AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE

Selected best practices and suggestions for improvement for clinicians and health system managers

Hospital-Acquired Complication **14**

CARDIAC COMPLICATIONS

	HOSPITAL-ACQUIRED COMPLICATION	RATE[a]
1	Pressure injury	10
2	Falls resulting in fracture or intracranial injury	4
3	Healthcare-associated infections	135
4	Surgical complications requiring unplanned return to theatre	20
5	Unplanned intensive care unit admission	na[b]
6	Respiratory complications	24
7	Venous thromboembolism	8
8	Renal Failure	2
9	Gastrointestinal bleeding	14
10	Medication complications	30
11	Delirium	51
12	Persistent incontinence	8
13	Malnutrition	12
14	Cardiac complications	69
15	Third and fourth degree perineal laceration during delivery (per 10,000 vaginal births)	358
16	Neonatal birth trauma (per 10,000 births)	49

a per 10,000 hospitalisations except where indicated
b na = national data not available

Hospital-acquired cardiac complications include the diagnoses of:

- Heart failure and pulmonary oedema
- Arrhythmias
- Cardiac arrest
- Acute coronary syndrome including unstable angina and myocardial infarction – both STEMI (ST-segment elevation myocardial infarction) and Non-STEMI/NSTEMI (Non-ST segment elevation myocardial infarction).*

Why focus on cardiac complications?

Each year, patients in Australia experience almost 31,000 cardiac complications while in hospital.[1] These complications range from unstable angina, through to acute myocardial infarction, arrhythmias, pulmonary oedema and even cardiac arrest. Patients may experience symptoms including shortness of breath, peripheral oedema, paroxysmal nocturnal dyspnoea, palpitations, dizziness, collapse or sudden death.

About 30,000 Australians are diagnosed with heart failure every year, with older people more likely to develop heart failure.[2,3] In hospital, contributory causes may include excessive intravenous fluids, medicines not charted or onset of another cardiac event. An exacerbation of heart failure requires careful titration of medicines and monitoring of fluid and electrolyte status.

Cardiac arrhythmias can occur as a complication of treatment or worsening of pre-existing conditions. Patients experiencing arrhythmias are at risk of harm including the many consequences of haemodynamic compromise. In some cases the management of arrhythmia will be short lived and have no long-term impact; in others the consequences can be life-changing, shorten life expectancy or lead to sudden cardiac death.

It is important to identify early those at risk of significant clinical deterioration that could result in cardiac arrest and death.[4] A rapid, skilled response to cardiac arrest is vital for survival and limiting the degree of debilitation.[5]

* The specifications for the hospital-acquired complications list providing the codes, inclusions and exclusions required to calculate rates is available on the Commission's website.

Acute coronary syndromes account for more than 25,000 deaths per year in Australia and contribute to a large burden of acute in-hospital clinical care and morbidity.[6] Patients with unstable angina or myocardial infarction require close monitoring by specialist clinical teams and careful management of medicines to maximise health outcomes and prevent complications.[7]

Prevention of cardiac complications therefore presents an important challenge in acute care hospitals. A number of best practices have been shown to be effective in reducing the occurrence of cardiac complications, but these practices are not used systematically in all hospitals.

The rate of hospital-acquired cardiac complications in Australian hospitals was 69 per 10,000 hospitalisations in 2015–16.[1] Hospital-acquired cardiac complications prolong the length of hospitalisation, which impacts on patients and their families. These complications increase the cost of admission incurred by the health service. This additional cost may be the result of an increased length of stay, or more complex care requirements.[8] While there is an increased financial cost, the most significant cost is the pain and discomfort experienced by the patient.

Significant reductions in cardiac complication rates are being achieved in some hospitals by suitable preventive initiatives. The rate for cardiac complications at Principal Referral Hospitals* is 84 per 10,000 hospitalisations. If all Principal Referral Hospitals above this rate reduced their rate to 84 per 10,000 hospitalisations, then 5,053 cardiac complications during hospitalisation in these hospitals would have been prevented, and more when other facilities are considered.

* Hospitals were classified in the Principal Referral Hospitals peer group for these purposes according to the Australian Institute of Health and Welfare's former definition of major city hospitals with more than 20,000 acute weighted separations and regional hospitals with more than 16,000 acute weighted separations.

What is considered best practice for preventing cardiac complications?

All hospital-acquired complications can be reduced (but not necessarily eliminated) by the provision of patient care that mitigates avoidable risks to patients.

