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INTRODUCTION

Purpose of the manual:
Acute Kidney Injury [AKI] is common and potentially fatal. Despite its high incidence, mortality and cost, national audits have shown that care of AKI patients is variable and often poor. This manual offers Trusts a suite of clinical guidelines and pathways, designed to help staff deliver evidence based care to prevent and reduce the impact of AKI. The guidelines were drawn up to help any clinician, including most importantly, the ones with least experience of the condition, when faced with an AKI patient. In addition, recommendations on where to seek help and when, contact numbers, transfer checklists and referral pathways across the region have been included to prevent delays in getting patients the care that they need, regardless of where in the region they are treated. Organisations can adapt these documents to complement any work that is already embedded locally. The hospital care guidelines and pathways are designed to integrate with the primary care guidelines (included) which have been developed in tandem. These guidelines also support organisations in delivering AQuA (Advancing Quality Alliance) standards around acute kidney injury.

Isn’t there national work developing around acute kidney injury?
There is a national programme of work, led by the National Clinical Director for kidney disease, which recommends local implementation. The work of members of the regional group feeds into the national work and as improvements are made in practice they will be incorporated into future versions of the manual.

Who wrote the manual?
The guidelines and pathways that comprise the manual have been written and developed through consensus by a multi disciplinary, multi organisational group across Cheshire and Merseyside that is linked into ongoing national work. A survey was conducted in 2013 across all Trusts in the region to understand the services available and the gaps, both actual and perceived in comparison to the recent NICE guidelines. Varied sources including NICE guidance, NCEPOD recommendations and pre-existing local work have been utilised to formulate this manual. The group’s work was then checked, reviewed and signed off by the Cheshire & Merseyside Strategic Clinical Networks Kidney Group (October 2014), and by the Cheshire & Mersey Critical Care Network (October 2014).

Design & developments:
The manual is designed to allow any clinician to get to the part that is most relevant to their patient without having to trawl through a large document. Detailed references and source material have therefore been included in a separate folder. Work is ongoing on other aspects of AKI and will be added on in due course. Examples include contrast induced nephropathy, peri-operative and discharge care.

To best utilise these tools, each Trust is encouraged to appoint a senior clinician as their AKI lead and implement the NHS England patient safety advice on implementing AKI e-alerts to clinicians from their laboratory IT systems. Trusts are also asked to incorporate these transfer policies into their bed management practices and include AKI in their professional development programmes.

All updated versions of this manual will be posted on the websites of the Strategic Clinical Networks and the Critical Care Network, and sent to AKI champions in each organisation.

Please note that clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. When there is any uncertainty regarding the most appropriate clinical plan, early discussion with the nephrology or critical care teams is recommended.

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Medical Lead
Cheshire & Mersey Critical Care Network
Gary.masterson@rlbuht.nhs.uk
ACUTE KIDNEY INJURY BUNDLE

Date ____________ Time ____________

Hosp No Name Address
Date of Birth Age

ASSESSMENT BUNDLE (INITIATE ASAP & COMPLETE WITHIN FIRST 4 HOURS)

A. RISK ASSESS AND PREVENT (IF IN AKI, skip to step B. Diagnose)
   - Hypovolaemia
   - Deteriorating EWS
   - Oliguria
   - Sepsis
   - Chronic Kidney Disease
   - Potential nephrotoxic medicines
   - Iodinated contrast in past week

   □ NO RISK FACTOR

   If ANY Risk Factor Present, To Prevent AKI
   [Tick actions taken]
   1. Measure Urea, Creatinine and electrolytes [U&E] immediately & daily
   2. Avoid nephrotoxins unless no alternative
   3. Set regular monitoring of Early Warning Scores [EWS] & Urine output
   4. Set lower trigger for escalation from EWS and Urine output
   5. Maintain adequate BP and hydration

B. DIAGNOSE: Confirm AKI using one of the following criteria (Tick criteria).
   □ Serum creatinine rises by ≥ 26μmol/L within 48 hours
   □ Serum creatinine rises ≥ 1.5 fold from the reference value within one week [known / presumed]
   □ Urine output is < 0.5ml/kg/hr for > 6 consecutive hours
   The reference serum creatinine should be the lowest creatinine value recorded within 3 months of the event. If a reference serum creatinine value is not available within 3 months and AKI is suspected repeat serum creatinine within 24 hours.

