



**Yorkshire Neonatal Network**

**Transport Service**

# HANDBOOK



Dear All

Welcome to the Yorkshire Neonatal Transport Service! During the next 6 to 12 months you will be regularly joining the Team for an acute transfer, enjoying excessive heat, vibration, noise, artificial light, being physically strained, stressed and exhausted!

In order to ensure we all deliver a safe service, this booklet gives you an overview of the organisation of neonatal transfers, our guidelines, protocols and agreements. It is assumed that you are competent in procedures such as obtaining vascular access and endotracheal intubation, in addition to being familiar with the principles of neonatal care.

This handbook is not exhaustive manual on neonatal transport (see reference list for further information on transport). Topics that are covered are:

1. Team composition
2. Education / training
3. Operational guidelines
4. Activity
5. The retrieval process
6. Clinical Governance
7. Equipment
8. Cot bureau
9. Clinical guidelines

The aim of every acute neonatal transfer is to improve the outcome in a critically ill infant who is not in a hospital that provides the required level of intensive care. The organisation and safety of an acute retrieval thus requires careful planning and meticulous stabilization procedures, underpinned by good team work and clear communication strategies. The team relies heavily on feedback from yourselves and referring hospitals in order to develop our service further.

Our ultimate goal is to provide a high quality service across the Yorkshire region. Please do not hesitate to contact either Claire Harness or myself.

Dr Cath Harrison  
Consultant Neonatologist  
Lead Clinician for Yorkshire Neonatal Transport  
Service

Claire Harness  
Lead Nurse for Yorkshire  
Neonatal Transport Service

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# 1. TEAM COMPOSITION

Since January 2002, funding has been in place for the Yorkshire Neonatal Transport Service and a regionally funded Yorkshire Neonatal Cot Bureau. Both services are based at Leeds General Infirmary (LGI), LTH NHS Trust. The funding has enabled:

1. A Lead Consultant post for Neonatal Transport (Cath Harrison). Her responsibilities are:
  - Continuing team education and training
  - Development and review of medical policies
  - Quality management program (audit, clinical risk management)
  - Selection, orientation and supervision of middle grade doctors involved in transfers close liaison with Cot Bureau
  - Development of future initiatives - building regional links
2. A Lead Sister for Neonatal Transport (Claire Harness). Her responsibilities are:
  - Team recruitment
  - Continuing team orientation: education and training
  - Daily support role for team
  - Development and review of nursing policies
  - Equipment
  - Liaison with YAS (Yorkshire Ambulance Service)
3. 24 hour availability of a supernumerary nurse to provide the transfers needed across the Yorkshire region.
4. A fully staffed Neonatal Cot Bureau (see below).

## Medical staff

Phase 1 of the transport service incorporates the provision of nursing staff and a Lead Consultant, however due to limited funding there is no provision of supernumerary medical staff. This therefore has implications regarding the availability of full medical cover, as the transport team relies on the ability of the Leeds Teaching Hospitals Neonatal Units to provide daytime and out of hours cover with middle grade doctors. With the change in MMC, provision of middle grade doctors can be difficult.

Currently we will endeavour to carry out acute transfers between 8am and 10 pm Monday to Friday and use a Registrar from either LGI or SJUH (which ever unit has the most middle grade staff so as not to deplete cover at the base unit). Out of these hours, acute transfers will only happen into and between LTHT units after discussion with consultant on call.

## Supernumerary nursing staff

Since January 2002, we have 24 hour availability of a transport nurse with supernumerary status. The supernumerary status makes the team unique. It enables the neonatal nurse transport practitioner:

- To function freely from neonatal unit constraints
- To perform transfers without compromising the care to other infants
- To carefully assess, plan, implement and evaluate all aspects of the transport process

There are 2 nurses available during the day and one at night.

When not performing transports, daytime supernumerary nurses are involved in:

- daily inspection of all equipment and drugs potentially needed for transports as per "checklist", situated by the transport incubators, dated and signed as complete
- reporting of any defects / faults to Medical Physics ( ext 23492)
- organisation of transfers requiring daily liaison with:
  - o unit coordinator at both Leeds neonatal units, to ascertain which babies are ready/preparing for return to their base hospital and organise future transfers (assessment of priorities); this information is recorded in the Transport Diary (Transport Cupboard) on a daily basis
- co-ordinating back transfers ensuring
  - o medical and nursing transfer letters are written **prior** to the baby's departure,
  - o any outpatient appointments accompany the baby as well as information relevant to the infant's care from other medical teams e.g. ophthalmology or allied health specialities, e.g. physiotherapists, dieticians etc.
  - o non-acute transport care plan is commenced (to be filed in infant's notes when transport is completed)
- audit / research / project work
- providing preceptorship for new team members, imparting experience and knowledge throughout this period.

We have regular team meetings to discuss a variety of issues, such as new equipment, policies, assessment, documentation and ongoing or future projects.

## **Team Members**

Consultant	Dr Cath Harrison
Lead Nurse	Claire Harness
Doctors	Specialist Registrars from Leeds General Infirmary and St James's University Hospital
Advanced Neonatal Nurse Practitioners	Sally Kemp Sue Welch
Nurses	Sonia Heenan Alison Wolfenden Jane McGrail Emma Stowell Phillipa Peasegood Anne Louise Henshaw Catherine Freeman Laura Dexter Vicky Weatherall Liz Child Carolyn Pickles Nicola Scanlon Jennie Lewis Leah Boikhutso Ainsley Pryor Janet Wright Anne Harrop Gill Hill Laura Woodhouse Gill Ellis Debbie Burton Naomi Wallace Sophie Breheney Kelly young Karen Skelding Kelly Platt Lisa Auty Karen Batnag Karen White

## 2. EDUCATION/TRAINING

Medical transfers of infants can be logistically and clinically challenging. Hence, the transport of such high-risk and fragile population requires skilled personnel. It is increasingly recognised that specific training and expertise is to be directed to specialist retrieval teams. This was one of the motives to create our Yorkshire transport team, i.e. a team of nursing staff with specialist skills in neonatal transport to complement the clinical expertise of neonatal SpR's and consultants.

A clear understanding of safety during transfer remains a core part of neonatal nursing and medical care as all staff should be competent to undertake an *intra*-hospital transfer (admission from delivery suite, maternity ward etc, transfer to radiology department/other investigations, transfer to theatre).

### Nurses

Nursing staff must be experienced in neonatal training, must attend a transport training day before joining the team, and have to complete a period of supervised practice with competent team members. Topics covered during induction are stabilisation of the new-born, familiarisation with equipment and ambulance environment, design and review of guidelines and protocols and leadership. Formal testing of experience and competence in transport against a defined standard of care is essential.

