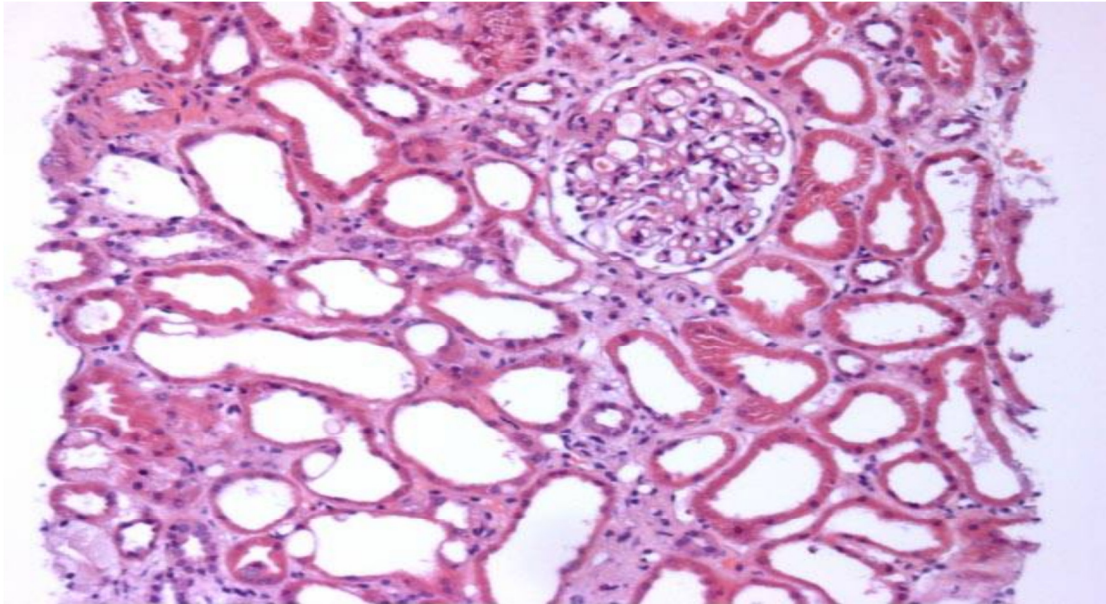


Acute Kidney Injury Patient Pathway (AKIPP) (Adult Patients)

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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**

Acute Kidney Injury

Causes of Acute Kidney Injury (PIP)

- **P**re-renal
- **I**ntrinsic-renal
- **P**ost-renal



Rising creatinine
=
↑morbidity and ↑mortality

↑Cr > normal range
=
> 50% loss of kidney function

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

Stage	Serum creatinine	Urine output
1	rise ≥ 26 µmol/L within 48hrs <u>or</u> rise ≥ 1.5- to 1.9 x baseline SCr	<0.5 mL/kg/hr for > 6 consecutive hrs
2	rise ≥ 2 to 2.9 x baseline SCr	<0.5 mL/kg/ hr for > 12 hrs
3	rise ≥ 3 x baseline SCR <u>or</u> rise > 354 µmol/L <u>or</u> commenced on renal replacement therapy (RRT) irrespective of stage	<0.3 mL/kg/ hr for > 24 hrs <u>or</u> anuria for 12 hrs

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 $K^+ > 5.5\text{mmol/L}$
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)

Ca^{2+}/PO_4^{3-} (myeloma)

Creatine Kinase
(rhabdomyolysis)

Blood cultures if sepsis
suspected

Document Urinalysis-
if blood, protein,
leucocytes or nitrites
send MSU

USS renal tract and
bladder

- if obstruction
suspected < 24 hrs
- if pyonephrosis
suspected < 6 hrs

*HUS = Haemolytic
Uraemic Syndrome
*TTP = Thrombotic
Thrombocytopenic
Purpura

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,
Spironalactone
Anti-hypertensives e.g.
ACE-I, ARB

Avoid

Contrast
Gentamicin
NSAIDs
Metformin

***Consult local trust AKI
guidelines***

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?

HOSPITAL TRANSFER POLICY TO RENAL UNIT FOR PATIENTS WITH AKI

Patient must be clinically assessed using ABCDE just prior to hospital transfer by referring team
Consider P2 referral (discuss with senior nurse)

In addition transfer may only proceed if the following criteria are met

Potassium must be safe

K^+ < 6.5 and No ECG changes

If hyperkalaemia has been treated it must be determined how and when 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

Acid-base status must be safe

pH > 7.2

Venous bicarbonate > 12 mmol/L

Lactate < 4 mmol/L

Respiratory status must be safe

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

Circulatory status must be safe

HR > 50/min and < 130/min

BP > 100mmHg systolic

MAP > 65mmHg

(lower BP values may be accepted if it has been firmly established these are pre-morbid)

Neurological status must be safe

Alert (AVPU)

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
ACIDOSIS
PULMONARY OEDEMA
URAEMIC ENCEPHALOPATHY
URAEMIC PERICARDITIS

BEGIN MEDICAL THERAPY AND SEEK SENIOR MEDICAL REVIEW



Hyperkalaemia in AKI

$K^+ > 6.0\text{mmol/L}$ 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)

$K^+ > 6.0\text{mmol/L}$ with ECG changes or $K^+ > 6.5\text{mmol/L}$ 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

$K^+ < 6.0\text{mmol/L}$

$\text{pH} > 7.2$

Venous bicarbonate $> 12\text{mmol/L}$

Lactate $< 4\text{ mmol/L}$

Respiratory status

Respiratory rate $> 11 /\text{min}$ and $< 26/\text{min}$

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 $> 50/\text{min}$ and $< 120/\text{min}$

BP $> 100\text{mmHg}$ systolic

MAP $> 65\text{mmHg}$

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.

Contributors:

Airedale General Hospital NHS Trust:

Rachel	Binks	Consultant Nurse
Colin	Evans	Consultant Biochemist

Bradford Teaching Hospitals NHS Foundation Trust:

Stephen	Goodall	Consultant Clinical Scientist
Russell	Roberts	Consultant Nephrologist

Calderdale and Huddersfield NHS Foundation Trust:

Denise	Cunningham	Senior Nurse / Renal Nurse Specialist
Peter	Hall	Consultant Anaesthetist
Richard	Johnson	Consultant Anaesthetist
Karen	Mitchell	Consultant Chemical Pathologist

Leeds Teaching Hospitals NHS Trust:

Mike	Bosomworth	Head of Biochemistry
Jo	Caldicott	Deputy Chief Nurse
Andrew	Cohen	Consultant Anaesthetist & WYCCN Clinical Lead
Ashley	Garner	Higher Specialist Trainee Clinical Biochemist
Andrew	Lewington	Renal Physician
James	Tattersall	Renal Physician
John	Dade	Pharmacist

Mid Yorkshire Hospitals NHS Trust:

Paul	Clarke	Consultant Intensivist
Marieke	Jordaan	Consultant Chemical Pathologist
Rajdeep	Sandhu	Consultant Anaesthetist
Stephanie	Symons	Consultant Urological Surgeon
Richard	Shepherd	Consultant
Nicole	Williams	Medical

Other Contributors:

Karen Dearden, Manager, West Yorkshire Critical Care Network

Jackie Parr, Specialised Services Commissioner, West Yorkshire Specialised Commissioning Group also representing Yorkshire & Humber Renal Network

Dr Sarah Harding, General Practitioner

Berenice Lopez, Consultant Chemical Pathologist, Harrogate

Kathy Smith, Coordinator, West Yorkshire Critical Care Network