Waikato District Health Board

Guideline

MRI - Preparation of infant in Newborn Intensive Care Unit (NICU)

Guideline Responsibilities and Authorisation

Department Responsible for Guideline	NICU
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Target Audience	Nurses
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Guideline Review History

Version	Updated by	Date Updated	Summary of Changes
2	Jayne Bennett	Aug 2013	Due for review
3	Joyce Mok	April 2015	• Add safety measures • Changes in management of equipment and infusion lines and pumps
4	Richard Pagdanganan	Oct 2018	3-yearly review

MRI - Preparation of infant in Newborn Intensive Care Unit (NICU)

1 Overview

1.1 Purpose

To outline steps for preparations of infants for magnetic resonance imaging (MRI) to ensure safety of infant and staff during procedure.

1.2 Scope

Waikato staff working in Newborn Intensive Care Unit (NICU).

1.3 Patient / client group

Babies and infants in Newborn Intensive Care Unit (NICU).

1.4 Definitions

MRI (Magnetic Resonance Imaging)	This is a relatively non-invasive imaging technology for diagnostic and evaluation purpose. It often provides more sensitive and specific imaging information about paediatric central nervous system abnormalities than ultrasonography or Computed Tomography (CT)
CPAP	Continuous Positive Airway Pressure
CVL	Central Venous Line
ECG	Electrocardiograph
ET	Endotracheal
NBM	Nil by mouth
PAL	Peripheral Arterial Line
IV	Intravenous Line
UAC	Umbilical Arterial Line

2 Clinical Management

2.1 Competency required

- Registered Nurse who has completed Level 3 orientation and if possible ventilator trained
- Registered Nurse who has completed Level 2 orientation for L2/L1 babies.

2.2 Equipment

- Bean bag (in store room)
- Laerdal bag and mask
- Green (oxygen) tubing – cut a 8 meter length from the roll (in Technician's room)
- Simms connectors for oxygen tubing x 2
- Neopuff + gas supply + flow meter (e.g. oxygen and air cylinders with regulators)
- Air and oxygen hose to connect ventilator/CPAP to wall supply at MRI waiting room
- For baby on ventilator/CPAP: Transport incubator / radiant warmer/incubator + respiratory systems + gas supplies (D-size oxygen and air cylinders)
- For baby who is in a cot and on low flow: Normal nasal cannula + portable oxygen cylinder.
- Special notes:
  - Optiflow is not allowed to be used because it has metal components.
  - Normal nasal flow: ask for one from paediatric ward (E4/E5) or in the technician's office.
- Portable suction system + suction catheter (on shelf next to transport incubator)
- Monitor for transport (check battery 2+hours): massimo for Level 1/Level 2 babies and a Phillipsx2 monitor for Level 3 babies.
- Clean nappy
- Completed safety checklist with signed consent forms
- Patient clinical notes
- Completed and signed MRI safety questionnaire
- Baby with IV Infusion, i.e. CVL/IV/Arterial/Venous Lines: 8 metres of tubing is required to ensure each fluid and medication is primed through line and run from the infusion pumps.
  - IV/CVL/UVC fluid:
  - Asena extension set with pressure disc + 4 packs of mini bore extension tubings (each tubing = approx. 200cm in length)
  - UAC/PAL:
  - No transducer
- If needed, bring with you Dextrose Gel in its original container
- 1ml syringe + medication label + gauze
- Arrange orderly (may need two if ventilator/CPAP + gas cylinders) to assist with transport to MRI room and back to NICU

NOTE: Refer NICU Nursing Procedure: Preparation of NICU Patients with Respiratory Support for Interdepartmental Transfer (5696) and cheat sheets.

2.3 Guideline

1. Informed Consent

- Medical staff to explain and discuss with parents about procedure and possible complications, and answer their questions to alleviate parent's concerns and anxiety.
- Inform parents about the possibility of baby being intubated on return.
- Obtain written parental consent by medical staff because anaesthesia and contrast may be used.

2. Safety measures before MRI

- Safety questionnaire must be completed and signed to ensure safety of baby before the procedure.
- All individuals (e.g. patients, personnel, parents) must undergo MRI safety screening and instructions before entering the MRI examination room.
- All personnel and all monitoring and support equipment must be safe for the magnet.
- Most resuscitation equipment is not magnet-safe and thus cannot be brought into the MRI scanning room.
- An unstable patient can undergo MRI if the clinical indication is urgent and no acceptable imaging alternative is available. However, magnet-safe monitoring equipment must be used, and, if resuscitation is required, the patient must be moved out of the MRI examination room to an appropriate site.

