Acute Kidney Injury Patient Pathway (AKIPP) (Adult Patients)

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Airedale Hospital NHS Foundation Trust
Bradford Teaching Hospital NHS Foundation Trust
Calderdale & Huddersfield NHS Foundation Trust
Leeds Teaching Hospitals NHS Trust
Mid Yorkshire Hospitals NHS Trust

West Yorkshire Critical Care Network
Yorkshire & Humber Renal Network

(v2.2)
ACUTE KIDNEY INJURY IS DEFINED AS:

- increase in serum creatinine of 26µmol/L within 48hrs
  OR
- increase in serum creatinine >1.5 times above baseline value within 1 week
  OR
- urine output of <0.5ml/kg/hour for > 6 consecutive hours

If a baseline serum creatinine is not available within 1 week the lowest serum creatinine value recorded within 3 months of the episode of AKI can be used.

If a baseline serum creatinine value is not available within 3 months and AKI is suspected
  - repeat serum creatinine within 24 hours

Acute kidney injury staging can be performed using serum creatinine or urine output criteria (Table 1). Patients that satisfy the definition for AKI can be staged according to whichever criteria (serum creatinine or urine output) gives them the highest stage.

### Table 1: KDIGO staging system for acute kidney injury

<table>
<thead>
<tr>
<th>Stage</th>
<th>Serum creatinine</th>
<th>Urine output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>rise ≥ 26 µmol/L within 48hrs or rise ≥ 1.5- to 1.9 x baseline SCr</td>
<td>&lt;0.5 mL/kg/hr for &gt; 6 consecutive hrs</td>
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<tr>
<td>2</td>
<td>rise ≥ 2 to 2.9 x baseline SCr</td>
<td>&lt;0.5 mL/kg/ hr for &gt; 12 hrs</td>
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<tr>
<td>3</td>
<td>rise ≥ 3 x baseline SCR or rise &gt; 354 µmol/L or commenced on renal replacement therapy (RRT) irrespective of stage</td>
<td>&lt;0.3 mL/kg/ hr for &gt; 24 hrs or anuria for 12 hrs</td>
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</table>
ACUTE KIDNEY INJURY (ADULT) PATIENT PATHWAY

INSTITUTE FOR ALL PATIENTS WITH
1.5 x rise in creatinine or
Oliguria (< 0.5mls/kg/hr) for > 6 hours or
Clinical suspicion of AKI (no baseline creatinine available)

IMMEDIATE ACTION REQUIRED

Full set of physiological observations
Use Early Warning Score (EWS) to identify patient requiring critical care outreach/ICU referral
Medical review to identify the cause of AKI
Perform the following:

**Volume status assessment**
capillary refill time
HR, BP, JVP, Heart sounds, peripheral/pulmonary oedema, fluid balance chart, urine output daily weights

**Fluid therapy**
If hypovolaemic give 250-500 mls bolus of crystalloid (0.9% sodium chloride if K⁺ > 5.5mmol/L in setting of oliguric AKI or rhabdomyolysis) or colloid (avoid Hydroxyethyl starch in patients with sepsis at risk or with AKI)
Convert to balanced crystalloid (Hartmann’s or Plasmalyte) once K⁺ level known and good urine output established
Continue until volume replete with regular review of clinical response
Stop fluids if any signs of pulmonary oedema
If patient is hypotensive in setting of pulmonary oedema request senior medical review

**Monitoring**
Volume status assessment
Observation charts EWS
Fluid balance chart Hourly urine volume Daily weight Consider urinary catheter U&Es twice daily (initially)
Assess acid/base status Venous bicarbonate Arterial Blood Gas (ABG) and lactate

**Investigation**
FBC - if platelets low request blood film/LDH (HUS/TTP*)
LFTs (hepatorenal)
Ca²⁺/PO₄³⁻ (myeloma)
Creatine Kinase (rhabdomyolysis)
Blood cultures if sepsis suspected
Document Urinalysis- if blood, protein, leucocytes or nitrates send MSU
USS renal tract and bladder
• if obstruction suspected < 24 hrs
• if pyonephrosis suspected < 6 hrs

