Recognition of AKI, assessment of severity and planning treatment

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Overview

- National Patient Safety Alert
- AKI alerts
- Paediatric AKI in the UK
- Guidance documents
- Take home messages

National Confidential Enquiry into Patient Outcome and Death

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).

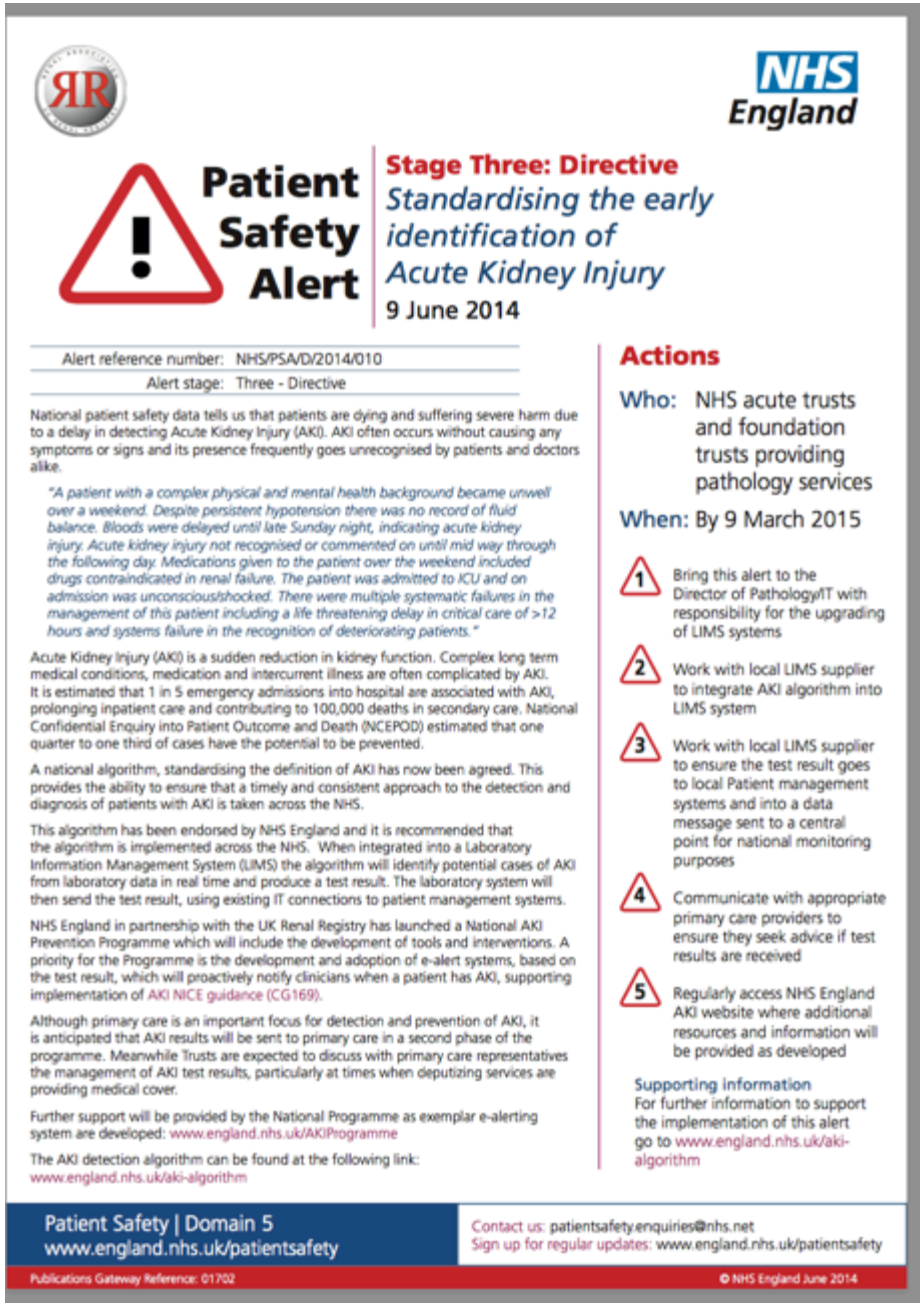
NCEPOD

2009

Conclusion

- Systematic failings in AKI
- Failures in:
  - Recognition and management of AKI
  - Recognition and management of complications
  - Referral and support
- Failures in recognition of the acutely ill

NCEPOD



NHS England

Patient Safety Alert

Stage Three: Directive

Standardising the early identification of Acute Kidney Injury

9 June 2014

Alert reference number: NHS/PSA/D/2014/010
Alert stage: Three - Directive

National patient safety data tells us that patients are dying and suffering severe harm due to a delay in detecting Acute Kidney Injury (AKI). AKI often occurs without causing any symptoms or signs and its presence frequently goes unrecognised by patients and doctors alike.

