

Joint Trust Guideline for the Prevention, Recognition and Management of Acute Kidney Injury in Adults

A Clinical Guideline recommended

For use in:	All clinical areas (excluding paediatrics)
By:	Clinicians and nursing staff
For:	Adult patients with, or at risk of developing, acute kidney injury (excluding obstetric patients)
Key words:	Acute kidney injury, AKI, Contrast Induced Nephropathy, CIN, Hyperkalaemia, Renal Replacement Therapy, RRT
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Compliance links: e.g. NICE	Acute Kidney Injury (NICE Clinical Guideline 169). NICE, 2013
If Yes – does the strategy/policy deviate from the recommendations of NICE? If so, why?	No deviation

This guideline has been approved by the Trust's Clinical Guidelines Assessment Panel as an aid to the diagnosis and management of relevant patients and clinical circumstances. Not every patient or situation fits neatly into a standard guideline scenario and the guideline must be interpreted and applied in practice in the light of prevailing clinical circumstances, the diagnostic and treatment options available and the professional judgement, knowledge and expertise of relevant clinicians. It is advised that the rationale for any departure from relevant guidance should be documented in the patient's case notes. The Trust's guidelines are made publicly available as part of the collective endeavour to continuously improve the quality of healthcare through sharing medical experience and knowledge. The Trust accepts no responsibility for any misunderstanding or misapplication of this document.

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Version and Document Control:

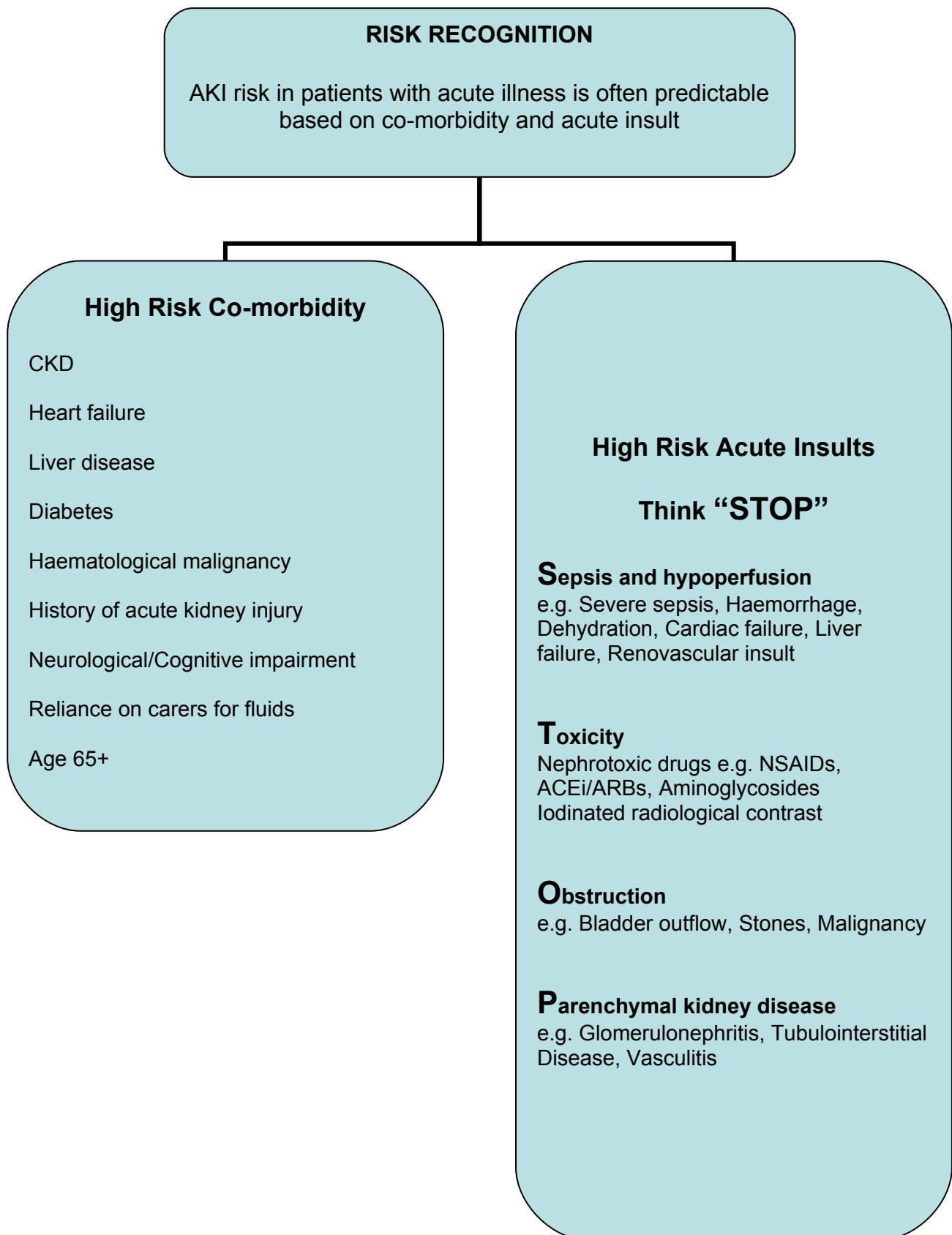
Version Number	Date of Update	Change Description	Author
JCG0024 v1	31/07/2014	Change of header and reference to joint hospital version.	
JCG0024 v2	22/11/2016	Change of key people, addition of key words, quick guidelines – risk recognition amended.	
JCG0024 v3	01/08/2017	Link to Trustdocs Id 9499 which is now archived replaced with external NHS link.	
JCG0024 v3.1	23/07/2018	Add link to https://www.thinkkidneys.nhs.uk/aki/wp-content/uploads/sites/2/2016/07/Medicines-optimisation-toolkit-for-AKI-MAY17.pdf also available on Trustdocs ID15286	
V4	March 2021	Updated and links added	Dr Ravi Varma