**Other Care**
Treat complications (page 6)
Treat sepsis
Administer antibiotics < 1 hr after recognition
Review drug chart and drug doses (opiates accumulate)

If hypotensive stop
Diuretics e.g. Loop diuretics, Spironolactone
Anti-hypertensives e.g. ACE-I, ARB
Avoid
Contrast
Gentamicin
NSAIDs
Metformin

Consult local trust AKI guidelines

*HUS = Haemolytic Uraemic Syndrome
*TTP = Thrombotic Thrombocytopenic Purpura
RENAL REFERRAL RECOMMENDED
Following Initial Assessment In Hospital

1. AKI Stage 3 (SCr 3x Baseline value) or
2. Persistent oliguria and/or rising serum creatinine despite supportive therapy or
3. Complications refractory to medical treatment:
   - Hyperkalaemia (K+ > 6.0)
   - Pulmonary oedema
   - Acidosis (pH < 7.15)
   - Uraemic encephalopathy
   - Uraemic pericarditis or
4. Acute Kidney Injury Plus
   - Suspicion of vasculitis - systemic features, blood & protein on urinalysis or
   - Paraprotein /Bence Jones Protein or
   - Haemolysis/low platelets or
   - Poisoning

If obstruction on USS refer to Urology
If pyonephrosis suspected will need nephrostomy < 6hrs

CONTACT RENAL UNIT REGISTRAR
(Leeds or Bradford via Switchboard)
Transfer to Renal Unit
Transfer target < 24 hours
Follow AKI transfer policy

DATASET FOR RENAL UNIT REFERRALS
Details of clinical presentation & co-morbidities
Current clinical status - ABCDE assessment, MEWS
Urine output
U&Es, bicarbonate, FBC, LFTs, Bone
If hyperkalaemic - ECG, treatment details
Urinalysis
USS report
MRSA status
Diarrhoea in last 48 hrs?
In addition transfer may only proceed if the following criteria are met:

<table>
<thead>
<tr>
<th><strong>Potassium must be safe</strong></th>
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<tbody>
<tr>
<td>K⁺ &lt; 6.5 and No ECG changes</td>
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<tr>
<td>If hyperkalaemia has been treated it must be determined how and when</td>
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<tr>
<td>Hyperkalaemia will recur if transient therapy such as insulin and dextrose has been used and the underlying cause not treated such that K⁺ can be excreted via the urine eg obstruction relieved or urine output re-established</td>
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<th><strong>Acid-base status must be safe</strong></th>
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<tr>
<td>pH &gt; 7.2</td>
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<tr>
<td>Venous bicarbonate &gt; 12 mmol/L</td>
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<tr>
<td>Lactate &lt; 4 mmol/L</td>
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<th><strong>Respiratory status must be safe</strong></th>
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<tr>
<td>Respiratory rate &gt; 11/min and &lt; 26/min</td>
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<tr>
<td>Oxygen saturation &gt; 94%</td>
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<tr>
<td>Oxygen support not &gt; 35%</td>
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<tr>
<td>If patient required acute CPAP must have been independent of this treatment for 24 hrs</td>
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<th><strong>Circulatory status must be safe</strong></th>
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<tr>
<td>HR &gt; 50/min and &lt; 130/min</td>
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<tr>
<td>BP &gt; 100mmHg systolic</td>
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<tr>
<td>MAP &gt; 65mmHg</td>
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<tr>
<td>(lower BP values may be accepted if it has been firmly established these are pre-morbid)</td>
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<th><strong>Neurological status must be safe</strong></th>
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<td>Alert (AVPU)</td>
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**IF CRITERIA NOT MET INITIATE EMERGENCY REFERRAL TO LOCAL CRITICAL CARE OUTREACH/ICU**

Once patient is stabilised follow ICU to Renal Unit transfer policy
Transfer target post stabilisation < 24 hrs
AKI WITH COMPLICATIONS