> *"A patient with a complex physical and mental health background became unwell over a weekend. Despite persistent hypotension there was no record of fluid balance. Bloods were delayed until late Sunday night, indicating acute kidney injury. Acute kidney injury not recognised or commented on until mid way through the following day. Medications given to the patient over the weekend included drugs contraindicated in renal failure. The patient was admitted to ICU and on admission was unconscious/shocked. There were multiple systematic failures in the management of this patient including a life threatening delay in critical care of >12 hours and systems failure in the recognition of deteriorating patients."*

Acute Kidney Injury (AKI) is a sudden reduction in kidney function. Complex long term medical conditions, medication and intercurrent illness are often complicated by AKI. It is estimated that 1 in 5 emergency admissions into hospital are associated with AKI, prolonging inpatient care and contributing to 100,000 deaths in secondary care. National Confidential Enquiry into Patient Outcome and Death (NCEPOD) estimated that one quarter to one third of cases have the potential to be prevented.

A national algorithm, standardising the definition of AKI has now been agreed. This provides the ability to ensure that a timely and consistent approach to the detection and diagnosis of patients with AKI is taken across the NHS.

This algorithm has been endorsed by NHS England and it is recommended that the algorithm is implemented across the NHS. When integrated into a Laboratory Information Management System (LIMS) the algorithm will identify potential cases of AKI from laboratory data in real time and produce a test result. The laboratory system will then send the test result, using existing IT connections to patient management systems.

NHS England in partnership with the UK Renal Registry has launched a National AKI Prevention Programme which will include the development of tools and interventions. A priority for the Programme is the development and adoption of e-alert systems, based on the test result, which will proactively notify clinicians when a patient has AKI, supporting implementation of AKI NICE guidance (CG169).

Although primary care is an important focus for detection and prevention of AKI, it is anticipated that AKI results will be sent to primary care in a second phase of the programme. Meanwhile Trusts are expected to discuss with primary care representatives the management of AKI test results, particularly at times when deputizing services are providing medical cover.

Further support will be provided by the National Programme as exemplar e-alerting system are developed: www.england.nhs.uk/AKIProgramme

The AKI detection algorithm can be found at the following link: www.england.nhs.uk/aki-algorithm

Actions

Who: NHS acute trusts and foundation trusts providing pathology services

When: By 9 March 2015

1. Bring this alert to the Director of Pathology/IT with responsibility for the upgrading of LIMS systems
2. Work with local LIMS supplier to integrate AKI algorithm into LIMS system
3. Work with local LIMS supplier to ensure the test result goes to local Patient management systems and into a data message sent to a central point for national monitoring purposes
4. Communicate with appropriate primary care providers to ensure they seek advice if test results are received
5. Regularly access NHS England AKI website where additional resources and information will be provided as developed

Supporting information
For further information to support the implementation of this alert go to www.england.nhs.uk/aki-algorithm