### Doctors

Any acute transport is a high risk situation and needs thorough knowledge of neonatal stabilisation, equipment etc. As a doctor assisting the transport team, you need to have independent thought and action, in order to give correct and helpful advice to the stabilizing personnel at the referring hospital. Specific skills you must have for safe neonatal transport are:

#### Airway management:

- recognize impending respiratory failure
- perform effective bag-valve-mask ventilation
- perform atraumatic intubation with appropriate endotracheal tubes
- instillation of artificial Surfactant
- management of ventilator settings

#### Circulation:

- skills for routinely and reliably securing IV access in tiny patients

#### Advanced procedures

- percutaneous needle aspiration of the chest
- chest tube insertion
- umbilical catheter insertion
- intra-osseous vascular access

## Which doctors can do a transfer?

As it is unsafe and unacceptable to go out on a squad without being familiar with the basic equipment, we organise a transport training session in the first weeks for all new neonatal middle grades based in Leeds Teaching Hospitals. The session includes discussion of stabilisation, equipment, protocols and transport scenarios. At the end of the session an equipment competency form will be completed.

There is a monthly transport rota which allocates an SpR for transfer either side of the city depending on numbers.

It is hoped:

- There will be some **flexibility** in the above scheme, to allow for all SpR's to receive maximum exposure to neonatal transport.
- A buddying system is in operation to allow a more experienced SpR/ consultant to accompany you on acute transfers until you feel you are competent. However:
  - o It is not always possible to send you out with a more experienced due to rota and staffing constraints, and as you are a Registrar on a tertiary Neonatal Unit, the assumption is that you are competent in advanced airway management and venous access. We are fortunate that all the transport nurses are extremely competent and so can help you with anything that is unfamiliar.
  - o There is also a retrieval competency form that can be used if you attend a transfer with a "buddy"

# Yorkshire Neonatal Network Team

## Transport Equipment Competency Assessment

The staff member must be able to demonstrate familiarity with each piece of equipment to be signed off.

<u>Equipment</u>		<u>Date</u>	<u>Assessor</u>
General	Retrieval bag contents	.....	Y/N .....
	Infusion pumps	.....	Y/N .....
	Oxygen cylinders	.....	Y/N .....
	Shrader valve	.....	Y/N .....
Monitoring	Philips monitor	.....	Y/N .....
	Arterial transducers	.....	Y/N .....
	End tidal CO <sub>2</sub>	.....	Y/N .....
Incubator	Portable Suction	.....	Y/N .....
	Ventilator and circuit	.....	Y/N .....
	Bag valve mask system	.....	Y/N .....
	Heat settings	.....	Y/N .....

This assessment was completed satisfactorily Y/N .....

Comments.....  
.....

Signed by supervisor.....Print name..... Date.....

Signed by trainee.....Print name..... Date.....

# Yorkshire Neonatal Network Transport Team

## Transport Retrieval Competency Assessment

Date of transfer ..... Retrieval 1/2/3 please circle

Diagnosis .....

Assessor

\_\_\_\_\_

Taking referral	Identifies key clinical issues	Y/N .....
	Structured approach to assessment	Y/N .....
	Gives appropriate clinical advice	Y/N .....
	Completes receiving form	Y/N.....

Organisation	Communicates with senior staff	Y/N .....
	Checks transport equipment with nurse	Y/N .....
	Establishes urgency of transfer	Y/N .....
	Phones referring hospital before departure	Y/N .....

Stabilization	Undertakes handover	Y/N .....
	Stabilizes ABCD	Y/N .....
	Appropriate management if needed	Y/N .....
	Familiar with transport equipment	Y/N .....
	Communicates to family	Y/N .....
	Secures equipment to patient with nurse	Y/N .....
	Prepares emergency equipment with nurse	Y/N .....
	Packages patient and ensures safe transfer with nurse	Y/N .....
	Performs pre departure checks with nurse	Y/N.....

During transport	Ensures equipment securely loaded	Y/N.....
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Ensures appropriate road speed Y/N .....

Ensures adequate temperature control Y/N .....

Logical approach to troubleshooting Y/N .....

Handover Adequate handover Y/N .....

Completes documentation Y/N .....

**Comments from assessor**

.....  
.....  
.....  
.....

This assessment was completed satisfactorily Y/N.....

**Please keep this form with a copy of the transport documentation in your portfolio.**

Signed by supervisor.....Print name..... Date.....

Signed by trainee.....Print name..... Date.....

### 3. OPERATIONAL GUIDELINES

#### Transfers done by Yorkshire Neonatal Transport Service

##### SpR & Nurse

- Acute (i.e., ventilated) neonatal medical and surgical collections into and out of Leeds Teaching Hospitals
- Acute (suspected) cardiac collections (i.e. ventilated), only if a bed is available on Ward 4 (Cardiac intensive care, LGI)

##### Nurse-led transport

- Non-acute transfers to and from base hospitals within the Yorkshire region
- CPAP infants – see guidelines below
- Non-acute transfers between District General Hospitals (i.e. from one DGH to another DGH).
- Babies on Prostin, not ventilated, needing cardiac assessment

The transport team does **NOT** attend home deliveries. Infants born at home needing urgent medical care can reach hospital faster by using the "999" ambulance service.

#### Nurse Led CPAP transfers

##### INFANT

1. Stable on NCPAP for > 48 hrs
2. Oxygen requirement < 40%
3. Clinically stable
4. I. V. access - maintenance fluids
5. Drugs: not on Morphine, Inotropes, Prostin
6. No underlying complications that could result in a problem

##### NURSING STAFF

1. Transport nurse has completed a minimum of 3 acute transfers
2. Transport nurse is fully competent in using the CPAP equipment mounted on the transport incubator and has knowledge of troubleshooting

##### OTHER CRITERIA

1. Paramedic crew desirable
2. Journey no longer than 1.5 hours.

Please refer to "Yorkshire Region Guidelines for Neonatal Stabilisation Prior to Transfer" for agreed safe practice during neonatal transport.

## **Communication with other Consultant Neonatologists on-call**

You must inform the consultant on-call that you are retrieving a baby and discuss the patient. We rely on paediatric and PICU registrars to cover the unit while you are out.

If you are based at LGI and the available bed is at SJUH, you must inform the consultant on call at LGI that you are leaving the unit, and you must inform the consultant at SJUH that you are bringing the baby to SJUH and the relevant clinical details.

Whilst on the transfer, if you have clinical queries, these should be directed to the consultant on call for the RECEIVING unit.