IF AKI IS DIAGNOSED STAGE AKI BELOW

<table>
<thead>
<tr>
<th>Stage</th>
<th>Serum Creatinine Criteria</th>
<th>Urine Output Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26μmol/L rise or 1.5 – 1.9 X reference in 48 hrs</td>
<td>&lt; 0.5 ml/kg/hr &gt; 6 consecutive hrs</td>
</tr>
<tr>
<td>2</td>
<td>Increase 2 – 2.9 X reference in 48 hrs</td>
<td>&lt; 0.5 ml/kg/hr &gt; 12 consecutive hrs</td>
</tr>
<tr>
<td>3</td>
<td>Increase ≥3 X reference in 48 hrs Or ≥354 μmol/L or commenced on renal replacement therapy (RRT)</td>
<td>&lt; 0.3 ml/kg/hr &gt; 24 consecutive hrs or anuria for 12 hrs</td>
</tr>
</tbody>
</table>

STAGE __________________________

IDENTIFY & TREAT CAUSE:
   - Common causes include Hypoperfusion, Obstruction, Sepsis, Intrinsic Kidney Diseases, Rhabdomyolysis, Toxins, Trauma/Surgery, Liver decompensation
   - If unknown, document as unknown

CAUSE __________________________

IF AKI IS CONFIRMED COMMENCE MANAGEMENT BUNDLE OVERLEAF

Name __________________________
Grade __________________________
Bleep No. ________________________
Signature ________________________
**ACUTE KIDNEY INJURY BUNDLE**

Date ___________ Time ___________

### MANAGEMENT BUNDLE (INITIATE ASAP & COMPLETE WITHIN FIRST 24 HOURS)

1. **BP & HYDRATION:**
   - **BP LOW**
     - □ Stop antihypertensives and diuretics
     - □ IV Fluids prescribed based on volume status
     - □ Input / output chart commenced
     - □ Hourly EWS & urine output
   - **BP HIGH**
     - □ Continue antihypertensives
     - □ All other measures as above except IV fluids

2. **MEDICATION:**
   - □ Stop / Avoid all potential nephrotoxins and drugs that can become toxic in AKI
     - *Including ACE-1, ARB’s, Aliskiren, NSAIDs, COX 2 inhibitors, K sparing diuretics, Metformin, Aminoglycosides, IV contrast, Trimethoprim*
   - □ Pharmacist review within 24 hours including dose adjustment

3. **INVESTIGATIONS:**
   - □ ABG / Venous HCO3, FBC, U&E, CK, bone profile, Chloride, LFT, CRP, CXR, ECG
   - □ Urine dipstick, C&S, ACR
   - □ Urgent Renal Screen in all patients with blood/protein in Urine or AKI 2 or 3: ANCA, Anti GBM, Serum Electrophoresis, Urine Bence Jones protein, Coagulation
   - □ Urgent Hepatitis B, C & HIV in all AKI 3 and progressive AKI 2
   - □ Daily U&E and venous HCO3 until AKI resolved
   - □ Ultrasound KUB
     - Within 24 hours if obstruction suspected / Cause of AKI unknown / AKI not resolving
     - Within 6 hours if suspicion of infected kidney (pyonephrosis) / obstructed single kidney
   - **Reason for not requesting scan:** __________________

4. **CATHETERISE:**
   - □ If urine output low / obstruction suspected

5. **TREAT COMPLICATIONS:**
   - □ Acidoses
   - □ Pulmonary Oedema
   - □ Hyperkalaemia

6. **INFORMATION: To patient or carer/s**
   - □ Explain
   - □ Information sheet given

### REFERRAL ADVICE

**ALL PATIENTS WITH AKI SHOULD HAVE A SENIOR REVIEW WITHIN 12 HRS**

<table>
<thead>
<tr>
<th>Critical Care Outreach</th>
<th>Renal</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients with AKI meeting local referral criteria for critical care outreach who would be for escalation of care</td>
<td>AKI Stage 3: Refer all patients <strong>within 12hr of detection of AKI stage 3</strong> AKI Stage 1 / 2: Complications or progression despite medical management or if possible cause that may need specialist renal treatment (refer to referral criteria)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Critical Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Failure (Pulmonary Oedema) or Circulatory Failure requiring Inotropes Multi-organ failure or Severe Acidosis (pH&lt;7.2) Patients not responding to medical management or who may need dialysis in centre without on-site renal teams</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Urology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal tract obstruction and <strong>immediately</strong> if evidence of pyonephrosis, solitary obstructed kidney, bilateral obstruction or complications of obstruction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Grade</th>
<th>Bleep No.</th>
<th>Signature</th>
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# Management of Hyperkalaemia in Patients with AKI

