The Northern Neonatal Network
An Operational Delivery Network
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Guideline for the transfer of all infants with possible need for urgent surgical intervention (for NEC or similar pathology)

V3.0 (July 2017)

Due for review – July 2019

Northern Neonatal Network guideline

Guideline for Transfer of all infants with possible need for urgent surgical intervention (for NEC or similar pathology)

Purpose and summary

This guideline has been produced to guide management of infants who may require urgent surgical intervention and require inter-hospital transfer. It represents current consensus and has been produced following a Network working group and widespread consultation, including input from the Paediatric Surgical team at the RVI. Review was undertaken after audit of process and outcomes in May 2014 and again in 2015.

Audit highlighted the potential points where babies can be optimised before and during transfer, where faster readiness for theatre can be achieved, and the potential benefits of using the quaternary transfer form (see appendix).

This document has been updated to reflect regional changes to regional Neonatal Transport arrangements and the establishment of the Northern Neonatal Transport (NNeTS) team, hosted by Newcastle Hospitals NHS Foundation Trust, co-located on Ward 35 (NICU) at the RVI, and commissioned to provide all neonatal transports for service users in the Northern Neonatal Network.

Management at local unit

Prompt recognition of the potential need for transfer facilitates safe and effective transfer, and maximises the ability of the neonatal surgical team to assess, prioritise and plan intervention. The process must work effectively 24/7, so direct consultant supervision of cases, and direct consultant-to-consultant referral will be needed on a regular basis 'out of hours'.

A baby with a recognised deterioration of likely surgical origin will require:

- Urgent senior review - **consultant level** - with appropriate written documentation unless there are significant extenuating circumstances and the senior review is still of suitably high level e.g. Neonatal HST or senior SAS doctor.
- Senior (consultant) review of x-rays is needed to ensure relevant pathology is detected and acted upon quickly
- Early discussion with the on-call neonatal consultant at the RVI (contact via ward 35 RVI: tel 0191 282 5635)

Rationale: Audit data showed a proportion of perforations and other serious pathology was not detected by junior staff. Senior x-ray review is required even out of hours.

Transfer

Indicators that transfer is needed to a surgical centre:

Major abdominal pathology • sudden or discoloured abdominal distension, cardiovascular/respiratory compromise, or perforation on x-ray ► baby requires time-critical transfer to a surgical centre.
'Failure' of conservative management • increasing cardiovascular compromise, rising CRP, decreasing platelets, ongoing distension or worsening erythema
X-ray showing 'fixed loops' for more than 24 hours

Process:

Organisation

- FIRST AND FOREMOST: There must be direct **neonatal consultant-to-neonatal consultant** discussion 24/7 – via ward 35 RVI.
  - Because of logistics around time critical transfers and access to advice the **neonatal consultant on call at the RVI should be approached first**.
  - ***If*** surgical advice is needed it can be sought ***after*** discussion with neonatal consultant at the RVI.
  - Registrar to registrar discussion should NEVER take place without the necessary consultant being informed, even 'out of hours'.
- If there is no immediately available intensive care cot on ward 35 RVI, arrangements will be made to transfer existing babies to other units (including PICU) to create space
- In the exceptional event where no space can be created, a joint discussion between the neonatal consultants at the referring unit and the RVI, the senior nurse (RVI) along with consultant paediatric surgeon and on call consultant for PICU, RVI will be needed to ensure safe and timely access to surgical intervention elsewhere
- **Information on the 'transfer to quaternary service' form A/B should be collected and discussed at this point (see appendix).**

- To ensure that there is appropriate response to the situation evolving, the transfer should be categorised as per NNeTS prioritisation categories and the Consultant on call for NNeTS involved in the planning for transport:
  - **Category A (Time Critical, potentially unstable):** If baby is likely to need rapid surgical intervention on arrival at surgical centre: NNeTS team should aim to leave base within 60 minutes of the referral telephone call without exception.

    Any intestinal perforation, or cardiovascular compromise = time critical
  - **Category A (Time critical, Stable)**: If *urgent* surgical intervention is not considered likely within next 6 hours: NNeTS team should arrive at referring centre within 3.5 hours of referral telephone call.

    Note: these infants are at high risk of deterioration so good communication to the neonatal team at the RVI is essential while the NNeTS team is travelling to ensure that any change (especially deterioration) in condition is responded to appropriately.
  - **Category C**: ongoing abdominal concerns but without any acute need or deterioration. Transfers should be planned so that the baby arrives within normal working hours.

