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 **8**

RENAL FAILURE

	HOSPITAL-ACQUIRED COMPLICATION	RATE[a]
1	Pressure injury	10
2	Falls resulting in fracture or intracranial injury	4
3	Healthcare-associated infection	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

Renal failure (or acute kidney injury) refers to a hospital-acquired acute renal failure requiring haemodialysis or continuous haemofiltration.*

Why focus on renal failure?

Each year, a large number of patients develop hospital-acquired renal failure, with 980 people in Australian public hospitals developing renal failure that required haemodialysis in 2015–16.[1] The rate of hospital-acquired renal failure was 2.2 per 10,000 hospitalisations in 2015–16.[1]

Hospital-associated acute kidney injury (also known as acute renal failure) is common[2,3] as it may be caused by impaired renal perfusion due to hypotension or dehydration, medications, recent surgery, radiographic contrast media, or sepsis.

Renal failure may cause distressing symptoms including fluid retention and swelling, dyspnoea, drowsiness, fatigue, cognitive clouding and confusion, persistent nausea, and seizures. The condition also has an extremely high mortality rate of 50%.[3] Early recognition and intervention are important elements of effective treatment.[4]

Hospital-acquired renal failure also prolongs length of stay. Patients who develop renal failure while in hospital remain in hospital for 27 days longer on average than those without this hospital-acquired complication.[1] The national average cost per admitted acute overnight stay is $2,074[5], meaning that each hospitalisation involving hospital-acquired renal failure can be presumed to incur approximately $55,998 in extra costs.

Significant reductions in hospital-acquired renal failure rates are being achieved in some hospitals through preventive initiatives. The rate of hospital-acquired renal failure requiring haemodialysis at Principal Referral Hospitals† was 3 per 10,000 hospitalisations in 2015–16.[1] If all Principal Referral Hospitals above this

* 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.

† 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.

rate reduced their rate to 3 per 10,000 hospitalisations, then 317 episodes of renal failure requiring dalysis during hospitalisation in Principal Referral Hospitals would have been prevented, and more when other facilities are considered.

What is considered best practice for preventing renal failure?

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

The **health service organisation** providing services to patients at risk of renal failure:

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

Clinicians caring for patients at risk of renal failure:

- 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[6], 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.

Top tips for prevention and management of renal failure

The following provides key points for clinicians to consider to avoid this hospital-acquired complication

Conduct risk assessment

- Conduct a comprehensive risk assessment
- Identify risk factors such as: major surgery and trauma, multi-organ failure, increased age, diabetes mellitus, cardiovascular disease and malignancy, chronic kidney disease, sepsis, hypovolemia, hypotension, nephrotoxic medications and/or muscle ischaemia
- Assess patients for renal failure risks, particularly when their hospital episode is associated with:
  - The use of iodinated contrast agents
  - Chronic kidney disease (adults with an estimated glomerular filtration rate less than 60 ml/min/1.73 m^2)
  - Oliguria (urine output less than 0.5 ml/kg/hour)
  - Symptoms or signs of nephritis (such as oedema or haematuria)
  - Symptoms or history of urological obstruction, or conditions that may lead to obstruction
  - Neurological or cognitive impairment or disability, which may mean limited access to fluids because of reliance on a carer
  - Deteriorating early warning scores / physiological parameters.

For a patient at risk, develop a prevention plan as part of a comprehensive care plan

Develop prevention plan

Clinicians, patients and carers develop an individualised, comprehensive prevention plan to prevent renal failure that identifies:

- Goals of treatment consistent with the patient's values
- Any specific nursing requirements, including equipment needs
- Any allied health interventions required, including equipment needs
- Observations or physical signs to monitor and determine frequency of monitoring
- Laboratory results to monitor and determine frequency of monitoring
- If specialist assistance is required.