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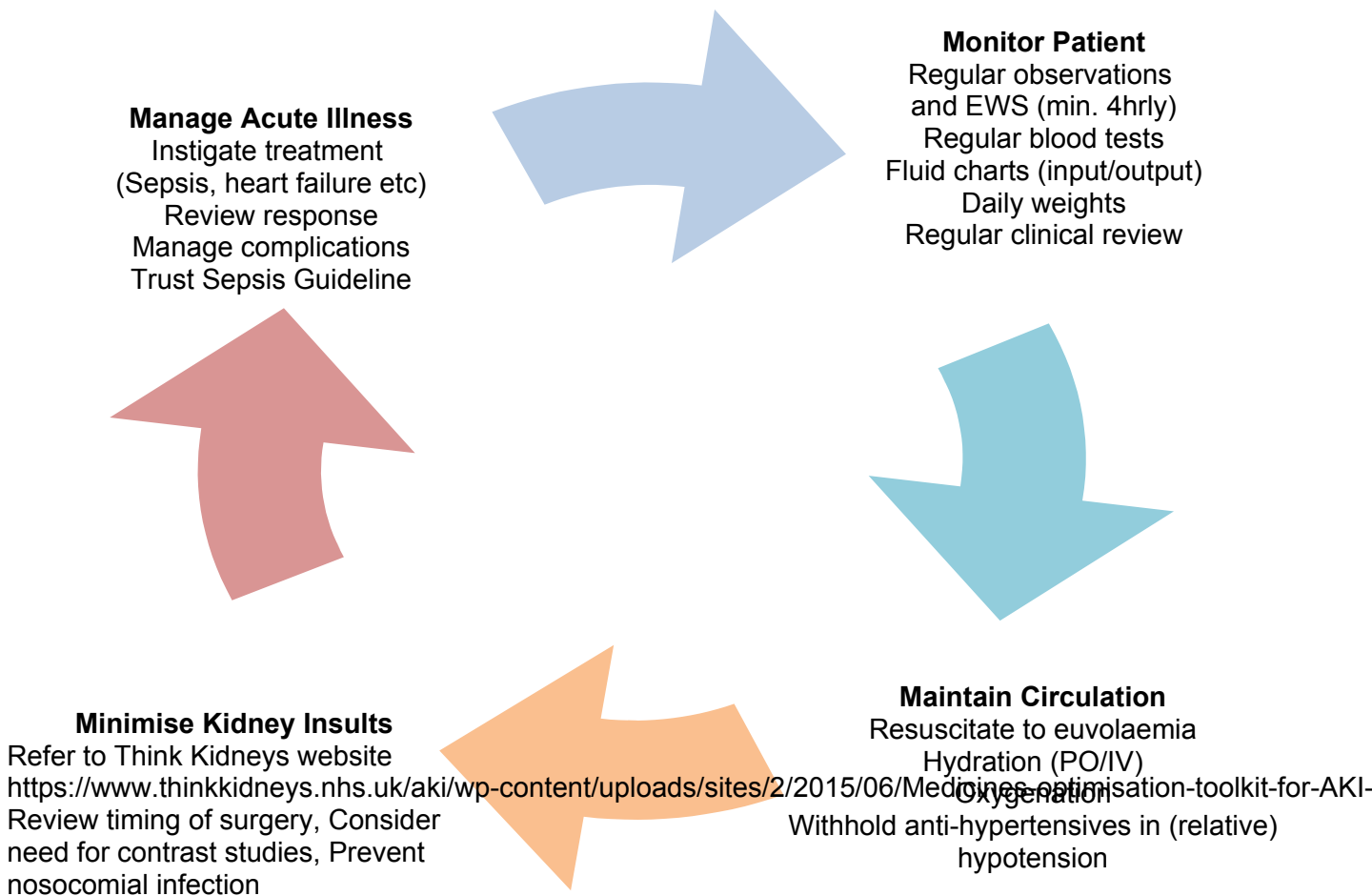
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Quick guidelines