The **health service organisation** providing services to patients at risk of cardiac complications:

- Has governance structures and systems in place to identify those at risk of cardiac complications and to support delivery of appropriate care
- Ensures that equipment and devices are available to effectively manage cardiac complications.

Clinicians caring for patients at risk of cardiac complications:

- Conduct appropriate risk assessments
- Provide preventive measures and care in accordance with best-practice guidelines.

The National Safety and Quality Health Service (NSQHS) Standards (second edition), in particular the Comprehensive Care Standard[9], support the delivery of safe patient care.

The advice contained in the hospital-acquired complication fact sheets aligns with the criteria in this standard, which are as follows:

- Clinical governance structures and quality-improvement processes supporting patient care
- Developing the comprehensive care plan
- Delivering the comprehensive care plan
- Minimising specific patient harms.

Clinical governance structures and quality-improvement processes

to support best practice in the prevention and management of cardiac complications

Health service organisations need to ensure systems are in place to prevent cardiac complications through effective clinical governance and quality improvement.

The NSQHS Standards (2nd ed.) describe actions that are relevant to the prevention and management strategies outlined below. These actions are identified in brackets.

Policies, procedures and protocols

Health service organisations ensure policies, procedures and protocols are consistent with national evidence-based guidelines for the risk assessment, prophylaxis and management of cardiac complications. **(1.27, 5.1a)**

Best-practice risk assessment and management

Health service organisations:

- Agree on the process and criteria for cardiac complications risk assessment **(5.7)**
- Inform the clinical workforce of risk assessment requirements **(5.1c)**
- Identify a format for cardiac care plan for high-risk patients **(5.4)**
- Identify a management plan format for patients with cardiac complications. **(5.12, 5.13)**

Identification of key individuals/ governance groups

Health service organisations identify an individual or a governance group that is responsible for:

- Monitoring compliance with the organisation's cardiac complications policies, procedures and protocols **(1.7b, 5.2a)**
- Presenting data on the performance of cardiac complications prevention and management systems to the governing body **(1.9, 5.2c)**
- Overseeing the clinical care of patients at risk of or experiencing cardiac complications. **(5.5b)**

Training requirements

Health service organisations:

- Identify workforce training requirements **(1.20a)**
- Train relevant staff on the use of risk assessment, prevention plans and cardiac complications management plans **(1.20b, 1.20c)**
- Ensure workforce proficiency is maintained. **(1.20d, 1.22, 1.28b)**

Monitoring the delivery of prevention and care

Health service organisations ensure mechanisms are in place to:

- Report cardiac complications **(1.9, 5.2)**
- Manage risks associated with cardiac complications prophylaxis and management **(5.1b)**
- Identify performance measures and the format and frequency of reporting **(1.8a)**
- Set performance measurement goals **(1.8a)**
- Collect data on compliance with policies **(1.7b)**
- Collect data about cardiac complications risk screening activities, including whether risk assessment is leading to appropriate action **(5.1b, 5.2)**
- Identify gaps in systems for screening patients for cardiac complications **(1.8, 5.2)**
- Collect data on incidence, prevalence and severity of cardiac complications **(5.2)**
- Provide timely feedback and outcomes data to staff. **(1.9)**

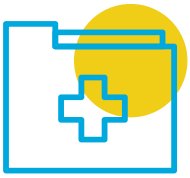
Quality-improvement activities

Health service organisations:

- Implement and evaluate quality-improvement strategies to reduce the frequency and harm from cardiac complications **(5.2)**
- Use audits of patient clinical records and other data to:
- identify opportunities for improving cardiac complications prevention plans **(5.2)**
- identify gaps and opportunities to improve the use of cardiac complications prevention plans **(5.2)**
- monitor the overall effectiveness of systems for prevention and management of cardiac complications **(5.2)**
- Use audits of patient clinical records, transfer and discharge documentation and other data to identify opportunities for improving cardiac complications management plans. **(5.2)**

Equipment and devices

Health service organisations facilitate access to equipment and devices for the prevention, detection and management of cardiac complications, such as electrocardiography (ECG) machines and Holter monitors. **(1.29b)**



Developing the patient's comprehensive care plan

to support best practice in the prevention and management of cardiac complications

Clinicians should collaborate with patients, carers and families in assessing risk, in providing appropriate information to support shared decision making, and in planning care that meets the needs of patients and their carers.