Hyperkalaemia in AKI

K\(^+\) > 6.0mmol/L and no ECG changes

- 10 units soluble insulin to 50mls 50% dextrose intravenously over 15 mins (lasts 4-6hrs)
- salbutamol 10-20mg (5mg back to back) nebuliser 6 hourly (caution if tachycardia or ischaemic heart disease)

K\(^+\) > 6.0mmol/L with ECG changes or K\(^+\) > 6.5mmol/L with or without ECG changes

- 10mls of 10% calcium gluconate intravenously over 2 minutes. If no response 10 mls can be given again every 10 minutes until the ECG normalises (may require up to 50mls) If this is not available, 3ml of calcium chloride 10% (available in crash box) is equivalent to 10mls of calcium gluconate 10%

Acidosis in AKI

pH < 7.15 is an indication for immediate critical care/ICU referral

Pulmonary oedema in AKI

Sit patient up

- Oxygen 15 Litres/min via non-rebreathe bag and titrate as appropriate
- IV GTN (50mg in 50ml 0.9% sodium chloride) commence 2ml/hr & titrate up to 20ml/hr maintaining systolic BP > 95mmHg

Consider Furosemide only if patient haemodynamically stable and well filled intravascularly

Try intravenous Furosemide 80-160mg (dose depends on severity)

Furosemide may be administered on one more occasion if no response in 1hr

Do not delay referral appropriate critical care/ICU referral

Uraemic encephalopathy/pericarditis

Indications for renal replacement therapy
AKI TRANSFER POLICY – ICU TO RENAL UNIT

Contact the Renal Unit Registrar/Consultant to arrange transfer to the Renal Unit
Transfer target post stabilisation on ICU < 24 hrs

GUIDELINE FOR SAFE ICU TO RENAL UNIT TRANSFER

**Metabolic status**
- K⁺ < 6.0mmol/L
- pH > 7.2
- Venous bicarbonate > 12mmol/L
- Lactate < 4 mmol/L

**Respiratory status**
- Respiratory rate > 11 /min and < 26/min
- Oxygen saturation > 94%
- Oxygen support not > 35%

  If patient required acute CPAP must have been independent of this treatment for 24 hrs
  If ventilated < 1 week patient should have been independent of respiratory support for 48 hrs
  If longer term invasive ventilation patient should have been independent of all respiratory support for 1 day for each week ventilated and for a period not less than 48 hours.

**Circulatory status**
- HR > 50/min and < 120/min
- BP > 100mmHg systolic
- MAP > 65mmHg

  If given vasopressors, patient must have been off them for > 24 hrs

**Neurological status**
- Alert (AVPU) > 24 hrs
AKI REFERRAL (PRIMARY CARE)

AKI STAGE 3 (creatinine 3 x baseline) or Clinical features suspicious for vasculitis (rash, joint pains, blood & protein in urine)

CONTACT RENAL UNIT REGISTRAR
Or Consultant on call via switchboard (Leeds or Bradford)

FOR ADVICE or POTENTIAL ADMISSION TO RENAL UNIT FOR ASSESSMENT

AKI STAGE 2 (rise in creatinine 2 – 2.9 x baseline)

CONTACT LOCAL ACUTE MEDICAL TEAM

FOLLOW AKI PATIENT PATHWAY & REFERRAL GUIDELINE
Patients who have had an episode of AKI are at risk of chronic kidney disease long-term. The risk depends upon the severity and duration of the episode of AKI.

Careful consideration must be given to discharge arrangements following an episode of AKI to ensure appropriate follow up care.

Kidney function should be checked prior to discharge. Patient will require long term follow up if evidence of chronic kidney disease (CKD).

Medications should be reviewed prior to discharge with a plan to reintroduce medications that may have been withheld during the acute illness e.g. anti-hypertensives, diuretics at an appropriate time.

Patients should be given a patient information leaflet explaining why they developed AKI and their risk factors.
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