Mechanism

- NNeTS base is co-located with the NICU at the RVI in Newcastle and is therefore the NNeTS team is up to two hours from the most geographically distant units in the Northern Neonatal Network. It may also mean that the NNeTS team needs to be re-tasked while out on transport to pick up a surgical baby. This makes **early discussion** around babies with NEC who will potentially deteriorate even more important.
- The referring team's key priority is solely clinical management of the baby in front of them: *planning of the transfer* will be coordinated by the NNeTS team in close liaison with the Consultant Neonatologist on call at the RVI.
- The transport team should be contacted on the usual NNeTS telephone number (0191 2303020) **AFTER discussion with the RVI neonatal consultant on call.**

Preparation:

Clinical condition of the baby:

Some babies will not get better until surgical intervention occurs: transfer is their most urgent need, but their condition should be optimised in the time before and during transport wherever possible. Infants who are extremely ill or who have intestinal perforation will go to theatre as soon as possible on arrival at the surgical centre.

The table below outlines interventions to be considered in this optimisation process. Items marked * are required for safe anaesthesia:

Fluid support	Losses from the intravascular space may be massive and easily underestimated due to 'invisible' (3rd space) fluid loss in the abdomen. Many sick babies with NEC will require >60ml/kg additional fluid over the first 12-24 hours
Blood pressure	Inotropes may be needed in addition to fluids: adrenaline started via peripheral venous access is very effective, quick and easy to administer
Venous access	Central venous access is preferable, but only very occasionally essential. Most sick babies will benefit from referral to the surgical team rather than delaying transfer whilst this is secured
***Optimising haemoglobin**	Transfusion should not be deferred because of transfer – blood can be given en route, or used as acute volume support before transfer
***Adequate platelet count**	For operative intervention – platelet count must be urgently checked, and platelets given en-route if necessary (and possible)
***Managing coagulopathy**	Consider giving fresh frozen plasma, cryoprecipitate, vitamin K and tranexamic acid for very sick babies likely to require laparotomy. Formal clotting test is preferable if possible to help guide further support, but treatment should not be delayed and products can form part of the fluid resuscitation before or during transfer
Antibiotic and antifungal cover	Add metronidazole if not already done, and commence fluconazole prophylaxis if not already done. Ensure any existing positive bacteriology is made available to the NNeTS team.
Abdominal drain	Paracentesis may be considered in certain situations with massive abdominal distension restricting ventilation or impacting blood pressure. Should be discussed with RVI neonatal consultant who will liaise with surgeons.
Timely transfer	Spending longer than an hour 'stabilising' the baby may not be in the baby's best interests. If uplift is delayed for more than an hour for stabilisation (including acquisition of blood products to administer) ongoing management must be coordinated by the local consultant in cooperation with the NNeTS team, liaising directly with the RVI consultant, primarily utilising consultant-to-consultant discussions via conference calling if available.

Documentation to go with baby/be made available:

No administrative task should delay time critical transfers, but the receiving team need relevant information to plan ongoing care. Some of this information should travel with the baby, but it is essential that information that allows the receiving surgical centre to register the baby on the erecord system before its arrival should be made available prior to the baby arriving. This allows minimisation of delay in ordering tests and interventions on arrival of the baby.

Transfer letter	The letter must outline key events for the baby. A handwritten letter *by someone who knows events* is often most helpful. If a 'Badger letter' is the standard means of communication from a referring unit, it must be completed in a focussed way around the acute surgical problem: the bulk of the letter should be entered in the 'summary of care' section to reflect the key acute concerns and antecedent events. **It is neither acceptable nor helpful to cut and paste the information typed under the 'systems' sections into the 'summary of care' section.** Information on past events that are important to the baby and family, e.g. significant IVH, PDA (and treatment status) along with what the family understand about these and the acute events are **essential**.
Contemporary clinical notes	A *photocopy* of all clinical notes, results charts, drugs chart or other relevant documents to travel with the baby. If the baby is more than 2 weeks old, the last 7 days or so with key events may suffice.
Laboratory results	Most recent **Hb, platelet,** neutrophil count**, sodium, potassium,** creatinine (bold indicate needed for theatre) and any relevant changes in these parameters over the last few days
Clinical process	Information on recent fluid support received, inotropes, vascular access and when these were established (including line insertion, tip position and verification)
Family details	Parental contact details, where they are currently, and explicitly what they have been told
Radiology	Relevant x-rays to be transferred immediately to RVI PACS system
Crossmatch sample	Ideally, the referring team should provide a labelled crossmatch sample from the baby for the NNeTS team to bring back to the RVI with the baby.