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Prevention and Management of AKI in 'at risk' adults with acute illness



Preventing Contrast Induced Nephropathy (CIN)

CIN is caused by iodinated contrast.

Risk factors include:

CKD (especially if $eGFR < 40\text{mL}/\text{min}/1.73\text{m}^2$), diabetes, heart failure, renal transplant, age >75 years, hypovolaemia, increasing volume of contrast, intra-arterial contrast.

Clinicians should consider if the test is absolutely necessary, could it be deferred or is there an alternative imaging modality without the need for contrast?

High risk patients or those with an acute illness should be volume expanded with 0.9% sodium chloride to euvolaemia prior to the procedure, and if $eGFR < 40\text{mL}/\text{min}/1.73\text{m}^2$, *consider* withholding high risk medications, e.g. ACEi/ ARBs/ diuretics, for 48 hrs pre- and post-scan.

U&Es should be checked 48-72 hours post-contrast to screen for CIN; delay re-introducing high risk medications if an AKI is confirmed.

If high risk or acutely ill patients have a contraindication to pre-hydration, please discuss with senior member of nephrology team prior to procedure.

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Assessment for AKI

All patients admitted with acute illness and / or at risk of AKI should have their U&Es measured at presentation

This should be repeated within 48 hours and monitored regularly throughout their admission

Remain vigilant for **AKI eAlerts** on ICE reporting

Staging of AKI

STAGE 1

sCr $\geq 26\mu\text{mol/L}$ in 48hrs

or

sCr $\geq 1.5\text{-}2\text{x}$ baseline

or

UO $< 0.5\text{mL/kg/hr}$ for $> 6\text{hrs}$

STAGE 2

sCr $\geq 2\text{-}2.9\text{x}$ baseline

or

UO $< 0.5\text{mL/kg/hr}$ for $> 12\text{hrs}$

STAGE 3

sCr $\geq 3\text{x}$ baseline

or

UO $< 0.5\text{mL/kg/hr}$ for $> 24\text{hrs}$

Or

Anuric for 12hrs

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Care Pathway for Patients with, or at risk of, AKI