Deliver prevention plan

Where clinically indicated, deliver renal failure prevention and management strategies, such as:

- Systems to recognise and respond to oliguria and/or deterioration in defined early warning criteria
- Routine consultation with nephrology specialists prior to administering iodinated contrast agents, and consideration of the requirement, and patient suitability, for volume expansion and pharmacological protection
- Fluid resuscitation and management as indicated
- Consideration of pharmacological intervention as appropriate
- Haemodialysis and/or continuous renal replacement therapy if the patient is not responding to medical management, as indicated by hyperkalaemia, metabolic acidosis symptoms and/or complications of uraemia (for example, pericarditis or encephalopathy) and/or fluid overload pulmonary oedema.

Monitor

- Monitor the effectiveness of renal failure prevention and management strategies, and reassess the patient if renal failure occurs
- Review and update the care plan if it is not effective or is causing side effects
- Engage in reviewing clinical outcomes, identifying gaps and opportunities for improvement.

Clinical governance structures and quality-improvement processes

to support best practice in renal failure prevention and management

Health service organisations need to ensure systems are in place to prevent renal failure through effective clinical governance and quality-improvement processes.

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 prevention and management of renal failure requiring haemodialysis. **(1.27, 5.1a)**

Best-practice screening and management

Health service organisations:

- Agree on the process and criteria for risk assessment for kidney injury **(5.7)**
- Inform the clinical workforce of risk assessment requirements **(5.1c)**
- Identify a format for prevention plans for high-risk patients **(5.4)**
- Identify a management plan format for patients with acute kidney injury. **(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 renal failure policies, procedures and protocols **(1.7b, 5.2a)**
- Presenting data on the performance of kidney failure prevention and management systems to the governing body. **(1.9, 5.2c)**

Training requirements

Health service organisations:

- Identify workforce training requirements **(1.20a)**
- Train relevant staff on the use of risk assessment, prevention plans and 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 renal failure **(1.9, 5.2)**
- Manage risks associated with renal failure prevention 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 risk assessment activities for risk of renal failure, including whether risk assessment is leading to appropriate action **(1.8, 5.1b, 5.2)**
- Collect data on incidence, prevalence and severity of renal failure **(1.11)**
- 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 renal failure **(5.2)**
- Use audits of patient clinical records and other data to:
  - identify opportunities for improving renal failure prevention **(5.2)**
  - monitor the overall effectiveness of systems for prevention and management of renal failure **(5.2)**
- Use audits of patient clinical records, transfer and discharge documentation and other data to identify opportunities for improving renal failure management. **(5.2)**

Equipment and devices

Health service organisations facilitate access to equipment and devices for the prevention and management of renal failure. **(1.29b)**

Developing the patient's comprehensive care plan

to support best practice in renal failure prevention and management

Clinicians should partner with patients, carers and families, 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 renal failure

Clinicians use relevant screening processes at, or prior to, presentation to assess the risk of renal failure. Risk factors associated with renal failure include[7]:

- Major surgery and trauma
- Multi-organ failure
- Increased age
- Diabetes mellitus, cardiovascular disease and malignancy
- Chronic kidney disease
- Sepsis
- Hypovolemia
- Hypotension
- Nephrotoxic medications
- Muscle ischaemia.

Risk screening

Clinicians comprehensively assess the conditions, medications and risks identified through the screening process.

Use strategies to prevent and manage renal failure

Assess patients for renal failure risks as indicated, particularly when their hospital episode is associated with[7,8]:

- The use of iodinated contrast agents
- Pre-operative assessment
- Chronic kidney disease (adults with an estimated glomerular filtration rate less than 60 ml/min/1.73 m^2)
- Oliguria (urine output less than 0.5 ml/kg/hour)
- Symptoms or signs of nephritis (such as oedema or haematuria)
- Symptoms or history of urological obstruction, or conditions that may lead to obstruction
- Neurological or cognitive impairment or disability, which may mean limited access to fluids because of reliance on a carer
- Deteriorating early warning scores / physiological parameters.

