trauma services

(3) Combined ICU/CCU service

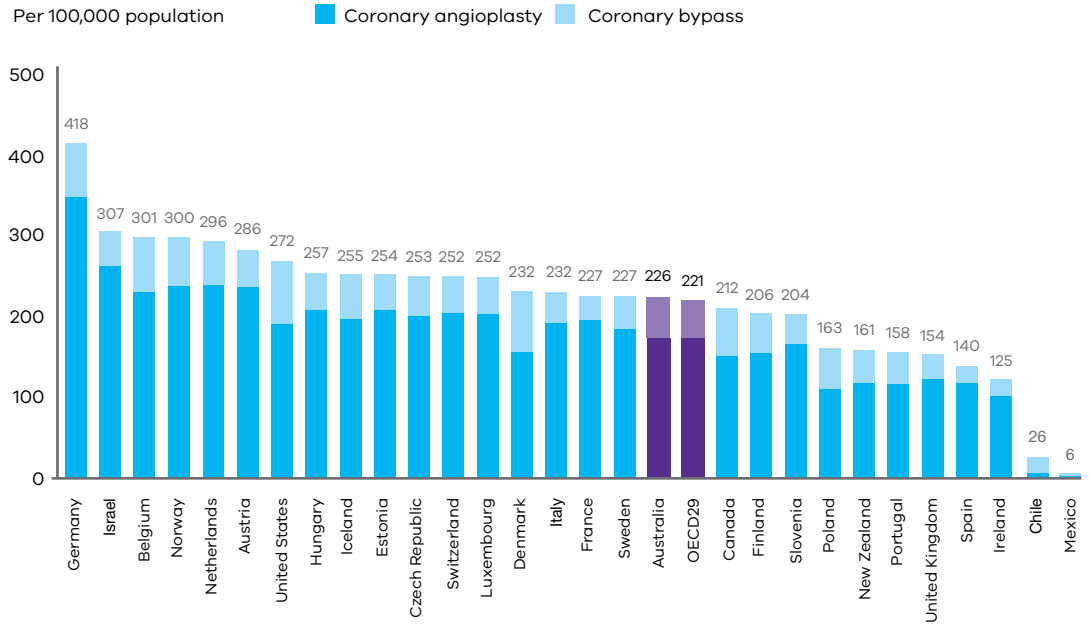
(4) Williamstown Emergency department is not a 24-hour service

Private cardiac services

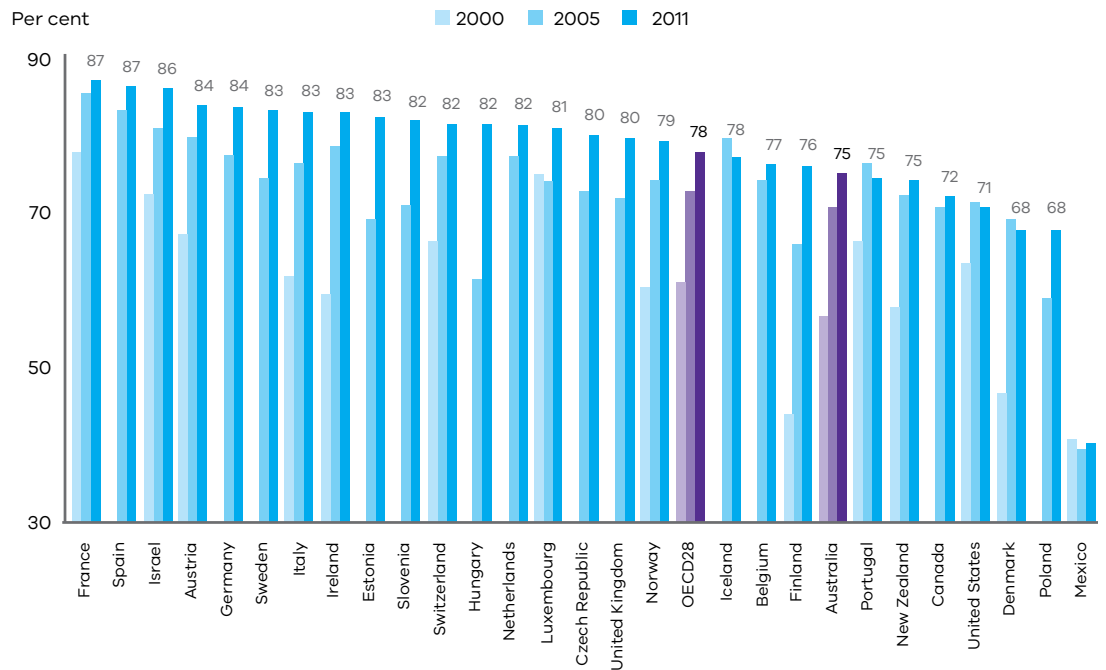
Hospital	ED	ICU	CCU	Procedural services		Cardiac rehab	Heart failure
				Cath lab	Cardiac surgery		
Albury Wodonga Private Hospital				✓			
Avenue Private Hospital				✓			
Cabrini Hospital Malvern	✓	✓	✓	✓	✓	✓	
Cotham Private Hospital						✓	
Donvale Rehabilitation Hospital						✓	✓
Dorset Rehabilitation Hospital						✓	
Epworth Eastern Hospital		✓	✓	✓	✓	✓	
Epworth Hospital Richmond	✓	✓	✓	✓	✓	✓	
Epworth Rehabilitation						✓	✓
Geelong Private Hospital				✓			
Jessie McPherson Private Hospital			✓	Use facilities of Monash			
John Fawkner Private Hospital	✓	✓	✓	✓		✓	
Knox Private Hospital	✓	✓	✓	✓	✓	✓	✓
Linacre Private Hospital				✓			
Melbourne Private Hospital		✓	✓	✓	✓	✓	
Peninsula Private Hospital		✓		✓	✓	✓	
St. John of God Ballarat		✓		✓		✓	
St. John of God Bendigo		✓		✓		✓	✓
St. John of God Geelong		✓		✓			
St. John of God Nepean Rehabilitation						✓	✓
St Vincent's Private Hospital		✓	✓	✓	✓		
Valley Private Hospital	✓	✓	✓	✓	✓	✓	
Warringal Private Hospital		✓	✓	✓	✓	✓	
Western Private Hospital				✓		✓	