## **Out of region transfers**

### **From LTHT to Out of region**

- Acute - if medical staff available
- Non-acute - if nursing staff available

## **Ambulance booking**

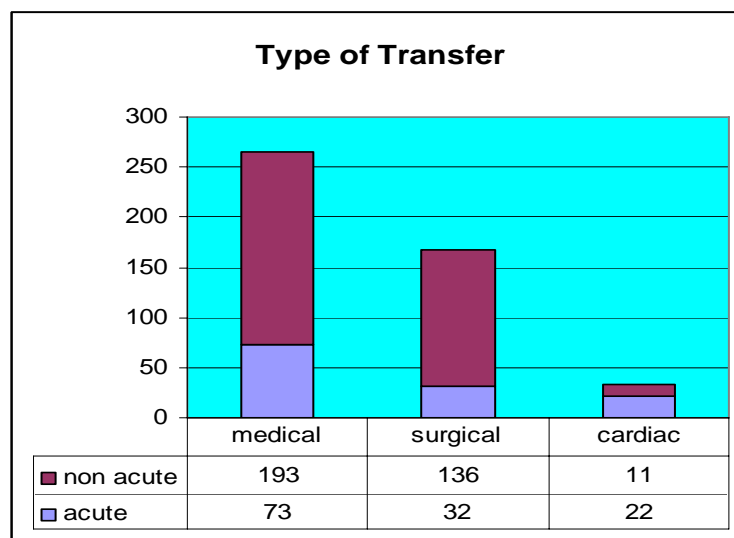
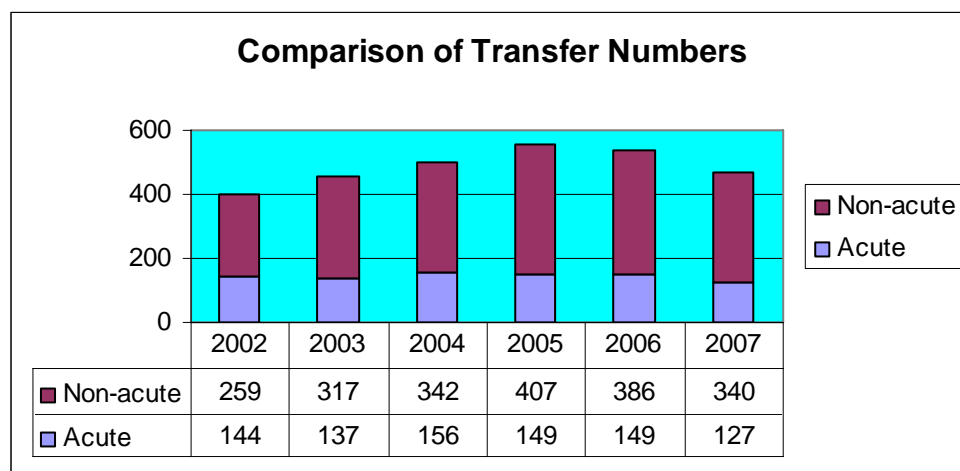
This is the transport nurse's responsibility in conjunction with the Cot Bureau

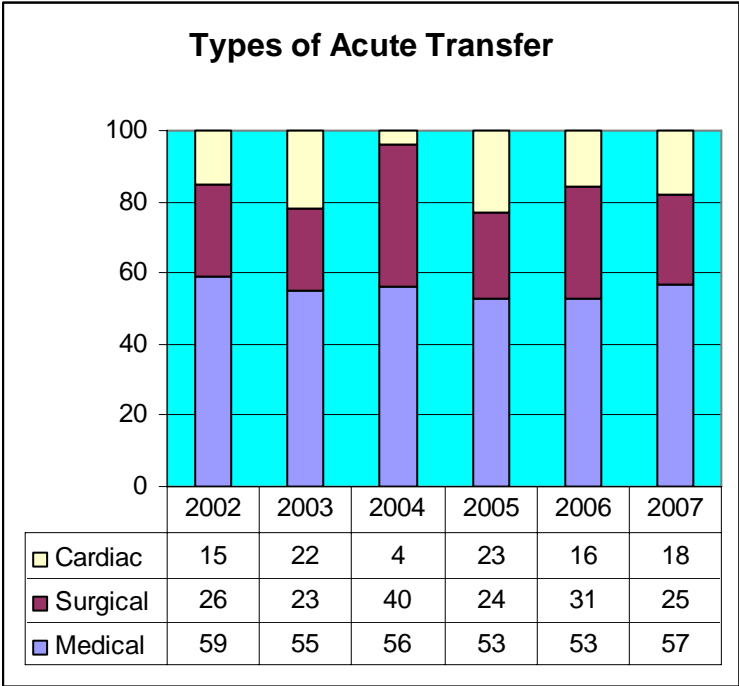
## 4. ACTIVITY

The YNTS currently carries out approximately 550-600 transports per year.

A third are classed as acute and thus require medical personnel.

Since the start of 2008, and the availability of 2 transport nurses during the day, the number of back transfers, non ventilated cardiac babies, DGH-DGH traders and repatriation from Out of Region Hospitals back into the Yorkshire Neonatal Network has increased by nearly 50%.





There has been little change in the % of medical and cardiac babies being transferred, but there has been a significant fall in the number of acute surgical babies transferred. This could be attributed to more antenatal transfers allowing delivery in Leeds coupled with closure of the LGI unit due to staffing and therefore capacity issues.

## 5. THE RETRIEVAL PROCESS

The physical transport itself is only part of the overall retrieval process. It is essential that the appropriate steps are followed from the moment that a referral is made to ensure a satisfactory outcome.

Separate nursing guidelines are available (not covered in this handbook) to ensure a consistent approach to the transport of babies across Yorkshire ("operational policies on acute and non-acute transfers"). We focus here on those aspects in the retrieval process that are of prime importance for transport doctor(s).

As you will notice, effective **communication** and meticulous **documentation** are essential throughout the entire retrieval process, i.e. from the initial telephone request until hand-over at the receiving hospital. Transfer records should be legible, full and accurate, contemporaneous, dated, timed and signed and be able to withstand legal scrutiny.

### 1. Referring phone call and organisation of retrieval

Any transfer process begins with the referring phone call and thus good communication. Since November 2003, each hospital within the Yorkshire region started to use standardised "transfer information and audit" forms. On the next pages, you will find

- a copy of the form used by both the referring and receiving hospital
- identical forms are used for effective communication

Once a referring hospital has been allocated a cot through the cot bureau:

1. The referring hospital
  - a. must complete the (referring) referral form
  - b. ring receiving unit
  - c. receiving unit fills in (receiving) form
  - d. must then contact the transport doctor ( if not at receiving unit)
2. The transport team doctor
  - a. Completes transport information and audit form
  - b. Discuss current management
  - c. Give any advice to referring hospital- discuss with consultant on call if in doubt-on
    - i. stabilisation - focus on maintenance of A, B and C
    - ii. appropriate interventions and, where possible, get the referring team to initiate these (e.g. obtaining sufficient vascular access)
3. The transport nurse will
  - a. ascertain from the unit co-ordinator if any training nurse team members can accompany the transfer for experience
  - b. relay information regarding the expected condition of the infant to the nurse in charge of ICU
  - c. commence "the acute care plan"

## 2. Before the ambulance arrives:

Check the following:

Do you know which hospital you're going to?