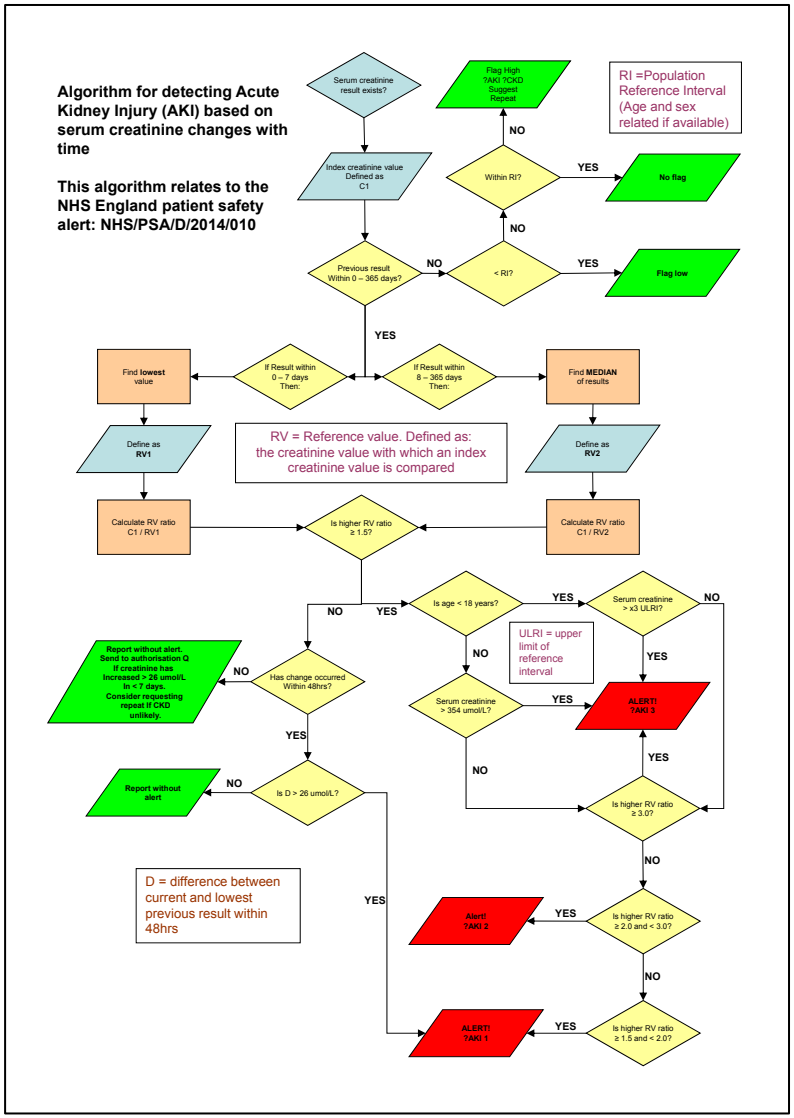
Patient Safety | Domain 5
www.england.nhs.uk/patientsafety

Contact us: patientsafety.enquiries@nhs.net
Sign up for regular updates: www.england.nhs.uk/patientsafety

Publications Gateway Reference: 01702

- Think Kidneys Campaign
- AKI Algorithm