## Immediate Management

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
</tr>
</thead>
</table>
| 0 – 30 MINS | Check & document Early Warning Score  
Cardiac Monitor  
If unwell, K+ > 6.5 mmol/L or acute ECG changes present |

### ABCDE Approach
- Seek expert help if airway, breathing or circulation compromised
- Obtain IV access (If using 50% glucose or 10% calcium infusions consider central line)
- Assess fluid status and Resuscitate or Replace fluid loss

### Exclude Pseudo-Hyperkalaemia
- Repeat U&E using lithium heparin anti-coagulated sample container
- Check Venous or Arterial Blood Gas for prompt K+ result

### Perform 12 Lead ECG

## Severity Based Management

### MILD
- K+ 5.5–5.9 mmol/l

### MODERATE
- K+ 6–6.4 mmol/l

### Severe
- K+ ≥ 6.5 mmol/l

### Any Acute ECG Changes
- Peaked T waves, Absent P waves, Broad QRS, Sine wave, Bradycardia, VT

### Protect the Heart
- 10 ml 10% Calcium Gluconate IV (2.26 mmol) over 5–10 min and repeat after 10 min if no improvement on ECG

### Shift K+ into cells
- Add 10 units soluble Insulin (usually Actrapid) to 250ml 10% Glucose IV over 30 min (Alternatively 50ml 50% glucose IV over 15 min) and repeat until Potassium < 5.5mmol/L for at least 4hrs.
- Salbutamol 5mg via Nebuliser (can give up to 10-20mg total as back to back). Ensure HR < 120
- Give IV Sodium Bicarbonate (1.26% or 1.4%) 500ml over 4hr if serum bicarbonate < 20mmol/L and not volume overloaded

### Remove K+ from body
- Give calcium resonium 30g orally stat then 15g qds along with laxative as resonium can often contribute to constipation. Give as a 30g rectal enema to be retained ≥ 6hrs if can’t tolerate orally
- Sodium resonium 30g qds can be used in patients with hypercalcaemia
- Give IV Furosemide 80mg as bolus ONLY if euvoalaemic or overloaded

### Consider Dialysis
- Where there is poor response to medical therapy discuss with Renal or Critical Care team urgently.

### Monitor & Avoid Cause
- Monitor serum K+ and blood glucose as suggested
- Consider cause of hyperkalaemia, prevent further rise and recurrence
- Stop medications that can cause hyperkalaemia such as ACE-I, ARB, Aliskiren, Trimethoprim, K sparing diuretics & spironolactone
- Complete AKI Bundle if hyperkalaemia is associated with AKI

### Ongoing
- Serum Potassium
- Potassium should be measured at the following times after identification and initiation of treatment of hyperkalaemia
  - 1hr
  - 2hr
  - 4hr
  - 6hr
  - 24hr

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Developed by AKI group, signed off 21/10/14 by Cheshire & Merseyside Strategic Kidney Network & Cheshire & Mersey Critical Care Network.  
# Management of Pulmonary Oedema in Patients with AKI

## Immediate Management

**Airway Breathing Circulation Disability Exposure (ABCDE) Approach**

- Seek expert help if airway, breathing or circulation compromised
- Nurse in upright position
- Administer High flow O2 (60 – 100% unless contraindicated)
- Obtain IV access
- If being administered IV fluids – immediately discontinue
- Monitor urine output hourly
- Perform 12 Lead ECG and CXR

## Subsequent Management

### Is patient Hypotensive?

#### Yes

- Consider referral to Critical Care
  - Contact Nephrology on call team
  - CPAP & Inotropes

#### No

- **Loop diuretics:** Was patient already taking these?
  - If diuretic naïve consider Furosemide 40mg IV.
  - If inadequate response, double the dose every 60 min up to a dose of 400mg.
  - N.B. max rate is 4mg/min.
  - If responds to bolus, put onto undiluted furosemide IV infusion via syringe pump titrated up to 10mg/hr aiming to maintain urine output at 0.5 ml/kg/hr
  - N.B. Max daily dose 1.5g
  - If known dialysis patient, also contact nephrology on call immediately

- **IV Isosorbide Dinitrate eg Isoket:** Commence 0.05% solution starting at 1ml/hr or 0.1% solution at 0.5 ml/hr and monitor cardiovascular status, stopping it if BP < 100mmHg and/or HR > 120/min

- **IV Diamorphine/ Morphine:** Give only if BP > 100mmHg

### Has patient responded to treatment?

- Reduced breathlessness with improvement in RR, SpO2 and Urine output > 0.5ml/kg/hr

#### Yes

- Senior review and discussion with Nephrology team on-call to establish plan for ongoing care

#### No

- **Urgent senior review**
  - Contact Nephrology on call team
  - Consider referral to Critical Care
  - Dialysis may be required
ACUTE KIDNEY INJURY REFERRAL CRITERIA

PLEASE NOTE: You will need to refer to the AKI Transfer Checklist along with this document.