Advance booking on erecord at the RVI	It was identified as a requirement from a child death review that pre-registration of a baby en-route to the RVI should occur to ensure minimisation of any delay ordering tests or investigations should occur for any baby being moved for assessment and treatment of NEC. This can be done in two ways: **Preferred:** If the Badger system is being used by the referring unit, the baby must be discharged from the referring unit to the RVI, and the Band 7 Nurse in charge at the RVI (red area) must be notified on this occurring. This allows the baby to be admitted to the RVI badger area and thus details made available to enter the baby on erecord. Optional: If Badger is not being used, a telephone call must be made to the RVI on departure of the NNeTS team (by NNeTS staff **OR** the referring team) to the Band 7 nurse in charge, relaying the following information about the baby: ➢ **Surname** ➢ **NHS Number** ➢ **Home address + Postcode** ➢ **M/F** ➢ **Date of Birth** ➢ **GP (+address)** ➢ **Contact Tel. No. for parents**

Contact with the surgeons:

- As the referring team will be busy focussing on acute clinical care, it is the responsibility of the RVI neonatal consultant to ensure the surgical team and consultant are aware:
  - the baby is being transferred
  - likely time of arrival
  - apparent urgency of operative intervention
- Occasionally a baby will require drainage of the abdomen before transfer: the neonatal team at the RVI will liaise between the surgeons and the local team to facilitate this.

Preparation for arrival at the RVI:

Time saving steps can be taken once the baby has been accepted for transfer, including:

- Registering the baby on e-record **in advance of arrival** (inform B7 nurse RVI: see above for two possible methods of information transfer)
- Warning blood bank that the baby is en route if expected to go urgently to theatre. **Specifically request**:
  - An adult unit of packed cells
  - Platelets and fresh frozen plasma if required

Note: where possible and appropriate, the NNeTS will bring a labelled sample for cross match purposes with the baby. The admitting SHO on ward 35 is responsible for sending this to blood bank.

- Alerting the surgical team to the arrival of the baby immediately (ring the paediatric surgical registrar as soon as the transfer team arrive on ward 35 i.e. prior to moving from the transport incubator).
- Alerting the anaesthetist of the expected time of arrival and likely condition of the baby: ring the Consultant Paediatric Anaesthetist on call directly. The theatre coordinator will be able to identify this person who can be contacted via switchboard even out of hours.

Appendix 1

Transfer to quaternary service – to be used for referrals in for specialist (usually surgical) input V3 March 2017

These infants by definition require specialist input often urgently. The format that follows is designed to facilitate both management pre, during and after transfer, and timely access to theatre on arrival.

- **Form A should be completed by the referring and NNeTS teams**.
- **Form B should be completed by the receiving team (Wd 35 RVI).**

Form A may be photocopied by the referring team for their clinical notes, but the ***original*** should travel with the baby.

Form A (referring team to complete)

Section A - Referral details

Name _____
Date of birth _____
NHS Number_____
Gestation _____
Birth weight _____
Current weight _____

Referring Consultant to Consultant Call to RVI:

Date (dd/mm/yy)_____
Time (24 hour clock)_____
Made By (name, grade):_____
To (name, grade): _____

Acute concern (list):

_____
_____
_____
_____
_____
_____
_____

Most recent x-ray date time and interpretation: _____
_____
_____
_____

IF **CVL/PICC or equivalent** sited state radiological *tip position* and *reviewer/date of review*.