- **Electronic AKI alerts**
- Patient Safety Alert
- 9th March 2015

National AKI algorithm



www.england.nhs.uk

- NHS England
- Standardising the early identification of AKI
- AKI 1,2,3
- **Paediatrics included**

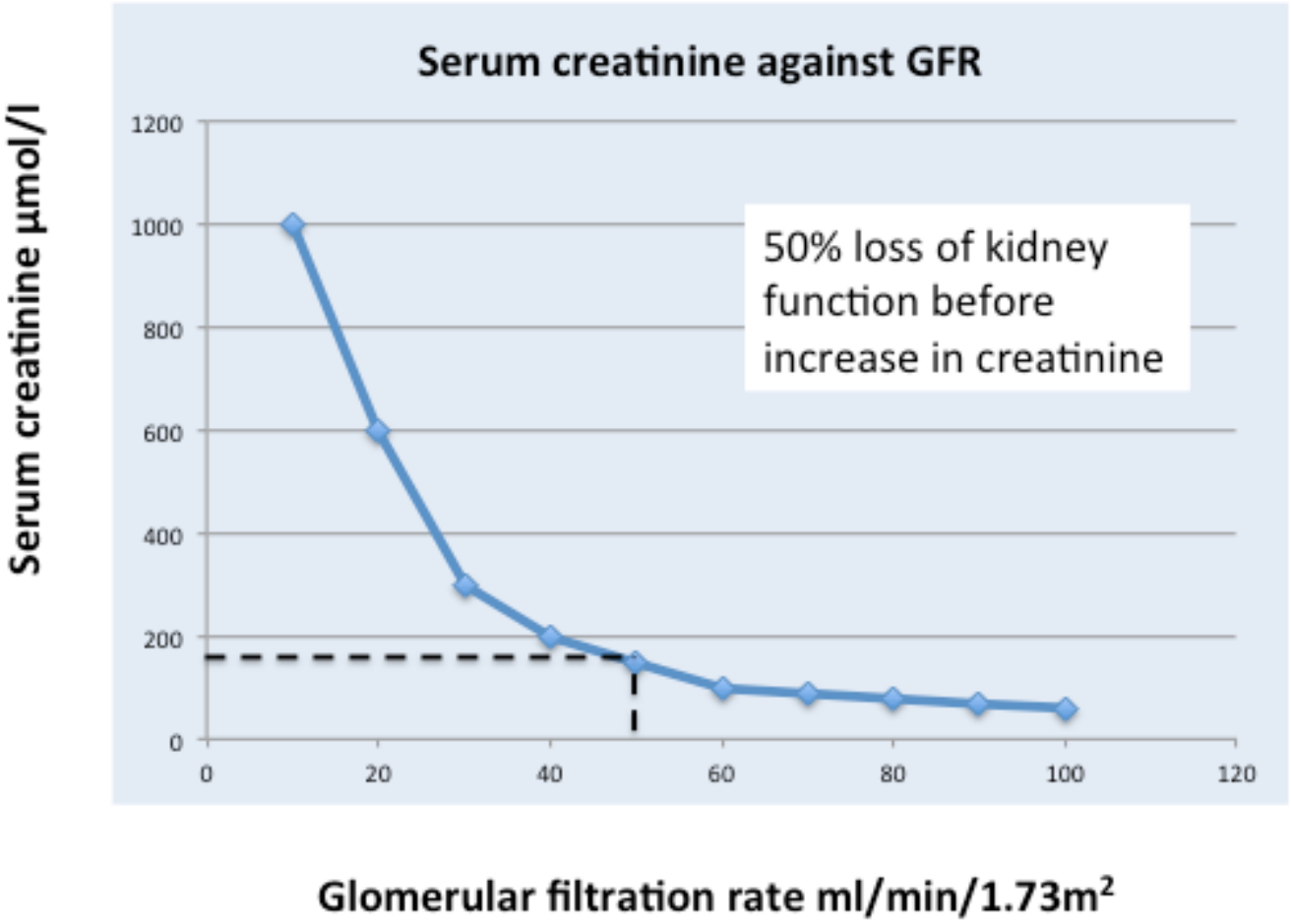
Is AKI a problem in paediatrics?