Have you completed the receiving form?

Have you got the transport information and audit sheet that you have started filling in?

Have you sought any advice you anticipate you might need regarding ongoing management of the baby?

Do the rest of the medical team know you are leaving the unit?

Have you got money with you?

Have you got a mobile phone with you?

Have you got warm clothes with you?

Food?

Toilet?

Travel sickness pills?

## 3. On arrival at referring hospital

Introduce yourself to receiving hospital team

Obtain detailed history and careful review of information available

Examine baby

Review current management and results

Make any changes necessary to optimise stabilisation

If necessary, phone consultant on call at receiving unit to discuss optimal management

Make sure ETT and lines are secure

REMEMBER, the majority of babies have been well stabilised by the referring unit and you may not need to do anything

DO NOT ADJUST SETTINGS IF NOT NEEDED

THERE IS NO NEED TO CHANGE AN ETT IF IT IS WORKING AND SECURE

Fill in any changes on the audit/ information sheet

## 4. Before leaving the referring hospital

Check you have:

- summary letter, including most recent laboratory results
- overview of drugs/total fluids given and current drug/fluid regime
  - please document when last dose of drugs have been given
- most recent x-rays
- photocopy of patients notes (where practicable)
- maternal blood sample (EDTA)
- 
- see checklist at end of audit form

## 5. Packaging and moving the infant to the transport incubator

The process of brief disconnection and reconnection to life support is indicated only when the team is convinced the stabilisation process has been completed successfully.

A co-ordinated approach and careful planning are essential. An efficient move involves three staff to allow for minimal heat loss, optimum care for syringes, tubes and drains.

The aim is to re-establish heat and oxygen to the infant within 15 seconds of disconnection.

### Make sure ETT and lines are secure prior to moving

- transfer to the incubator can be initiated ONLY when physiological parameters are satisfactory, all tubes and lines are secure, and monitoring is working
- place transport equipment as close as possible to the warmer/incubator
- keep all equipment on mains electricity/gas supply until ready to move
- remove all monitoring except saturation from baby
- if feasible, transfer fluid syringes to transport pumps before moving the infant - if not feasible, essential fluids must be transferred first
- check observations before the infant is disconnected from the saturation monitor and the ventilator and moved into the transport incubator
- upon moving the infant
  - o connect ventilation tubing swiftly
  - o connect monitoring equipment
  - o assess air entry and chest movement in conjunction with saturation
  - o when the above are acceptable
- transfer any remaining fluid syringes to the transport pumps
- position the infant appropriately, allowing good visibility of ventilation tubing, chest, IV sites and drains
- secure the infant using Velcro straps
- commence the observation chart on transport care plan.

## 6. Family support

Dealing appropriately with the parents of transported babies is a difficult task for the transport team

1. There is only the short period of stabilisation during which staff can establish a relationship with the parents
2. As most acute transfer occur during the first 24 hours following birth, the mother is often still recovering from the delivery or may be under the effects of a general anaesthesia

Nevertheless, sufficient time should be spent with the parents or care-givers before leaving the referring hospital

1. Team members must be introduced and the reasons for transfer explained
2. Whatever the coping mechanism of the parents (either aggressive outburst, disbelief or complete withdrawal), the team must respond with an attitude of acceptance and calm reassurance to reduce parental anxiety
3. Parents will be given a leaflet about the transport team, receiving unit, with general neonatal information, map and telephone numbers, together with a photograph of their baby
4. No matter how sick the infant is, the transport team will allow the parents to touch or hold their infant prior to departure
5. It is also important not to predict how long the baby will need to stay at the receiving hospital; for example, in the case of a complex congenital disease needing expert opinion(s), we would never tell the parents "their baby will be away for two days only" as such regularly seems to last longer

We agreed that mothers cannot accompany their infant in the ambulance when the transfer is acute and/or the mother is inpatient or an early discharge (C/S or SVD). In such cases:

- the medical and nursing care must be given to the infant without interruption
- in the event of an (unexpected) emergency during transfer there is little/no time to explain what is going on
- care cannot be delivered to mothers if they become unwell during transfer
  - o the majority of the transport team are not practicing midwives
  - o there is very limited space in the ambulance

Mothers may accompany only if:

- the infant is not ventilated and stable
- the transport nurse feels comfortable with the mother travelling
- ambulance service is informed and accepts

## **7. Leaving the referring hospital**

- Perform a set of observations before changing from mains electricity and gas to incubator supply
- THANK ALL INVOLVED and leave the unit
- Transport team must call the receiving unit
  - o To provide update on the infant's condition
  - o the equipment needed back at the receiving hospital
  - o estimated time of arrival.

## 8. During Transfer

Attach gas hoses to the ambulance supply. Use mains power (i.e. preserve battery energy): includes DC supply for the incubator/ventilator and inverter supply for the monitor.

Although fixation of the equipment and incubator into the ambulance is usually undertaken by the ambulance staff, please ensure that the fixation is appropriate, and that the infant is safely secured within the incubator (belts, restraints, blankets)!

**All team members must wear seat belts during the transfer.**

Apart from the clinical indication/condition for which a baby is transferred (cardiac, medical or surgical), specific problems associated with neonatal transport are:

- thermoregulation
- hypoglycaemia
- hypotension
- parental separation

Untoward incidents during inter-hospital transfers are normally very rare when transport staff are appropriately trained in planning, patient stabilisation and equipment use. Prevention is of prime importance, as deterioration of an infant's condition en route may not always be obvious in a noisy, vibrating and dimly lit ambulance. The following are therefore imperative:

- adequate sedation and restraining belts to prevent the infant from moving within the incubator, which itself must be tightly secured to the ambulance
- constant monitoring of:
  - o heart rate (ECG)
  - o blood pressure (arterial or non-invasive)
  - o oxygen saturation (pulse oximetry)
  - o end tidal CO<sub>2</sub> – remember this shows a trend not an accurate measurement of PaCO<sub>2</sub>
  - o temperature
  - o during transport, thermal control may be difficult due to a less controlled environment, cold weather, travel over a long period of time, and less efficient equipment
- correct delivery of fluids and drugs
- transport nurse to document vital parameters/fluids using detailed observation charts (every 30 minutes)

The mnemonic "DOPE" helps to identify possible causes for untoward events:

- displacement of ET tube
- obstruction of ET tube
- pneumothorax
- equipment failure

It is essential to stop the ambulance whenever there is a need for immediate intervention. Again, maintaining adequate communication with senior staff is vital in such circumstances (use transport team mobile phone).