All AKI

Possible diagnosis that may need specialist treatment:
- Vasculitis
- Glomerulonephritis
- Tubulointerstitial nephritis
- Myeloma

AKI with no clear cause
Inadequate response to treatment
Complications associated with AKI
AKI Stage 3
Prior Renal Transplant

NEPHROLOGY HUB REFERRAL
Refer Urgently if meets criteria listed below for renal replacement

Renal Replacement Criteria
Refer patients immediately if any of the following are not responding to medical management:
- Hyperkalaemia
- Metabolic acidosis
- Symptoms or complications of uraemia (for example, pericarditis or encephalopathy)
- Fluid overload
- Pulmonary oedema

All AKI

Obstruction on USS (NB partially obstructed patients may have normal or high urine volumes)

LOCAL UROLOGY REFERRAL
Refer Urgently if meets criteria listed below

Urgent Urology Criteria
Immediate referral if one or more of the following present:
- Pyonephrosis
- Obstructed single kidney
- Bilateral upper urinary tract obstruction
- Complications of AKI secondary to urological obstruction

When nephrostomy or stenting is used to treat upper tract urological obstruction, undertake as soon as possible and within 12 hours of diagnosis.

CRITICAL CARE REFERRAL

Referral should be made to Local Critical Care Team for patients where AKI is part of multi-organ failure and escalation is considered appropriate.
Referral should also be made where the AKI transfer checklist suggests requirement due to criteria that would make transfer to renal hub potentially unsafe.

Developed by AKI group, signed off 21/10/14 by Cheshire & Merseyside Strategic Kidney Network & Cheshire & Mersey Critical Care Network.
REFERRAL PATHWAYS FOR ADULT PATIENTS WITH AKI

PLEASE NOTE: ALL renal hubs have to maintain dedicated renal beds for priority transfer of patients with single organ failure AKI

Uncomplicated single organ failure AKI
With low risk of requiring level 2 critical care respiratory or cardiovascular support.

Local Renal Hub
Where considered appropriate for transfer by renal team, transfer to local Renal Hub
Complete AKI Transfer Checklist
Refer to Renal Contact Sheet

Multi organ failure AKI
Patients with AKI as part of a systemic disease requiring the support of other organs

Local critical care service
For support and stabilisation at local critical care unit.
If patients have multiple organ failure secondary to a systemic disease usually managed by nephrology (such as vasculitis) an onward referral to critical care unit in renal centre should be arranged.
Complete AKI Transfer Checklist

No Local Renal Hub bed available

Alternative Renal Hub
Local renal hub’s consultant nephrology team to identify bed in alternative Cheshire & Mersey Renal hub.
Once bed identified Referring team to liaise directly with alternative Renal Hub to effect transfer.
Complete AKI Transfer Checklist

Local critical care service
Renal Replacement Therapy [RRT] for uncomplicated, single organ AKI should be provided by local critical care service in referring site if no renal hub beds available with priority transfer back to local renal hub or alternative renal unit.
Once admitted to critical care, critical care team to liaise with local renal hub for priority transfer back to local renal hub, or alternative renal unit.
Complete AKI Transfer Checklist

Step-down
Transfer back to be arranged when decided as clinically appropriate by the Critical Care/ Renal team.
## ACUTE KIDNEY INJURY TRANSFER CHECKLIST

**PLEASE NOTE:** The following criteria **MUST** be met to enable renal teams to ensure transfer safety without the involvement of the referring hospital’s critical care team. If in doubt, discuss case with the local critical care team.