  NOTE: If baby is on respiratory support, refer to NICU Nursing Procedure: *Preparation of NICU Patients with Respiratory Support for Interdepartmental Transfer (5696)*
- Check instructions from anaesthetist about the time for NBM and ensure this is documented to ensure safety of infant in case intubation is required.
- Discuss with consultant to ensure MRI department will give sufficient notice, preferably 4-6 hours in advance, for staff to prepare infant's infusions and respiratory support systems for the safe transfer of infants to and from MRI department.
- Isolate CV lines from the skin and attach it well to an area that is not being scanned as metal inside hub of catheter can heat causing melting of line or burning of baby.
- BP transducer is not allowed in the MRI scanning room.
- Ensure arterial line is taped securely because no BP monitoring/alarm is available during transport and scanning.
- Remove monitoring probes/electrodes, e.g. electrodes of BRAINZ monitor, rectal and skin temperature probes.
- Connect ventilator using the oxygen and air hose to wall gas supply while in MRI waiting room to conserve gas in cylinders.

3. Management of infusions, lines and pumps

- As pumps have metal components, tubing must be long enough so that syringe/infusion pumps may be left outside the MRI scanning room.
- Syringe pumps and infusion pumps need approximately 8 metres of tubing primed with medication.
- Keep extensions and lines tidy to prevent tangles because of extra length of the extensions by winding up the extensions to ensure each set of tubing is coiled neatly in a single file and secure the coil with Coban loosely to enable easy uncoiling and prevent tangling.

4. Transferring infants

- Change baby's nappy before leaving unit and take spare one because a wet nappy can distort imaging.
- If baby is in a cot, dress baby in clothing with no metal buttons because metal should not be brought into MRI scanning room.
- Wrap/cover baby in blankets and put hat on baby before leaving and on returning to the unit to reduce heat loss during transfer.
- Arrange orderly to assist with the transport of baby to MRI and back to NICU.

5. Monitoring during scanning

- If arterial line is insitu, ensure arterial line is taped securely because no BP monitoring/alarm is available during transport and scanning.
- Site of arterial line must be visible or maintain constant observation on arterial line to ensure no disconnection or traction on the lines and arterial catheter.
- All metal monitoring e.g. ECG leads, saturation probes, must be removed from baby once at MRI room.
- Monitor infant by using the designated SpO_2 monitor in the scanning room.
- Baby is placed in bean bag to minimise movement of baby during scanning.
- Bean bag nozzle attached to wall suction, sucking air out of bag causing baby to be held inside bag.
- When scanning is completed, ensure airway is patent, all lines are secured and infusing, and recommence standard NICU monitoring during transport.

6. Management of airway/respiration

- Baby on nasal flow:
  - Normal nasal prong tubing will be connected to wall oxygen in scan room.
  - No oxygen tanks to be taken inside scanning room as they are metal containers.

- Baby on CPAP:
  - To be changed to low flow if baby can tolerate it, otherwise baby may be intubated as CPAP systems are not available at MRI scanning room.
  - Occasionally, baby may be put on single (naso-pharyngeal) prong using ivory ET tube and medical staff to provide CPAP using a Laerdal bag.

- Baby on ventilator:
  - NICU medical staff use Laerdal bag to manually ventilate infant.
  - Anaesthetist, if present, uses MRI anaesthetic tubing to ventilate baby manually.

3 Evidence base

3.1 References

- The Royal Children's Hospital (2017) Magnetic Resonance Imaging (MRI) in Newborn: Guideline for use. Retrieved from https://thewomens.r.worldssl.net/images/uploads/downloadable-records/clinical-guidelines/magnetic-resonance-imaging-mri-in-the-newborn_150517.pdf
- Jill V Hunter, J. (2014). *Approach to neuroimaging in children*. Retrieved on March 20, 2015 from http://www.uptodate.com/contents/approach-to-neuroimaging-in-children?source=machineLearning&search=preparations+of+infants+for+MRI&selectedTitle=1%7E150&sectionRank=1&anchor=H14#H15

3.2 Associated Waikato DHB Documents

- Waikato DHB NICU Nursing Procedure: Preparation of NICU Patients with respiratory support for interdepartmental transfer (5696)