Identify patient risk factors associated with cardiac complications

Clinicians use relevant screening processes at or prior to presentation to assess the risk of cardiac failure, arrhythmia, ischaemia and/or clinical deterioration. Specific risk factors include[10]:

- Age
- Male gender
- High blood pressure and left ventricular hypertrophy (LVH)
- Abnormal blood lipids: high total cholesterol, LDL-cholesterol and triglyceride levels, and low levels of HDL cholesterol
- Diet high in saturated fat
- Diabetes mellitus
- Excess homocysteine in blood
- Inflammatory markers such as elevated C-reactive protein
- Abnormal blood coagulation such as elevated fibrinogen
- Heredity or family history
- Tobacco and alcohol use, physical inactivity and obesity
- Low socioeconomic status.

Risk assessment

Clinicians comprehensively assess the conditions, medicines and risks identified.

Use strategies to prevent and manage cardiac complications

Clinicians assess patients for cardiac complication risks as indicated, particularly when their hospital episode is associated with:

- Recent emergency surgery
- Sudden onset palpitation and haemodynamic stability
- Loss of consciousness
- Ventricular arrhythmias
- Changes in medicines
- Fluid overload.

Document the comprehensive care plan	Clinicians conduct a comprehensive clinical assessment of patients at-risk or with cardiac complications and document the following in the clinical notes: • Clinical history and assessment • If heart failure and/or pulmonary oedema was present, or suspected of being present, at the time of admission, confirm that the complication previously existed or was part of the patient's presenting problem, a comorbidity or chronic disease (such as a frail nursing home resident with history of poorly controlled heart failure, present to the emergency department with shortness of breath and worsening of peripheral oedema) • Describe clearly all relevant clinical findings (such as recent emergency surgery, sudden onset, palpitation and haemodynamic stability) • Document any additional (secondary) diagnosis if the complication arose during the current episode of care or as the principal diagnosis if consequent to a previous episode of care, that is a readmission, and describe clearly all relevant clinical findings (such as patient reason for admission, sudden onset, loss of consciousness, ventricular arrhythmias) • Document contributing factors, predispositions or comorbidities which are relevant for the incident (such as recent surgery, changes in medicines, fluid overload) • Document any associated investigations (such as chest X-ray, cardiac echocardiograms).
Institute appropriate monitoring	Clinicians implement testing or monitoring of clinical and laboratory indicators including: • Jugular venous pressure • Peripheral oedema • Chest auscultation • Electrolytes, urea and creatinine, troponin.
Audit documentation	Clinicians monitor completion of observation charts.

Delivering comprehensive care

to prevent and manage cardiac complications

Safe care is delivered when the individualised care plan, that has been developed in partnership with patients, carers and family, is followed.

Working in partnership to deliver the care plan

Clinicians work in partnership with patients and carers to implement prevention and management strategies as clinically appropriate, including:

- Clinical management according to best-practice guidelines
- Systems to recognise and respond to deterioration in defined early warning criteria
- Specific strategies where clinically indicated, for example[11,12,13]:
  - physical examination (including measurement of blood pressure and heart rate) resting 12-lead ECG, stress test
  - pathology, such as blood tests (troponin, creatinine, glucose, haemoglobin etc)
  - echocardiogram
  - antiplatelet therapy/anticoagulant therapy
  - oxygen and pain relief
  - afterload reduction agents such as nitro-glycerine
  - anti-thrombin therapy
  - coronary angiography
  - percutaneous coronary interventions
  - coronary artery bypass grafting
  - development of a symptom management and treatment escalation plan
  - rehabilitation and discharge planning.

Partnering with patients

Inform patients and carers of the risks, prevention strategies and management of cardiac complications.

Documentation

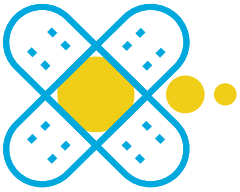
Document the treatment plan, goals and outcome.

Monitor impact of plan

Monitor the effectiveness of these strategies in preventing cardiac complications and reassess the patient if cardiac complications occur.

Update care plan

Review and update the care plan if it is not effective or is causing side effects.



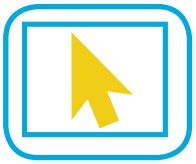
Minimising specific patient harm

Patients at risk of specific harms are identified, and clinicians deliver targeted strategies to prevent and manage these harms.

Fluid overload

Ensure the fluid requirements of the patient are:

- Planned
- Delivered
- Intake is monitored
- Adjusted as appropriate to ensure fluid overload is avoided.



