

## LRI Children's Hospital

### Monitoring of fluid status, renal function and gentamicin level in paediatric patients Standard Operating Procedure.

Staff relevant to:	Nursing, Medical and Pharmaceutical Staff caring for paediatric surgical patients
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### 1. Introduction and who this standard operating procedure (SOP) applies to

#### 1. INTRODUCTION AND BACKGROUND

The distributive shock, which can occur in response to sepsis, is a risk factor for end organ failure. In paediatric patients this is often compounded by dehydration, due to poor oral intake and/or high fluid losses through diarrhoea and vomiting.

Gentamicin is an aminoglycoside antibiotic, effective against gram negative bacteria and frequently used in surgical patients. Side effects include ototoxicity and nephrotoxicity due to accumulation in the proximal tubules of the kidney, the drug is almost entirely dependent on renal excretion

If inadequately managed at any stage in the care pathway, a negative fluid balance can potentiate the nephrotoxic effects of Gentamicin and cause an acute kidney injury (AKI).

The aim of this Standard Operating Procedure (SOP) is to;

- Facilitate safe monitoring of patient fluid balance and Gentamicin level.
- Aid compliance with local guidelines as referenced above.

- Serve as a resource for trainee health care professionals or those less familiar with patients on Gentamicin therapy (e.g. staff on wards with outlying surgical patients).

This SOP applies to all medical, nursing and pharmaceutical staff involved in the care of paediatric patients, on Gentamicin at Leicester Royal Infirmary (LRI). This procedure should be applied at all times including normal working hours, on call, weekend and bank holiday working.

#### **Related Documents:**

- [Acute Kidney Injury AKI UHL Children's Hospital Guideline](#)
- [Fluid Electrolyte Management UHL Children's Hospital Guideline](#)
- Gentamicin prescribing- paper chart on paediatric wards
- [Procedure for Intravenous Administration of Gentamicin UHL Children's Hospital](#) via Medusa

## **2. Standards and Procedures**

<b>Main operating steps</b>	<b>Rationale</b>
<p><b>Pre-theatre</b></p> <ul style="list-style-type: none"> <li>• Patients planned for theatre for an acute surgical abdomen, require intravenous (IV) access for fluids and antibiotics. During cannulation, blood samples will be sent for urea and electrolytes (UEs) in addition to a full blood count and C-reactive protein.</li> <li>• Baseline renal function should be reviewed at the earliest opportunity, ideally pre/peri operatively.</li> <li>• Children noted to have acute kidney injury (AKI) on presentation, or patients with underlying renal tubulopathy, a transplant kidney or chronic kidney disease (CKD) stage III and above, should be escalated to the general paediatric team out of hours or the renal physicians in normal working hours.</li> <li>• Whilst awaiting medical input the surgical team should refer to the acute kidney injury guidelines for principles of management; including avoiding nephrotoxic agents such as non-steroidal anti-</li> </ul>	<p>Patients who are placed nil by mouth for theatre require maintenance fluids as a minimum.</p> <p>Early identification of acute kidney injury improves treatment and outcome.</p> <p>Care of children with complex conditions should be shared by the surgical and paediatric specialities.</p> <p>Early implementation of treatment, with an aim to prevent progression of the AKI.</p>

<p>inflammatory drugs (NSAIDS).</p> <p><b>Peri-operative</b></p> <ul style="list-style-type: none"> <li>• Gentamicin is usually started at induction of anaesthesia or during the procedure. As a result, the <b>first dose</b> of Gentamicin is commonly given in theatre by the anaesthetist. This will be prescribed as a stat dose on Nervecentre©.</li> <li>• Children with an acute kidney injury at presentation or underlying CKD should receive a reduced dose of gentamicin, as per the trust monograph see appendix 1</li> <li>• The surgical team will state clearly in the post-operative instructions, that ongoing monitoring of the patients fluid balance and Gentamicin will be conducted as per this SOP. If not, this should be discussed with the operating surgeon for a clear alternative plan.</li> <li>• In patients who are to continue on Gentamicin, the <b>second dose</b> will be prescribed on the drug specific chart in use on the children's wards. This will be performed by a member of the surgical team when the patient returns from theatre. The prescription will be well in advance of the time of the second dose, to prevent delay in administration.</li> </ul> <p>Whilst an electronic "refer to chart" prescription will also be signed on Nervecentre©, this platform is not currently in use for Gentamicin dosing.</p> <ul style="list-style-type: none"> <li>• Insertion of short/mid-term venous access will be considered for all patients who are likely to require gentamicin monitoring.</li> </ul>	<p>Patient safety. Avoid dose repetition. Ensure staff are using documentation familiar to their practice.</p> <p>Patients with renal impairment require an adjusted dose of gentamicin.</p> <p>Professional accountability. Clear communication of ongoing care requirements.</p> <p>Patient safety. Avoids dose delay, confusion when interpreting level.</p> <p>Supports medical/nursing care Improves patient comfort, reduces distress of repeated cannulation/blood sampling.</p>
<p><b>Post-operative</b></p> <ul style="list-style-type: none"> <li>• All patients on Gentamicin will commence on full maintenance IV fluids on return from theatre. These patients will require daily U&amp;Es.</li> </ul>	<p>Patients are unlikely to tolerate oral fluids in the immediate period following surgery.</p>