Examples:

- in the event of a displaced or obstructed ET tube
  - o stop the ambulance whenever suspicion arises
  - o assess the infant
  - o ventilate via bag-valve-mask technique
  - o re-intubate
  - o secure ET tube
- in the event of a (tension) pneumothorax
  - o one has to balance the need for chest drain insertion against the risk of inducing hypothermia
  - o alternatively, one may consider to perform a needle thoracocentesis, divert to the nearest hospital and perform the definitive procedure in a warmed and safe environment

## Speed of transfer

If stabilisation prior to transfer has been adequately performed, there should be no need for travelling excessively fast. Except in rare circumstances, the infant should improve during transfer rather than simply endure it.

The aim is to move a stable patient at normal speed with only minor changes in physiology and therapy.

**Blue-lights, sirens and excessive speed are discouraged** for the safety of the transport staff. A recent study showed the blue lights and sirens changed the time of transport by a mere few minutes which had no effect on patient outcome.

## 9. On arrival at receiving hospital.

All transfers into LGI to use the Jubilee Building entrance

Once in receiving hospital neonatal unit:

- Carefully move patient and reassess in ABC fashion
- check all lines (position on x-ray) - drains - tubes – monitors

Debrief **after** transfer from incubator

Finish writing/documentation

Transport nurse to complete all documents and file original in babies notes and copy to pink transport file. If baby has not returned to or left LTHT a copy of the documentation is left with the receiving hospital and the original is placed into the pink transport file.

## 6. CLINICAL GOVERNANCE

There is a clear need for a well-organised and comprehensive quality assurance program for any neonatal transfer service. To ensure a high quality in neonatal transport the following are important:

- Communication and documentation
- Educational programme
- Regular audit, i.e. a systematic review of all transfers, their timings, patient outcome, cost of the service etc using robust data collection
- Incident reporting mechanisms and critical incident monitoring
- Research

All transports are reviewed on a weekly basis by the lead consultant and nurse.

### Audit

Audit is essential to allow evaluation and improvement of the service. It is an important tool not only for clinical risk management, but also to move the service forward. Therefore, meticulous documentation is of high importance. Our current data collection includes:

1. Transport: demographics, type of transfer, timings, clinical details, complications. Timing issues include the hour of transport requests, length of transport time, length of time at bedside, incidence of delayed calls (see receiving hospital information and audit sheet)
2. Middle grade staff (non)-availability - careful audit of SpR non-availability will provide the facts and figures of the future needs of the transport team
3. Transfers refused for various other reasons
4. The number of transfers out of region

In practical terms, the following information is captured for every transport:

- all requests, successful or refused are logged onto the computer database by the administrator of the Cot Bureau
- the doctor who discusses the case prior to transfer documents the history, current management in a systems approach, and the advice given
- the data items on the Transport Documents are completed as fully as possible (various timings, physiological variables - systolic BP, temperature, blood sugar, pH and PaO<sub>2</sub>)
- all information is entered into (Excel) database

### Research

Transport nurses carry out small research projects, such as enquiries into parental satisfaction, severity scoring systems during transport and effect of noise/vibration.

## 7. EQUIPMENT

Important equipment issues are safety, reliability and compatibility. This will be covered in a training session with completion of an equipment competence form. You will get the opportunity to familiarise yourself with the equipment prior to your first squad. If in doubt, always ask the transport nurse who has a prominent role in ensuring the equipment is correctly used and handled. The following items are in place:

### **Ti500 - Globetrotter Neonatal Transport System (Hillrom)**



- suitable for all transfers, especially acute inter-hospital retrievals
- a detailed manual covering all components of the system (dials, cylinders, compressor, ventilation circuits, heating, suction, monitoring, alarm pumps) can be found next to the incubator - please read carefully!
- can be used for CPAP as well (see policies and guidelines folder next to incubator)
- mounted on a Ferno "falcon" trolley to ensure compliance with the West Yorkshire Ambulance Fleet and European weight guidelines

### **Baby Pod (Advanced Healthcare Technologies)**

- transportable cot for non-acute transfers, involving low dependency babies who:
  - o can maintain their own temperature in an open cot
  - o do not have IV infusions
  - o do not have ventilatory requirements
- baby Pod is always carefully fixated on the ambulance trolley on the ward



## Philips M3 transport monitor

- very effective at coping with movement during transport as well as being compatible with the unit wide monitoring system

## Equipment bags

- 1 large blue bag (on wheels): contains the equipment needed for an inter-hospital transfer
- 1 small blue bag: as above - contents, but used only for intra-hospital trips
- 1 yellow drug bag
- 1 bag with fridge drugs
- 1 small para bag for *nurse-only* transfers (to minimise the amount of inappropriate equipment carried)

## Miscellaneous

- dictaphone to help staff who suffer from travel sickness, record observations rather than write them
- low flow oxygen meters for both cylinder and wall socket use

## Summary of currently available transport systems

### LGI site

- 1 Ti 500 Globetrotter incubator with nCPAP capability
- 1 Ti 500 Globetrotter incubator with Nitric oxide capability
- 1 baby 'Pod' for low dependency transfers

### SJUH site

- 1 Ti 500 Globetrotter incubator with nCPAP capability
- 1 baby 'Pod' for low dependency transfers

## Mode of transport: ambulance

Any YAS vehicle is capable of transporting any of the above equipment

## 8. COT BUREAU

The Yorkshire Neonatal Cot Bureau is a robust 365 day a year service that has gone from strength to strength since it was set up in 2002. Systems have been developed to ensure that cot status is available to health professionals 24 hours a day.

The cot bureau is currently open 14 hours a day from 8am-10pm and during this time the cot bureau administrator will happily assist any hospital within the Yorkshire Region to transfer patients when the service is required. Every effort is made to ensure that the patient remain within the Yorkshire Region however if this is not possible the administrator will locate the closest most appropriate bed for the patient.

If the cot bureau has not been used when a transfer is needed, they will not be aware of external babies, meaning that they cannot assist in returning the patients to the region as soon as possible. If a hospital prefers not to use the cot bureau, they can complete a transfer form @ [www.yorkshireneonet.org.uk](http://www.yorkshireneonet.org.uk). Once submitted it is sent directly to the Cot Bureau Manager.

















If any units are contacted about a possible transfer during the night (and are unable to accept), refusal information can also be sent directly to the Cot Bureau Manager from the above web page. This information is collected and stored for reporting on at a later date.

The cot bureau is hoping to open the cot bureau site where health care professionals will be able will have the ability to access transfer, transport and other cot bureau obtained by the cot bureau. Once the site is up and running passwords will be issued in-order for people to access the site.

## 9. TRANSPORT GUIDELINES

- **Yorkshire Region Guidelines for Neonatal Stabilisation Prior to Transfer**
  - o Most things that go wrong in a retrieval can be anticipated. This was part of our motivation to create a regionally accepted, systematic approach towards the stabilisation of an infant prior to transport. Such guidelines are aimed to avoid or minimise "en route disasters"
  - o See page 28 of handbook for guideline.
  