### ESSENTIAL CRITERIA

<table>
<thead>
<tr>
<th><strong>AIRWAY</strong></th>
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<tbody>
<tr>
<td>□ Airway patent &amp; Safe without adjuncts</td>
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<table>
<thead>
<tr>
<th><strong>BREATHING</strong></th>
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<tbody>
<tr>
<td>□ Respiratory Rate &gt; 9/min and &lt;25/min</td>
<td></td>
</tr>
<tr>
<td>□ Adequate Oxygenation as per Oxygen guidelines confirmed by arterial blood gas analysis where indicated and not on more than 35% Oxygen.</td>
<td></td>
</tr>
<tr>
<td>□ Not requiring CPAP</td>
<td></td>
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<table>
<thead>
<tr>
<th><strong>CIRCULATION</strong></th>
<th></th>
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<tbody>
<tr>
<td>□ Heart Rate ≥ 50/min and &lt; 120/min</td>
<td></td>
</tr>
<tr>
<td>□ BP ≥ 100mmHg and MAP of ≥ 65mmHg without inotropic support</td>
<td></td>
</tr>
<tr>
<td>□ No request for blood products in last 4 hours</td>
<td></td>
</tr>
<tr>
<td>□ No life threatening haemorrhage in last 24 hours</td>
<td></td>
</tr>
<tr>
<td>□ No CPR in last 24 hours</td>
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<tr>
<th><strong>DISABILITY</strong></th>
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<tr>
<td>□ AVPU – Alert</td>
<td></td>
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<tr>
<td>Discuss any New or background cognitive impairment on referral</td>
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<table>
<thead>
<tr>
<th><strong>METABOLIC</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Potassium &lt; 6mmol if AKI</td>
<td></td>
</tr>
<tr>
<td>If chronic RRT patient Potassium not more than 1mmol above usual pre-dialysis baseline</td>
<td></td>
</tr>
<tr>
<td>□ pH &gt; 7.2</td>
<td></td>
</tr>
<tr>
<td>□ Lactate &lt; 4</td>
<td></td>
</tr>
</tbody>
</table>

### AKI TRANSFER INFORMATION

1. Ensure above clinical assessment of transfer safety is made by at least a Middle Grade doctor or above.
2. Urgency of Transfer is a matter of senior (StR or Consultant) clinical judgement.
3. Choice of staff to accompany patient is for senior (StR or Consultant) judgement. If in doubt, critical care service in the referring hospital should be requested to offer an opinion on how the transfer should proceed.
4. Inform receiving unit of Infection Control status of patient where applicable.
5. Complete Intensive Care Bed Information Form for all AKI Transfers to Renal Hub or Critical Care beds.
6. Follow Cheshire & Mersey Critical Care Network (CMCCN) standards for inter-hospital transfer of critical care patients.

<table>
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<tr>
<th>Name</th>
<th>Grade</th>
<th>Bleep No.</th>
<th>Signature</th>
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## KIDNEY UNIT CONTACTS

**PLEASE NOTE:** This information is correct at the time of publication.

### Aintree University Hospital
- Southport District General Hospital
- Ormskirk District General Hospital
- Walton Centre
- Merseycare

**CONTACT**
- Nephrology Consultant on Call
- Aintree University Hospital
- Telephone 0151 5255980
- Also Fax 0151 5292420

### Royal Liverpool University Hospital
- Broadgreen Hospital
- Liverpool Heart & Chest Hospital
- Liverpool Women’s Hospital
- Warrington General Hospital
- Halton General Hospital
- Whiston & St Helens Hospital
- Nobles Hospital, Isle of Man

**CONTACT**
- Nephrology Registrar on Call
- Royal Liverpool Hospital
- Telephone 0151 7062000

### Arrowe Park Hospital
- Clatterbridge Hospital
- Countess of Chester Hospital

**CONTACT**
- Nephrology Consultant on Call
- Arrowe Park Hospital
- Telephone: 0151 6785111
- Chester to Telephone: 01244365000
- Fax: 0151 6047475

### Macclesfield Hospital

**CONTACT**
- Nephrology Consultant on Call
- Central Manchester University Hospital
- Telephone: 0161 2761234

### Mid Cheshire Hospitals - Leighton Hospital

**CONTACT**
- Renal secretary or Nephrology Registrar on Call
- University Hospital of North Staffordshire
- Telephone: 01782 715444
- Fax: 01270 612512

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PREVENTION OF ACUTE KIDNEY INJURY

**RISK FACTORS FOR AKI**

- Chronic kidney disease (adults with eGFR less than 60 ml/min/1.73 m²)
- Renal transplant recipients
- Heart failure
- Liver disease
- Diabetes
- History of acute kidney injury
- Oliguria (urine output less than 0.5 ml/kg/hour)
- Cognitive impairment that may limit access to fluids
- Hypovolaemia
- Use of drugs with nephrotoxic potential (such as non-steroidal anti-inflammatory drugs)
  - [NSAIDs], aminoglycosides, angiotensin-converting enzyme [ACE] inhibitors, angiotensin II receptor antagonists [ARBs] and diuretics) within the past week, especially if hypovolaemic
- Use of iodinated contrast agents within the past week
- Urological obstruction – symptoms/ history or conditions that may lead to obstruction
- Sepsis
- Deteriorating BP, heart rate, respiratory rate.
- Age 65 yrs or more.