10 MARCH 2016

— KIDNEY — DISEASE & CHILDREN

ACT EARLY TO PREVENT IT!

Creatinine is a late biomarker



Paediatric AKI- the literature

- Depends on AKI definition used in studies

- 9-fold increase since between 1980-2005
  - *Vachvanichsanong P, Pediatrics 2006*

- PICU:
  - 25% all admissions
  - **82% AKI in critically ill children** (ventilation, inotropes)
  - 49% AKI Royal Manchester Children's Hospital
    - *McCaffrey J et al, Pediatric Nephrology 2015*

National study of paediatric AKI

British Association for Paediatric Nephrology

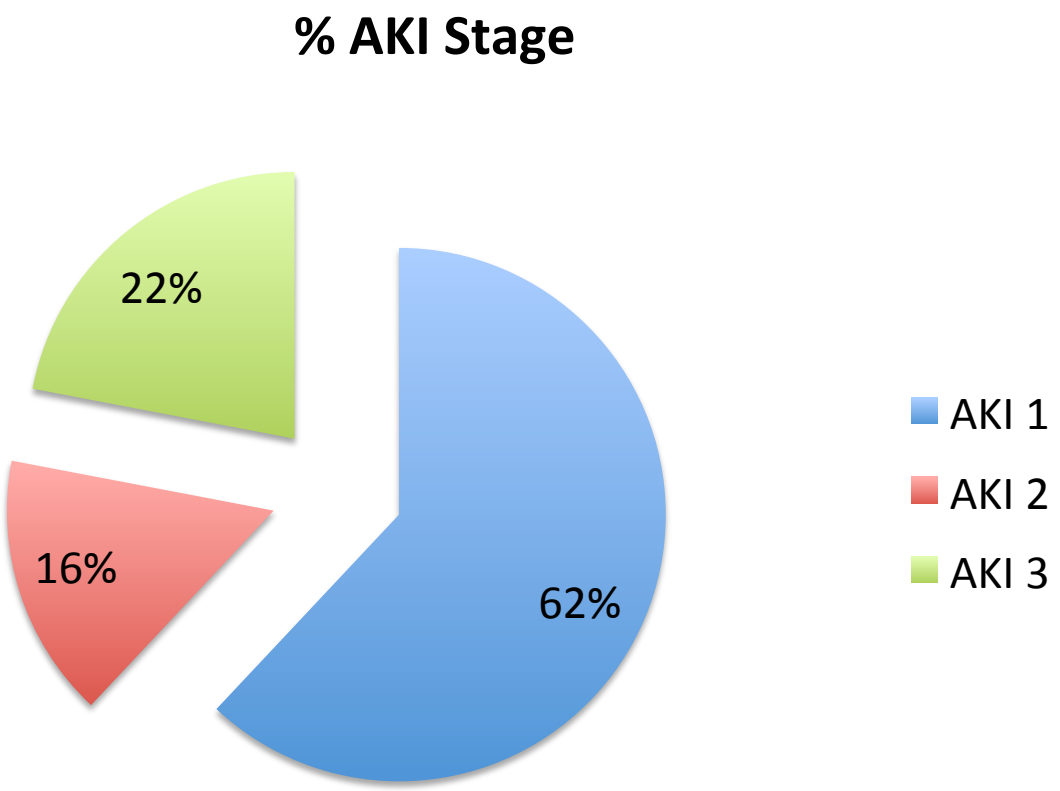
6-months

57,278 creatinine values

National study of paediatric AKI

- **5325** (10.8%) AKI episodes in **1112** patients
- **27%** AKI episodes recognised
- **In 27%**:
  - 16% daily weight
  - 33% urinalysis,
  - 38% renal USS,
  - 66% nephrotoxicity considered

National study of paediatric AKI



THINK KIDNEYS

Guidance for clinicians managing children at risk of, or with, acute kidney injury

Publication date May 2016

THINK KIDNEYS NHS

Think Kidneys is a national programme led by NHS England in partnership with UK Renal Registry

BAPN AKI MANAGEMENT RECOMMENDATIONS

AKI can be preventable: early detection and appropriate management reduces harm

Risk assess for AKI

check serum creatinine

High risk groups

Nephrourological, cardiac, liver disease

Malignancy, bone marrow transplant

Dependence on others for access to fluids

Medication
(eg., ACEi, ARB, NSAIDS, diuretics, aminoglycosides, calcineurin inhibitors)

High risk scenarios

History of reduced urine output

Sepsis

Hypoperfusion or dehydration

Nephrotoxic drug or toxin exposure

Renal disease or urinary tract obstruction

Major surgery

Prevention: 3Ms

MONITOR (**E**arly **W**arning **S**core, fluid balance, daily weight, urinalysis, serum creatinine and electrolytes)

MAINTAIN circulation (treat hypoperfusion adequately)

MINIMISE kidney insults (review, monitor and adjust medication)

Recognise AKI

Serum creatinine:
> 1.5x *reference* creatinine (=previous baseline if known)
>1.5x age specific upper limit refernce interval (ULRI)
(if creatinine between ULRI and 1.5x ULRI, repeat measurement)