Patient admitted to hospital with acute illness

Risk factor(s) for AKI to be documented

Initial assessment

History: consider pre-renal (~80%), post-renal (~15%), intrinsic (~5%). Think **STOP**

Medication review: nephrotoxins, self-prescribed/OTC, recently stopped (e.g. antibiotic courses)

Examination: full systems review with particular attention to volume status. Palpate for bladder

Diagnosis of AKI confirmed on initial or subsequent blood tests/UO

Document AKI (AKI Bundle)

Investigate

Urinalysis

- Dipstick (and document in notes)
- Protein:creatinine ratio
- MC+S

Blood tests

- FBC, U&Es, CRP, HCO₃ (daily); LFTs, CK, Bone group
 - If Hb/ platelets low **consider** TMA (TTP/ HUS etc.): Blood film, LDH, reticulocyte count, coagulation screen
- Consider renal screen*

Imaging

- CXR
- Renal tract USS <24hrs if no obvious cause of AKI <6hrs if pyonephrosis suspected
- CT KUB (if suspected urolithiasis)

*RENAL SCREEN

Should be considered in unexplained AKI, blood and protein on urinalysis or features of systemic disease e.g. lupus, vasculitis. It should include:
ANA, ANCA, Anti-GBM, complement, immunoglobulins, serum electrophoresis, serum free light chains assay

Management (click here)

Strict fluid balance

- Urinary catheter only if unable to maintain accurate balance chart (or confirmed bladder outflow obstruction)
- Resuscitate as appropriate
- Crystalloid is preferred to colloid. (Exercise caution with potassium containing solutions e.g. Hartmann's as risk of hyperkalaemia)
- Maintenance/ replacement/ resuscitation fluid and electrolyte requirements should be assessed regularly (sensible/ insensible losses) and supported by oral or parenteral means as necessary

Decompress renal obstruction

- Liaise with urology on-call for all non-urethral obstruction – likely to require nephrostomy in IRU (urgent if an obstructed infected system)

Manage acute complications of AKI - (click here)

Consider early referral to Nephrology

- All **AKI stage 3** unless readily reversible cause (e.g. bladder outflow tract obstruction)
- AKI stages 1 & 2 failing to respond after 48hrs
- Unexplained AKI
- Patients likely to need renal replacement therapy (click here)
- Any patient with possible parenchymal kidney disease (see list)
Active urine dip (blood ± protein)
Systemic features
Rapidly deteriorating renal function
- Pre-existing CKD stages 4 or 5 or renal transplant patients

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Acute Complications of AKI

Hyperkalaemia

See Trust guideline CA5091 Hyperkalaemia in Adults ([click here](#))

Medical management is only a temporary solution if the patient is oligo-anuric; refer to nephrology urgently for consideration of RRT if severe/refractory hyperkalaemia

Pulmonary oedema

Sit patient up, give high-flow oxygen (unless contraindicated)

Consider IV furosemide e.g. 100 – 250 mg infused at 4mg/min (smaller doses unlikely to work in AKI)

Consider GTN infusion if haemodynamically stable, e.g. 1-10mg/hr

Consider salt and fluid restriction (e.g. 0.75L-1.0L /day)

Metabolic acidosis

pH <7.35

Treatment should be reserved for significant acidosis (pH < 7.30), especially with hyperkalaemia

If no contraindications (e.g. fluid overload or type 2 resp. failure) IV sodium bicarbonate 1.26% may be used (under specialist supervision)

If present, hypocalcaemia should be corrected **prior** to starting sodium bicarbonate therapy (avoid using the same cannula for calcium gluconate and sodium bicarbonate infusions)

If pH <7.15, consider urgent nephrology (if haemodynamically stable) or critical care (if unstable) referral

INDICATIONS FOR ACUTE RENAL REPLACEMENT THERAPY (Urgent referral to on-call Nephrologist required)

Refractory hyperkalaemia (K^+ >6.5mmol/L or >6mmol/L with ECG changes)
Refractory acidosis (pH <7.2)
Oligo-anuric patient with pulmonary oedema
Uraemic complications (e.g. pericarditis, encephalopathy, bleeding etc.)