Additional resources

Australian Commission on Safety and Quality in Health Care. Acute Coronary Syndromes Clinical Care Standard. Sydney (AU): ACSQHC; 2014.

Australian Commission on Safety and Quality in Health Care. Track and trigger recognition and response systems. Sydney (AU).

Heart Foundation. Clinical information: Resources for health professionals, guidelines and tools. Sydney (AU).

National Institute for Health and Clinical Excellence. Unstable angina and NSTEMI: early management [CG94]. London (UK): NICE; 2010.

National Institute for Health and Clinical Excellence. Acute coronary syndromes in adults. [QS68]. London (UK): NICE; 2014.

National Institute for Health and Clinical Excellence. Acute heart failure: diagnosis and management. [CG187]. London (UK): NICE; 2014.

National Institute for Health and Care Excellence. Chronic heart failure: management of chronic heart failure in adults in primary and secondary care. [CG 108]. London (UK): NICE; 2010.

Clinical Excellence Commission. Between the flags – keeping patients safe: standard calling criteria. Sydney (AU).

The Cardiac Society of Australia and New Zealand. Resources.

Agency for Healthcare Research and Quality. Heart Failure. Rockville, MD, (US).

NSW Agency for Clinical Innovation. NSW clinical service framework for chronic heart failure. (AU); 2016.

Australian Resuscitation Council. The ARC Guidelines.

Australian Resuscitation Council. Guideline 11.9: Managing Acute Dysrhythmias. 2009

Note on data

The data used in this sheet are for hospital-acquired complications recorded during episodes of care in Australian public hospitals in 2015–16. Data are included where hospitals were able to identify that the complication had arisen during an admission using the condition onset flag. Figures reported by the Independent Hospitals Pricing Authority (IHPA) may differ due to the IHPA's methodology, which applies different inclusion/exclusion criteria.

References

1. Independent Hospital Pricing Authority (AU). Activity Based Funding Admitted Patient Care 2015–16, acute admitted episodes, excluding same day.
2. Heart Foundation. (AU); Available from: https://www.heartfoundation.org.au/.
3. Australian Institute of Health and Welfare. Cardiovascular disease: Australian facts 2011. Cardiovascular disease series. Cat. no. CVD 53. : Canberra: AIHW; 2011. Available from: http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=10737418530.
4. Australian Resuscitation Council & New Zealand Resuscitation Council. ANZCOR Guideline 11.1 – Introduction to Advanced Life Support2016. Available from: https://resus.org.au/guidelines/.
5. Hazinski MF, Nolan JP, Billi JE, Bottiger BW, Bossaert L, de Caen AR, et al. Part 1: Executive summary: 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. Circulation. 2010;122(16 Suppl 2):S250-75. Epub 2010/10/22.
6. Chew DP, Allan RM, Aroney CN, Sheerin NJ, Acute Coronary Syndrome Data Set Writing G, Acute Coronary Syndrome Data Set Working G. National data elements for the clinical management of acute coronary syndromes. Medical Journal of Australia. 2005;182(9 Suppl):S1-14. Epub 2005/05/04.
7. Akhtar MM, Iqbal YH, Kaski JC. Managing unstable angina and non-ST elevation MI. Practitioner. 2010;254(1730):25-30, 2–3. Epub 2010/07/31.
8. Independent Hospital Pricing Authority, Pricing and funding for safety and quality – Risk adjustment model for hospital acquired complications – version 3, March 2018, IHPA: Sydney.
9. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards (second edition). Sydney 2017.
10. World Health Organisation. Cardiovascular disease. Geneva (Switzerland): WHO; Available from: http://www.who.int/cardiovascular_diseases/en/.
11. National Institute for Health and Clinical Excellence. Unstable angina and NSTEMI: early management. London: NICE; 2010 [CG94]; Available from: https://www.nice.org.uk/guidance/cg94.
12. Australian Commission on Safety and Quality in Health Care. Acute Coronary Syndromes Clinical Care Standard. Sydney ACSQHC; 2014. Available from: https://safetyandquality.gov.au/wp-content/uploads/2014/12/Acute-Coronary-Syndromes-Clinical-Care-Standard.pdf.
13. Heart Foundation. Clinical information: Resources for health professionals, guidelines and tools. Sydney (AU); Available from: https://www.heartfoundation.org.au/for-professionals/clinical-information.

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