Documenting and communicating the care plan

Conduct a comprehensive clinical assessment of patients at risk or with acute renal failure and document the following in the clinical notes:

- Clinical history and assessment
- All relevant clinical findings (such as recent surgery, oliguria, generally unwell, recent onset, deterioration of creatinine levels)
- Acute kidney injury when confirmed, not creatinine levels alone
- Confirmation that renal failure developed during the episode of care was not present on admission
- If present on admission, confirmation that the complication was part of the patient's presenting problem, a comorbidity or chronic disease (as in a young patient presenting to the emergency department following recent injection of radiographic contrast media for CT scan, complaining of feeling unwell, nausea and complaining of an inability to pass urine)
- Contributing factors, predispositions or comorbidities that are relevant for the incident (such as recent surgery, dehydration, reaction to contrast media)
- Associated investigations (such as renal ultrasound, X-ray of ureter and pelvis, biochemistry)
- Treatment or care plan (such as fluid management and type of kidney replacement therapy).

Collaborating and working as a team

Medical, nursing, pharmacy and allied health staff work collaboratively to perform renal failure risk assessment and clinical assessment.

Institute appropriate monitoring

Implement monitoring of clinical and laboratory indicators including:

- Comprehensive fluid balance charts including input and output
- Monitor serum creatinine and other biochemical levels regularly
- Perform urinalysis and consider suitability for ultrasound
- Increase monitoring and clinical oversight of patients at risk of deterioration and/or acute kidney injury.

Audit documentation

Monitor completion of fluid balance charts.

Delivering comprehensive care to prevent and manage renal failure

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

Working in partnership to deliver the care plan	Clinicians implement prevention and management strategies as clinically appropriate, including[8]: • Clinical management according to best-practice guidelines • Systems to recognise and respond to oliguria and/or deterioration in defined early warning criteria • Routine consultation with nephrology specialists prior to administering iodinated contrast agents, and consideration of the requirement, and patient suitability, for volume expansion and pharmacological protection • Fluid resuscitation and management as indicated • Consideration of pharmacological intervention as appropriate • Haemodialysis and/or continuous renal replacement therapy if the patient is not responding to medical management, as indicated by hyperkalaemia, metabolic acidosis symptoms and/or complications of uraemia (for example, pericarditis or encephalopathy) and/or fluid overload pulmonary oedema.
Partnering with patients	Clinicians inform patients, families and carers of the risks, prevention strategies and management of renal failure.
Documentation	Clinicians document the treatment plan, goals and outcome.
Monitoring impact of plan	Clinicians monitor the effectiveness of these strategies in preventing renal failure and reassess the patient if acute kidney injury occurs.
Updating care plan	Clinicians 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.

Hydration

Ensure the fluid requirements of the patient are:

- Planned
- Delivered
- Intake is monitored
- Adjusted as appropriate.

Preventing delirium and managing cognitive impairment

Ensure a system is in place to:

- Recognise, prevent, treat and manage cognitive impairment
- Collaborate with patients, carers and families to support the patient and implement individualised strategies that minimise any anxiety or distress while they are receiving care.

Additional resources

Kidney Disease Improving Global Outcomes. KDIGO Clinical Practice Guideline for Acute Kidney Injury. Kidney International Supplements [Internet]. 2012; 2(1):[1-138 pp.].

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National Institute for Health and Care Excellence. Acute kidney injury, Quality Standard 76. London: NICE; 2014.

Zacharias M, Mugawar M, Herbison GP, Walker RJ, Hovhannisyan K, Sivalingam P, et al. Interventions for protecting renal function in the perioperative period. Cochrane Database of Systematic Reviews [Internet]. 2013; (9).

Note on data

The data used in this sheet are for hospital-acquired complications recorded during overnight acute 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 Hospital Pricing Authority (IHPA) may differ due to the IHPA's methodology, which applies different inclusion/exclusion criteria.

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8. National Institute for Health and Care Excellence. Acute kidney injury: prevention, detection and management. Clinical Guideline 169. London: NICE; 2013. p. 39.

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