- **Transfer guidelines for surgical newborns**
  - o Regionally accepted guidelines towards the safe transfer of newborn infants with a surgical condition
  - o Pay particular attention to fluid status: an infant with bowel obstruction may be markedly hypovolaemic
    - ensure all losses (vomit, nasogastric aspirates) have been replaced ml-for-ml with intravenous Saline 0.9%
    - ensure that there is adequate vascular access
    - ensure that there is an appropriate nasogastric tube on free drainage
  - o See page 39 of handbook for guideline.
  
- **Management of major adverse events during neonatal transfer**
  - o Whereas morbidity in transit is infrequent, death in transit is even rarer. However, it poses an extremely difficult situation. How long to sustain resuscitation depends on the configuration of the team, as for instance an ANNP cannot certify death, hence must continue resuscitation until hand-over to a doctor is possible. If one is close to the receiving hospital, one should continue resuscitation until arrival. Providing resuscitation in a hospital is always better than in the back of an ambulance. If the child dies in the ambulance, it is best to continue the journey to that hospital where the parents are travelling to
  - o See page 44 of handbook for guideline
  
- ***In utero* transports**
  - o Since the outcome of an outborn neonate with major medical or surgical problems (including extreme prematurity) remains worse than for an inborn infant, primary emphasis should always remain on prenatal diagnosis and subsequent maternal transfer whenever possible. Despite advanced training and technology, mothers usually make the best transport incubators.
  - o See page 45 of handbook for guideline.

## CONTACT DETAILS

- Office Dr Harrison  0113 392 83 01
- S Scrimshaw (Secr Dr Harrison)  0113 392 85 37
- Office Sr Harness  0113 392 85 02
  
- Neonatal Unit LGI  0113 392 71 66  
 0113 392 60 68
  
- Neonatal Unit SJUH  0113 206 57 00  
 0113 206 61 51
  
- Switchboard LGI  0113 243 27 99
- Switchboard SJUH  0113 243 31 44
  
- Mobile Phone transport team  07876 74 01 08
- YAS  01924 83 45 15
  
- Cot Bureau Contact Numbers:
  - o Neonatal Cot Bureau  0113 392 84 99
  - o Cot Bureau Fax  0113 392 60 68
  - o Team Leader  0113 392 85 01
  - o Cot Bureau Mobile  07867 52 84 50
  - o Team Leader Mobile  07050 10 26 13

# YORKSHIRE REGION GUIDELINES FOR NEONATAL STABILISATION PRIOR TO TRANSFER

## COMMUNICATION

### Receiving a call

- The referral unit must contact the cot bureau first to find an available cot on 0113 3928499
- The referral unit contact the transport team based on NICU at LGI on 0113 3927166 to advise of possible transfer from where, to where, and with details of baby and condition.
- Transport team to start filling in information and audit sheet.
- The referring unit contacts receiving unit ( if not LGI ) with information, both units (referring and receiving) to complete information and audit sheet
  - This must be used by doctors to discuss current management at time of referral request
  - Referring unit to fax completed information and audit sheet to transport team ( if receiving unit not LGI) on 0113 3926068 so transport team aware of baby's status.
- If severely unstable, transport doctor/ consultant at referring unit to discuss whether transfer of baby is appropriate with
  - consultant neonatologist on-call at receiving hospital
  - sub-specialist on-call at receiving end ( Surgical, Cardiac)
- Referring hospital must inform transport team of any deterioration after initial telephone discussion
- Referring hospital must inform cot bureau if transfer need changes e.g. baby now staying in referring hospital and transfer not required.

### Once transfer agreed

- Cot Bureau will contact ambulance control to arrange vehicle
- Transport nurse/cot bureau to ring referring unit when team setting off with expected time of arrival for retrieval
- Transport nurse to contact receiving unit with further details of baby and inform of possible expected time of arrival

### **Upon arrival at referring hospital**

- Team will introduce themselves to staff on unit
- Transport team to obtain detailed history + careful review of information available
- Transport nurse to receive completed transport documentation including
  - summary letter, including most recent laboratory results
  - overview of current medications and infusions
  - most recent X-Rays
  - photocopy of patients notes (where practicable)

### **Time-critical transfers**

- e.g. - Transposition of Great Arteries
  - acute surgical emergency (perforation, GI bleeding)
- do not excessively delay transfer to specialist centre although attempts should be made to stabilise (may be difficult or even impossible to achieve)
- if baby still unstable at point of departure, transport doctor always to discuss with receiving neonatal / specialist consultant appropriateness of transport prior to departure
- transport team to communicate with parents

### **Upon arrival at receiving hospital**

- Transport team to provide review of transport details to receiving hospital staff and history of baby
- Transport team to photocopy transport
- Transport nurse to provide feedback to referring hospital on day 1,2,3,4,7 post-transfer
- X-rays to be returned + letter during back-transfer to referring hospital

### For PDA cases

- Ensure that most recent CXR (or copy of) must be sent with baby to LGI
- Maternal blood sample must accompany baby if mum not visiting baby pre-operatively.
- Consent will be obtained by surgeon in person at LGI or over the phone by surgeon.

### AIRWAY

There should be a low threshold for intubation and ventilation, as transfer may be associated with clinical deterioration. Hence, problems should be anticipated and stability must be achieved prior to transfer.

Absolute indications for intubation in newborns are:

- grunting
- SaO<sub>2</sub> < 90%
- PaO<sub>2</sub> < 6.5 kPa
- PaCO<sub>2</sub> > 7 kPa
- Recurrent apnoeas
- Mean BP < (post-conceptual age in weeks) mm Hg.
- Also consider intubation when FiO<sub>2</sub> > 50%.

### ET Tube

Gestation	Weight	Diameter (mm)	Length Nasal (cm)	Length Oral (cm)
23-24	0.6 kg	2.5	7.0	6.0
25-26	0.75 kg	2.5	7.5	6.5
27-29	1.0 kg	2.5	8.0	7.0
30-31	1.5 kg	2.5	8.5	7.5
32-33	1.7 kg	3.0	9.0	8.0
34-35	2.0 kg	3.0	9.5	8.0
36-37	2.5 kg	3.0 – 3.5	10	8.5
38-39	3.0 kg	3.0 – 3.5	11	9.0
40	3.5 kg	3.5	12	9.5

- Diameter: the largest size practically possible and not smaller than 2.5 mm as virtually impossible to suction through
  - Length: see guide above - always confirm position clinically and on X-ray
  - Type of tube: whether oral or nasal, must be secure - a well stabilised baby should never extubate during transfer
    - tied, taped or fixed with referring unit fixation
    - transport team will not re-intubate unless ET tube cannot be secured using current tube
- 

## **BREATHING**

### **CPAP**

- CPAP < 24 hrs → intubate prior to transport team arrival
- CPAP > 24 hrs + clinically stable → intubation may not be indicated; discuss with transport team before arrival