**ACTIONS**

**AVOID POTENTIAL NEPHROTOXINS WHEREVER POSSIBLE** e.g. Trimethoprim, NSAIDs, COX 2 inhibitors

If patient unwell

- Ensure adequate hydration and BP.
- Temporarily suspend antihypertensives or agents that can lower BP such as opiates, nitrates, if BP is low.
- Temporarily suspend all potential nephrotoxins.
- Check U&E’s. If Serum K⁺ is > 5.7 mmol/L refer in to AED.
- If not responding clinically, or is oliguric, or if U&E’s show progressive worsening, refer in to AED unless advance directive states otherwise.

If patient is stable

- Replace any potential nephrotoxin with a non nephrotoxic alternative if possible.
- Recheck U&E’s 7 days after any dose increase of a potential nephrotoxin that is essential for treatment eg ACE inhibitors or ARB’s or diuretics.
- Temporarily suspend potential nephrotoxins before exposure to unavoidable risk such as IV contrast. Liaise with hospital team for contrast nephropathy prophylaxis.
- Recheck U&E’s 7 days after any episode of AKI or exposure to any potential insult such as major surgery or nephrotoxin eg. IV contrast.
- After an episode of AKI, hold potential nephrotoxins for 6 weeks to enable recovery. Then consider restarting if indicated.
- If worsening of urea or creatinine noted 10% or more from baseline, suspend nephrotoxin recheck U&E’s in a week. If continues to worsen, refer to nephrologist or general physician. If Serum K⁺ is > 5.7 mmol/L refer in to AED.
COMMUNITY ACUTE KIDNEY INJURY (AKI) GUIDELINE

### AKI DIAGNOSIS OR AKI ALERT RECEIVED FROM LABORATORY

Check patient’s previous urea, creatinine and electrolyte results (U&E’s) to differentiate AKI from stable Chronic Kidney Disease (CKD).

AKI is diagnosed on comparison of recent versus previous U&E results or drop in urine output as defined below:

- **Serum creatinine rise of ≥ 26µmol/L or ≥ 1.5 X reference in 48 hrs**
- **Urine output < 0.5 ml/kg/hr > 6 consecutive hrs**

- Review by GP / community nurse practitioner
- Diagnose & treat any acute illnesses contributing to AKI

### ESSENTIAL STEPS TO BE INITIATED BY COMMUNITY PHYSICIANS / TEAM

**think FLUiDS**

- **Fluid balance**: Check for signs of dehydration and treat and encourage oral fluid.
- **Low BP** (check BP and if low, SBP³<110), withhold anti-hypertensive, diuretics  
  (If history of angina/ cardiac arrhythmia, reduce beta blocker)
- **Urine**: dip test and microscopy
- **Bladder palpable**: catheterise
- **Drugs and Toxins**: Stop NSAID eg: Ibuprofen, COX 2 Inhibitors, Trimethoprim. ACE Inhibitors, Angiotensin receptor blockers. Avoid any nephrotoxic medications
- **Sepsis**: Look for signs of sepsis and treat accordingly

### REFERRAL

- **If Serum K is > 5.7 mmol/L**, refer in to AED, unless advance directive states otherwise
- **If patient unwell** and not responding clinically, or remains oliguric, or requires IV therapy, refer in to AED unless advance directive states otherwise
- **If patient is well**:
  - Continue with essential steps listed above
  - Repeat U & E’s in 24 - 48 hours
  - **Renal screen**: if haematuria/proteinuria in the absence of a UTI, or suspected vasculitis/ myeloma, discuss with Renal on-call team or Acute Medicine (Medical Admissions Unit / Emergency Admissions Unit)
  - Refer to hospital if vasculitis or acute nephritis suspected OR worsening U&E’s or persistent oliguria despite treatment, unless advance directive states otherwise
  - **Renal screen**: ANCA, Anti-GBM Ab, Autoantibodies, Serum Immunoglobulin & paraprotein, urine Bence Jones Protein, Urine albumin creatinine ratio

### RECOVERY

Review medications; commence monitoring if medications re-introduced. Discuss future risk reduction with patient/ carers.