Appendix 3: OECD comparison

Coronary revascularisation procedures, 2011



Coronary angioplasty as a share of total revascularisation procedures, 2000–2011



Appendix 4: Draft cardiac system design framework

For some years cardiac services have been informally classified in a four-level structure, based on planning frameworks developed by other jurisdictions and adopted by the Victorian Cardiac Clinical Network. Each level builds on the previous level of capability, and all health services are expected to provide care that is culturally and linguistically appropriate.

The agreed planning framework now includes an additional level to recognise the new service of a 'heart hospital', which will be defined as level 5. This new service level may provide care at similar clinical complexity to level 4 but will have a more expansive role in clinical leadership and support, education, training and research programs.

Consideration will need to be given to how level 5 roles may vary depending on whether the service is stand-alone cardiac only, or a comprehensive service capable of managing a range of conditions.

Level	Description	Expected number of services
Level 1	Commonly located in rural areas and provide care for the least complex patients. Manage initial resuscitation, stabilisation and care of emergency cardiac patients prior to early transfer to a higher level service. Limited inpatient care for low-complexity patients with chronic cardiac conditions but not patients with acute cardiac conditions.	All public hospitals
Level 2	Manage medium-complexity cardiac patients and chronic cardiac conditions, 24/7 emergency care of acute cardiac patients, with transfer to a higher level service as required. High dependency or coronary care services, non-invasive cardiology services and diagnostics, cardiac rehabilitation, heart failure programs and some outpatient cardiac services. No cardiac catheterisation laboratories or cardiothoracic surgery.	Up to 11 subregional hospitals
Level 3	Manage most acute and chronic cardiac patients and conditions, including high-complexity and higher risk patients. Acts as a referral centre for the regional area. Invasive and non-invasive cardiac services including 24/7 PCI service. Have cath labs for interventional diagnostics but no cardiothoracic surgery.	Up to nine regional centres
Level 4	Highest level of service complexity including both interventional cardiology and cardiothoracic surgery; manages complex acute and chronic cardiac patients; major cardiac referral centre; services include most complex and advanced diagnostics and treatments. Provides a wide range of ambulatory and outpatient cardiac services including cardiac rehabilitation, heart failure programs and specialist outpatient cardiac services.	Up to four, including Geelong
Level 5	Specialist cardiac centre providing local/regional service plus designated provider of specific high-complexity/low-volume services; leading role in teaching, training and research – including support to other providers. Cardiac treatment and intervention will be equal to level 4, with some services additional to level 4: <ul style="list-style-type: none"> • clinical leadership role within their defined area of Victoria • care coordination to enhance patient referral within their defined area • 24/7 specialist advice for clinicians within their area, including GPs • remote consultations through telehealth • clinical education and training • coordination of cardiac research programs. Some services will have a defined specialist statewide role, such as cardiac transplantation, complex EPS, complex valvular interventions or paediatric. Note: Level 5 may need to be further refined according to capacity to support patients with multiple chronic or complex conditions.	Up to two for south-east Victoria Up to two for north-west Victoria

Abbreviations

ACC	American College of Cardiology
ACCF	American College of Cardiology Foundation
ACS	Acute coronary syndrome
AHA	American Heart Association
AMI	acute myocardial infarction
ARV	Adult Retrieval Victoria
AV	Ambulance Victoria
CABG	coronary artery bypass graft
cath lab	cardiac catheterisation laboratory
CCU	coronary care unit
CHS	community health services
COPD	Chronic obstructive pulmonary disease
CSANZ	Cardiac Society of Australia and New Zealand
CT	Computerised Tomography
CTCA	CT Coronary Angiography
CVD	cardiovascular disease
EACTS	European Association for Cardio-Thoracic Surgery
ED	Emergency Department
ESC	European Society of Cardiology
EPS	electrophysiology studies
GP	general practitioner
ICU	intensive care unit
KPI	key performance indicator
MCRG	Major clinical related group
MRI	Magnetic Resonance Imaging
NHMRC	National Health and Medical Research Council
OECD	Organisation for Economic Co-operation and Development
PCP	Primary Care Partnership
PHN	Primary Health Network
PCI	percutaneous coronary intervention
RACS	Royal Australasian College of Surgeons
STEMI	ST elevation myocardial infarction
TAVI	transcatheter aortic valve implantation
VCCN	Victorian Cardiac Clinical Network
VCOR	Victorian Cardiac Outcomes Registry
VHH	Victorian Heart Hospital

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