### **Chest X-Ray**

- as soon as transport team sets off to referring hospital
- check
  - most recent ET tube in acceptable position ?
  - lung fields, pneumothorax ?
  - position of naso-gastric tube ?
- extra X-Ray *only* if clinical deterioration or ET tube change upon arrival of transport team

### **Naso-gastric tube**

- compulsory during transfers
- leave on free drainage
- regular aspiration → avoid gastric distension

### **Pneumothorax**

- must be drained with a formal chest drain before the journey in any infant on positive pressure ventilation
- secure fixation of drains
- paralysis compulsory

### Blood gas

- preferably arterial, prior to arrival of transport team + immediately before departure

## **DRUGS**

### **Neuromuscular blockade**

- Discuss with transport team at time of referral
- Preferred option in any acutely unstable infant
- May not be required in stable preterm infant requiring minimal ventilation

### **Pancuronium**

- to start as transport team on their way if required
- dose 100 microg/kg - repeat if necessary

### **Sedation in ventilated patients**

#### **Morphine**

- dose bolus 100micrograms/kg
- infusion 10-40 micrograms/kg/hr
- usual rate 24 micrograms/kg/hr

#### **Surfactant**

Type according to unit policy (preferably Curosurf)

- 1<sup>st</sup> dose to administer if
  - < 28 weeks + ventilated
  - 29-31 weeks + ventilated with PIP  $\geq$  20 mm Hg and FiO<sub>2</sub> >30%
- 2<sup>nd</sup> dose if
  - likely to be given during transfer, then administer ½ hr before arrival transport team and have blood gas ready for when team arrives.

## **CIRCULATION**

- All syringes labelled with dose, volume and type of infusion
- All fluids to be infused via 50 ml syringes
- The transport team will use Alaris pumps
  - If available - please have fluids drawn up in Alaris compatible giving sets
  - If not- please use a 50ml syringe and a routine giving set

### **Vascular access**

- Minimum of 2 routes of iv access
  - at least 1 more cannula available than required at time of departure
  - 2 peripheral or 1 central + 1 peripheral
    - Peripheral access- transparent fixation so that site can be observed

### **Central access**

- umbilical vein catheterization if haemodynamically unstable
- umbilical artery catheterization if haemodynamically unstable
  - low position = below L4/L5 or
  - high position = above diaphragm (T8-12)
- transport team will gain access if referral hospital not experienced
- secure with suture + tape as minimum
- check line fixation carefully before departure
- Transport team will check
  - patency of all lines before departure
  - position of central lines prior to departure (X-ray)

### **Fluids**

#### Maintenance Fluids

##### **Type**

- clear fluids during transfer
- if TPN already available: not to start but give to transport team

## Volume

- as per individual unit protocol
- asphyxia: restrict to 60 ml/kg/day
- monitor urinary output if necessary
  - if fluids at > 20 ml/hr ,prepare extra 50 ml syringe for possible use during transfer

Check blood sugar prior to team arriving

## Extra fluids

- **Resuscitation**
  - bolus of 0.9% saline - 10 ml/kg - repeat once if necessary
  - 4.5% Human Albumin Solution if protein losing condition
  - Add inotropic support if no improvement
  - prepare extra 50 ml syringe for possible use during transfer
- **Anaemia or acute blood loss**
  - Use blood 15ml/kg
- **NEC/gastroschisis**
  - anticipate sufficient volume replacement - may need up to 50 ml/kg fluid during resuscitation

---

## DRUGS

### Antibiotics

- **1<sup>st</sup> line antibiotics**
  - as per unit protocol, preferably amoxicillin/penicillin + gentamicin
  - add metronidazole if suspicion of NEC/ volvulus
- Ensure antibiotics are always given prior to arrival of transport team (i.e. do not delay administration)

## Inotropes

- start if insufficient response to 2 x 10 ml/kg volume bolus and mean BP < GA in weeks
- must be given through a central line
- 1<sup>st</sup> line - Dopamine
  - start with 5 micrograms/kg/min - increase by 5 micrograms/kg/min - allow 30 min for steady state - up 15 micrograms/kg/min
- 2<sup>nd</sup> line - Dobutamine
  - start with 5 micrograms/kg/min once dopamine at 15 micrograms/kg/min - increase by 5 micrograms/kg/min - allow 30 min for steady state - max 20 micrograms/kg/min
  - Only increase dopamine to max of 20 micrograms/kg/min when on maximum dose of dobutamine
- 3<sup>rd</sup> line - discuss with transport team
  - Hydrocortisone 2.5mg/kg/dose 4-6 hourly

## Dinoprostone

- starting dose 12.5 nanograms/kg/min unless instructed otherwise by cardiologist
  - increase to 50 nanograms/kg/min if no initial response
- Need to elective intubate & ventilate?
  - Yes -if infant is to be transferred immediately after starting Dinoprostone
  - No - if infant not having apnoeic episodes after several hours of Dinoprostone infusion

## Anti-convulsants

Seizure activity must be controlled prior to transfer (beware of masking seizure activity with muscle relaxants)

- **Phenobarbitone**
  - Loading dose 20 mg/kg over 20 min

- if persistent fits after 1-2 hrs: further dose of 10 mg/kg over 20 minutes
  - dose can be repeated
  - Maintenance (12 hrs after loading) 3 mg/kg/dose 12 hourly
- **Phenytoin**
    - Loading dose 20 mg/kg over 20 min
    - No maintenance dose
  - **Midazolam**
    - Loading dose 150 micrograms/kg over 30 min
    - Maintenance 50-200 micrograms/kg/hr

#### **Others**

- Please confirm whether Vitamin K has been given, how and when
- Don't Ever Forget Glucose: always check BM prior to departure to accepting hospital

#### **ENVIRONMENT**

- Maintain adequate temperature throughout stabilisation process - preferably do not clothe infant for acute transfer (nappy and hat sufficient if ventilated)
- Obtain maternal blood if < 1 month (1 tube, EDTA bottle, with full name, date of birth and hospital number)
- Consent for transfer - parents will be spoken to by transport team – if not possible then need to confirm parents are aware of transfer

## References

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## STANDARD INFUSION SYRINGE PREPARATION DETAILS

For information and guidance only

These are the standard syringe preparations as used by the Yorkshire Neonatal Transport Team.