<ul style="list-style-type: none"> <li>• The patient will undergo a daily fluid assessment by the surgical and nursing teams. Fluid balance charts including urine/nasogastric/stoma volumes will continue until the patient is off IV fluids altogether.</li> <li>• A Gentamicin level will be checked prior to administering the <b><u>third dose</u></b>. The patient's U&amp;Es will be checked simultaneously and can be requested on the same blood sample. The medical team will ensure the Gentamicin chart is completed in its entirety, including the trough level. The 3<sup>rd</sup> dose can be given before the level is reported <b><u>unless</u></b> there are concerns about deteriorating renal function.</li> <li>• U&amp;Es will be measured simultaneously with any subsequent Gentamicin levels a <b><u>minimum of 3 times</u></b> a week in accordance with trust guidelines.</li> <li>• Changes in the patients U&amp;Es/Glomerular filtration rate should be escalated to the surgical SHO/SPR immediately and discussion with renal team considered.</li> <li>• Patients who remain on <b><u>any</u></b> rate of IV fluid therapy but have their Gentamicin discontinued will continue to have regular U&amp;E monitoring (maximum interval- 48 hours).</li> <li>• Weaning of IV fluid therapy can be considered only when oral intake is successfully reinstated, and the child is not vomiting.</li> <li>• Strict charting of fluid balance -including measured volumes- should only be discontinued when IV fluids are weaned completely, all blood tests are within normal parameters and the child is mobilising.</li> <li>• Any nursing/parental concern about low volume of a child's oral intake or urine output should prompt a clinical assessment and consideration given to reinstatement of IV fluids.</li> </ul>	<p>To provide accurate monitoring of patient condition to enable intervention.</p> <p>Patient safety. Reduce number of invasive procedures. Professional accountability. Trust Gentamicin guideline adherence.</p> <p>Trust Gentamicin guideline.</p> <p>Cornerstones in management of AKI are prompt recognition and removal of nephrotoxic agents.</p> <p>As per standard fluid management guidelines.</p> <p>Enteral route must be reliable prior to weaning intravenous fluids</p> <p>Urine <b>output</b> not frequency is a clinical indicator of renal function. NICE Guidelines- AKI prevention detection and management</p> <p>Patient safety. Family centred care.</p>
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### **3. Education and Training**

None

### **4. Monitoring Compliance**

Compliance with this standard operating procedure will be monitored with an annual departmental audit. This will be conducted by the medical and nursing teams.

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements

### **5. Supporting References**

NICE. Intravenous fluid therapy in children and young people in hospital hospital NICE guideline [Internet]. 2015. Available from:

<https://www.nice.org.uk/guidance/ng29/resources/intravenous-fluid-therapy-in-children-and-young-people-in-hospital-pdf-1837340295109>

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<https://bnfc.nice.org.uk/drugs/gentamicin/>

Devarajan, P. (2024) *Acute kidney injury in children* , UpToDate. Available at:

<https://www.uptodate.com/contents/acute-kidney-injury-in-children-clinical-features-etiology-evaluation-and-diagnosis?search=acute+kidney+injury> (Accessed: 19 February 2025).

### **6. Key Words**

Paediatric surgical patients, fluid status, gentamicin levels, renal function, acute kidney injury

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**The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs. As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.**

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<b>Details of Changes made during review:</b> New SOP	