INDICATIONS FOR CRITICAL CARE REFERRAL
Hypotensive patients with AKI not responsive to fluid therapy
AKI requiring renal replacement therapy as part of multi-organ failure
Patients deemed too unstable for intermittent haemodialysis

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Objective/s

To standardise and optimise care of patients who are at risk of, or have developed, acute kidney injury (AKI).

Rationale

AKI is a common occurrence, affecting 13-18% of all patients admitted to hospital. There is a significant morbidity and mortality associated with AKI, and sub-optimal care is likely a major contributor (NCEPOD 2009). Early recognition, assessment of risk, and structured management of both the causes and complications are likely to improve outcomes. These guidelines were written based on the Acute Kidney Injury Guideline published by NICE (CG169), 2013.

List of Abbreviations

ACEi	Angiotensin Converting Enzyme Inhibitor
AKI	Acute Kidney Injury
ANA	Anti-Nuclear Antibodies (inc. anti-DS-DNA antibodies)
ANCA	Anti-Neutrophil Cytoplasmic Antibody
Anti-GBM Ab	Anti-Glomerular Basement Membrane Antibody
ARB	Angiotensin Receptor Blocker
AXR	Abdominal X-ray (radiograph)
CIN	Contrast Induced Nephropathy
CK	Creatine Kinase
CKD	Chronic Kidney Disease
CRP	C-Reactive Protein
CT KUB	Computed Tomography – Kidneys, Ureter, Bladder
CXR	Chest X-ray (radiograph)
eGFR	Estimated Glomerular Filtration Rate
EWS	Early Warning Score
GTN	Glyceryl Trinitrate
HCO ₃	Bicarbonate
HUS	Haemolytic Uraemic Syndrome
Ig	Immunoglobulins
IRU	Interventional Radiology Unit
IV	Intravenous
LDH	Lactate Dehydrogenase
LFT	Liver Function Tests
MW	Molecular Weight
NICE	National Institute of Clinical Excellence
NSAID	Non-steroidal Anti-inflammatory Drug
PO	Per Os (by mouth)
RRT	Renal Replacement Therapy
sCr	Serum Creatinine
TMA	Thrombotic microangiopathy
TTP	Thrombotic Thrombocytopenic Purpura
U&E	Urea and Electrolytes
UO	Urine Output

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Broad recommendations

[Risk recognition](#)

[Prevention of AKI](#)

[Diagnosing AKI](#)

[Care pathway](#)

[Management of complications](#)

Clinical Audit Standards

To be audited using NICE CG169 clinical audit tool

<https://www.nice.org.uk/guidance/ng148/resources>

Summary of development and consultation process undertaken before registration and dissemination

The authors listed above drafted this guideline on behalf of the Department of Nephrology who have agreed the final content. During its development it was circulated for comment to; Nephrology and Acute Medicine Departments, who all agreed with the content without revision. The author reviewed in March 2021 and only changes to links were made.

This version has been endorsed by the Clinical Guidelines Assessment Panel.

Distribution list/ dissemination method

Trust intranet.

References/ source documents

1. Acute Kidney Injury (NICE Clinical Guideline 169). NICE, 2013.
2. Adding Insult to Injury. A review of the care of patients who died in hospital with a primary diagnosis of acute kidney injury (acute renal failure). NCEPOD, 2009.
3. Clinical Practice Guideline on Acute Kidney Injury. UK Renal Association, 2011.
4. Clinical Practice Guideline for Acute Kidney Injury. KDIGO, 2012
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Resources - <https://www.thinkkidneys.nhs.uk/aki/resources/secondary-care/>
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