Urine output:
<0.5mls/kg/hr for 8 hours

AKI stage

AKI 1: Measured creatinine >1.5-2x *reference* creatinine/ULRI

AKI 2: Measured creatinine >2-3x *reference* creatinine/ULRI

AKI 3: Measured creatinine >3x *reference* creatinine/ULRI

British Association for Paediatric Nephrology

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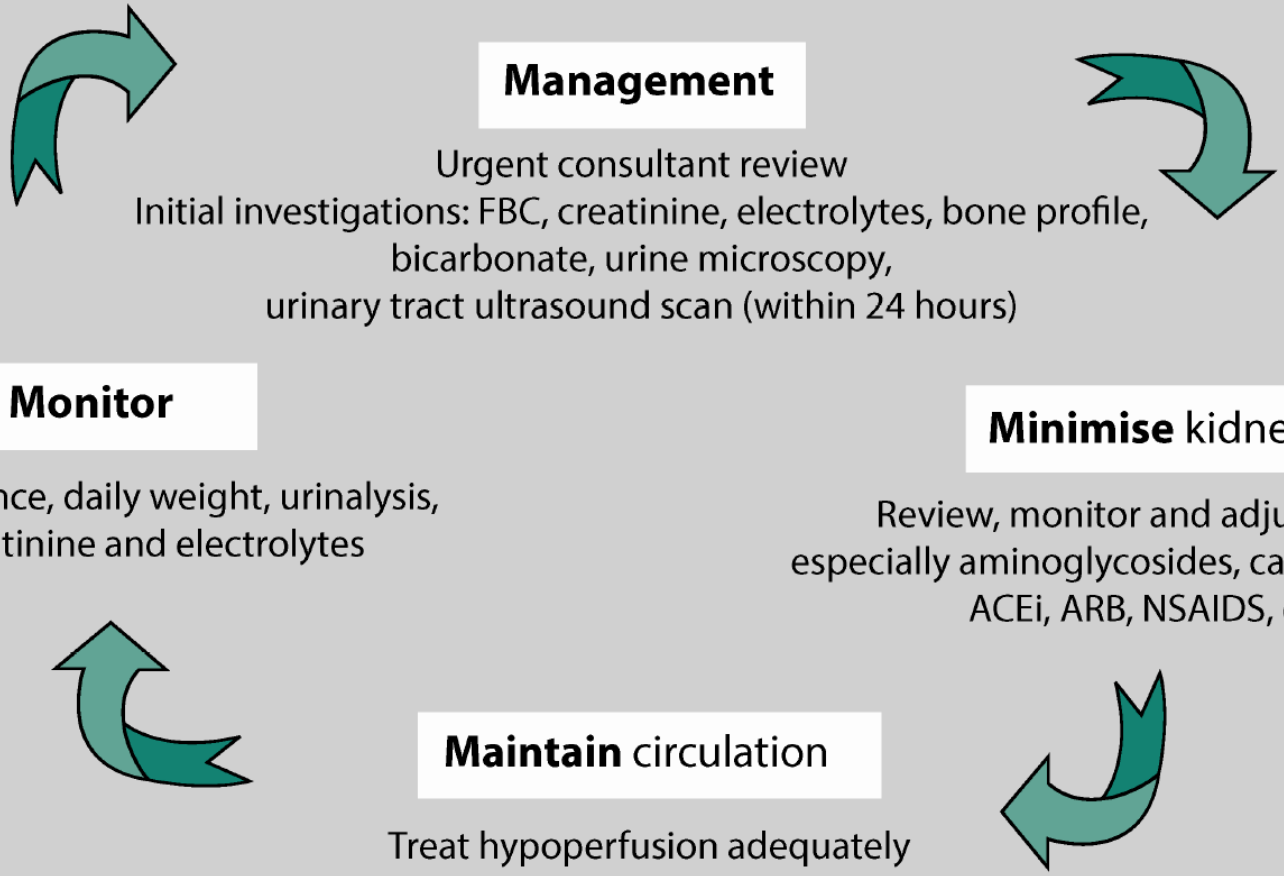
Management of confirmed AKI: 4Ms

1. Recognise and treat the underlying cause
2. Evaluate and review according to the following cycle:



Further management

AKI 1: If clinically relevant: C3/C4, ASOT, ANA, ANCA, anti-GBM antibodies, immunoglobulins, blood film, LDH, CK. **Consider discussion** with a specialist paediatrician with an interest in nephrology (SPIN) or tertiary nephrology

AKI 2: Investigations as for AKI 1. **Discuss** with SPIN or tertiary nephrology

AKI 3: Investigations as for AKI 1. **Discuss** with tertiary nephrology

PAEDIATRIC NEPHROLOGY REFERRAL

1. AKI in a patient with CKD4 or 5 or a renal transplant
2. Early referral if AKI is associated with multisystem disease or suspected intrinsic renal disease eg. haemolytic uraemic syndrome

Immediate referral in any stage of AKI with the following:
Potassium >6.5mmol/l (non-haemolysed sample)
Oligoanuria and plasma sodium <125mmol/l
Pulmonary oedema or hypertension unresponsive to diuretics
Plasma urea >40mmol/l unresponsive to fluid challenge

Follow-up

All patients who required dialysis or who have persisting proteinuria or reduced renal function at 3 months should be followed up by SPIN or tertiary nephrology

the 4Ms were adapted with kind permission of London AKI Network

Do I need to do anything in my hospital?

Age Group	Male		Female	
	Lower (LLRI)	Upper (ULRI)	Lower (LLRI)	Upper (LLRI)
0 - <14days	27	81	27	81
14d - <1yr	14	34	14	34
1 - <3yr	15	31	15	31
3 - <5yr	23	37	23	37
5 - <7yr	25	42	25	42
7 - <9yr	30	48	30	48
9 - <11yr	28	57	28	57
11yr	36	64	36	64
12yr	36	67	36	67
13yr	38	76	38	74
14yr	40	83	43	75
15yr	47	98	44	79
16yr	54	99	48	81
>16yr	Adult Range		Adult Range	
	59	104	45	84

Age related references ranges for creatinine (µmol/l)

Take home messages

- AKI is a common problem in paediatrics
- Respond to Safety Alerts
  - Reference ranges
- Guidance:
  - **M**onitor, **m**aintain, **m**inimise, **m**anage
- Outcome
  - Reduce the risk of chronic kidney disease

Acknowledgements

Karen Thomas

Julie Slevin

AKI working group

https://www.thinkkidneys.nhs.uk