_____
_____
_____

PACS Transfer of images to RVI system requested (time):_____

RVI interpretation (if known or discussed during consultant to consultant call):

_____
_____
_____
_____

Current clinical condition:

BP: _____ Heart Rate _____

Lab indices:

Hb (g/L): _____ Lactate (if available):_____

Platelets: _____ Base deficit: _____

PT (if available): _____

APTT (if available): _____

Fibrinogen (if available): _____

Abdomen:

Discoloration (Y/N): _____

Distension (Y/N): _____

Support:

Respiratory (mode, settings, FiO_2):

_____

Fluid (by bolus) since acute deterioration:

Fluid type:	Amount (ml/kg):
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Inotropes:

Type & rate (e.g. Adr 100nano/kg/min)	When started (time/date):
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Blood products:

Type:	Amount (ml/kg):
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Advice given / received at initial phone call:

_____
_____
_____
_____
_____
_____
_____
_____
_____

Agreed Categorisation of urgency of transfer (tick one):
To be agreed by referring and accepting neonatal consultant

☐ **Category A (Time critical, potentially unstable)**
i.e. surgical intervention likely on arrival at RVI; NNeTS team depart within 1 hour of referral call

☐ **Category A (Time critical, stable)**
i.e. sick but *urgent* surgical intervention is not obviously required: no perforation or cardiovascular/respiratory compromise yet. NNeTS team to arrive within 3.5 hours of referral call

☐ **Category C**
Ongoing abdominal concerns but **no acute deterioration**.

Transfer (NNeTS team to complete from here)

Time of arrival at baby _____

Current Condition (document most recent):
BP_____ **Hb** _____ **Platelets** _____
APTT _____ **PT** _____ **Fibrinogen**_____

Examination:
Abdomen (describe extent if 'yes'):
Discoloration (Y/N): _____
Distension (Y/N): _____

Respiratory (mode, settings, FiO_2, SaO_2):
_____

Cardiovascular:
a) Findings: e.g HR, heart sounds, CRT [central/peripheral], pulse volume:
_____
_____
_____
b) Effect: (e.g. U/O, Consciousness)
_____

Fluid (by bolus) since referral made (above):

Fluid type:	Amount (ml/kg):
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Inotropes (if changed from above):

Type & rate (e.g. Adr 100nano/kg/min)	When started (time/date):
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Blood products (if further given since referral OR if given en-route):

Type:	Amount (ml/kg):
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

REMEMBER TO OPTIMISE Hb, Platelets and BP *en route* if theatre anticipated wherever possible unless unacceptable delay incurred: *D/W RVI consultant*

Documents to travel (tick):

Clinical letter (if badger: check details are appropriately entered)	
Photocopies of most recent clinical notes	
This form (Form A)	

Telephone RVI Ward 35 pre-departure (time): : hrs

- **E-Record Pre-registration details provided to Band 7 (must be confirmed by ticking this box:)** ☐

Update to RVI (pre-departure): Information given/advice received

_____
_____
_____
_____
_____
_____
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_____
_____

Summary of actions taken during transfer:

- _____
- _____
- _____
- _____
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- _____
- _____

Form B (to be completed by RVI team at RVI)

Actions at RVI after acceptance and before baby arrives (record times using 24 hour clock):

Registered on E record (Ward 35 RVI)		
Contact surgeons (pre-alert)		
Contact consultant paeds anaesthetist (pre-alert)		
Contact blood bank (made aware of transfer and potential need for urgent theatre)		
Blood products ordered	Packed RBCs (1 adult unit)	
	Platelets	
	Fresh Frozen Plasma	
	Other:	

Time of NNeTS team arrival at RVI	
Time surgeons contacted to confirm arrival	
Time anaesthetists contacted to confirm arrival	

MONITORING STRATEGY

The standards outlined in this document were audited from April 2012 – March 2013, i.e for 12 months shortly after introduction in February 2012.
Several auditable standards have been extracted, which if fulfilled should improve care. These standards and the level achieved in this last audit are given below.

Standard '13-'14 audit (n=13)	Number achieving standard (%)	Standard aim
Local senior review including x-ray	8 (61)	100%
Consultant to consultant neonatologist	7 (53)	100%
Timely discussion	8 (61)	100%
Cot availability	13% to Leeds	0% out of region
Quaternary referral form +category	0	100%
Nearest team move baby	10 (77)	100%
Local preparation: 5 standards – BP, Hb, plt, coag,<1hour	BP 9 (70) coag 0 <1hr 2 (15) Hb 2 (15) plt 3 (23)	All 100%
Documentation: notes, letter, x-rays	20-80% depending on unit	100%
RVI preparation: Surgeons Anaesthetists E-record Blood bank requests	Difficult to audit with current documentation Changes to documentation made May 2014 to facilitate	100%
Repeat audit required July 2015 – network board accountable for ensuring undertaken and disseminating findings		

Document Control

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