### MORPHINE

- Vial presentation = 10 mg in 1 ml
  
- Morphine 3 mg in 50 ml
  - o take 0.3 ml of vial and transfer to syringe containing 49.7 ml of suitable diluent (0.9% saline, 5% dextrose, 10% dextrose). Mix well.
  - o loading 100 microgram/kg/hr for 2 hrs
  - o maintenance 25 microgram/kg/hr

### DOPAMINE

- Vial presentation = 200 mg in 5 ml
- Dopamine 1200 microgr/ml
  - o take 1.5 ml of vial and transfer to syringe containing 48.5 ml of suitable diluent (0.9% saline, 5% dextrose, 10% dextrose). Mix well.
  - o dose 5 10 15 20  
(microgr/kg/min)
  - o rate of infusion 0.25 0.50 0.75 1.00 (ml/kg/hr)

### DOBUTAMINE

- Vial presentation = 250 mg in 20 ml
- Dobutamine 1200 microgr/ml
  - o take 4.8 ml of vial and transfer to syringe containing 45.2 ml of suitable diluent (0.9% saline, 5% dextrose, 10% dextrose). Mix well.
  - o dose 5 10 15 20  
(microgr/kg/min)
  - o rate of infusion 0.25 0.50 0.75 1.00 (ml/kg/hr)

### DINOPROSTONE (Prostaglandin E2, Prostin E2)

- Vial presentation = 1 mg in 1 ml
- Dinoprostone 150 microgr in 50 ml
  - o take 0.15 ml of vial and transfer to syringe containing 49.85 ml of suitable diluent (5% dextrose and 0.9% saline). Mix well.
  - o dose 50 20 10 5 (nanogr/kg/min)
  - o rate of infusion 1.00 0.40 0.20 0.10 (ml/kg/hr)

## TRANSFER GUIDELINES FOR SURGICAL NEWBORNS

### I. GENERAL STABILIZATION PROCEDURES

- Stabilise in same way as medical transfers as regards to ABCDE (see Yorkshire Region Pre-Transfer Neonatal Stabilization Guidelines)
- **Gastro-Intestinal problems**
  - keep nil by mouth
  - indwelling 8F nasogastric or orogastric tube
    - position confirmed by X-ray or acid positive litmus
    - left open, draining the stomach, frequent aspiration if large volumes
  - **IV fluid management**
    - beware of excessive fluid losses e.g. in gastroschisis, NEC
    - when giving fluid boluses, 4.5% human albumin solution preferable to crystalloid as babies will be losing protein rich fluid from gut
- **Drugs**
  - Morphine infusion preferred for sedation (or other opiate if Morphine not available)
  - ensure Vitamin K has been given IM or IV prior to transfer in all surgical babies
- **Parents**
  - ensure sample of maternal blood is available for cross matching - EDTA bottle, fully labelled.
  - written consent will be obtained by Consultant Surgeon upon arrival at receiving Hospital - Consent will be taken by telephone in case parents not able to travel to receiving hospital
- **Communication**
  - **08.00 - 22.00**
    - contact Yorkshire Neonatal Cot Bureau to ascertain bed availability
    - if cot available, then discuss case with Surgical SpR/Consultant on call [Consultant Surgeon at receiving hospital MUST always be *aware* of transfer]
    - if medical input required, then neonatal SpR doing transfer will get all details by telephone and advice (+ discuss with Neonatologist on call)
  - **22.00 - 08.00**
    - as above - however, as Cot Bureau not operational at night, please ring straight to Senior Nurse in charge @ LGI neonatal unit
  - **always seek advice from Consultant Surgeon/Consultant Neonatologist at receiving end when**
    - baby acutely deteriorates prior to transfer
    - bowel perforation on X-ray
- It may not be possible to achieve total stability before transfer in critically ill infants. Resuscitation must take place, but if the baby cannot be stabilised without surgical intervention there may be occasions where it is better to transfer the baby urgently without achieving total stability. This is a difficult judgment and must be discussed with the Cons. Surgeon/Neonatologist at the receiving end.

- **During transfer**
  - avoid hypothermia in all circumstances - minimum interference reduces temperature stress on infant
  - consider fluid boluses

## II. SPECIAL CONDITIONS

<b>OESOPHAGEAL ATRESIA/TRACHEO-OESOPHAGEAL FISTULA</b>
--

- Use 10 F NG tube or Replogle tube if available
  - in pouch
  - on continuous drainage + aspirate at least every 10 minutes
    - to keep upper pouch empty and prevent overflow or tracheal compression
    - must be done, even if infant does not appear to have excess secretions
  - suction mouth with standard suction catheter if dribbly
- **Ventilation**
  - transfer as soon as possible to avoid prolonged ventilation prior to surgery
  - avoid ventilation if possible: inspiratory gases take path of least resistance (= through fistula) and may cause significant abdominal distension (or perforation)
  - if ventilation needed: urgent consultation with Consultant Neonatologist/Surgeon on-call
- Start iv Amoxicillin + Gentamicin
- **During transfer**
  - baby to be nursed prone with head up tilt, as far as practicable
  - try to keep infant contented (crying promotes gastric distension and subsequent regurgitation / aspiration)

<b>ADOMINAL WALL DEFECTS GASTROSCHISIS/OMPHALOCOELE/ECTOPIC BLADDER</b>
---

- **Exposed viscera**
  - cover with plastic/cling-film (does not need to be sterile)
  - contra-indicated: cotton wool and saline soaks
  - exomphalos with intact sac must be handled with extreme care to prevent rupture - avoid pressure and kinking - prevent stool contamination of the defect
- **Fluids: see above**
  - nil by mouth
  - NG/OG tube, free drainage
  - ensure adequate IV fluids + fluid boluses to give as 4.5% HAS
- Start IV Amoxicillin + Gentamicin + Metronidazole

- **During transfer**
  - nurse baby on side as this relieves tension on the mesentery
  - close observation of viscera - if circulation appears to be compromised, then reposition viscera in relation to infant (inspect base of viscera mass)
  - consider administration of fluid boluses
  - consider supplementary oxygen
  - regular temperature, pulse, respiration rate & BP monitoring

#### ABDOMINAL DISTENSION/SUSPECTED BOWEL OBSTRUCTION

- **8-10 F NG/OG tube**
  - free drainage + intermittent gastric suction
  - record amount and type of fluid aspirated
  - if aspirates > 20 ml/kg: replace with normal saline and Potassium (20mmol/500mls saline)
- IV fluids, and correction of shock
- AP and lateral shoot-through X-rays (lateral only if perforation suspected)
- Do not instrument the anus (e.g. washouts, rectal thermometers) as this may obscure lower GI contrast appearances of Hirschsprung's
- **During transfer**
  - nurse in supine position
  - if abdominal distension significant: close observation for hypoxia (splinting effect)

#### NECROTISING-ENTERO-COLITIS

- Ng tube; nil by mouth; IV fluids
- Check clotting and consider administration of FFP/extra Vitamin K
- Start IV Amoxicillin + Gentamicin + Metronidazole
- If UAC in situ, then do not remove (unless discussed with transport team)
- AP and lateral shoot through X-rays
- Ventilate if hypotensive or acidotic, according to *Yorkshire Neonatal Stabilization Guidelines*

#### CONGENITAL DIAPHRAGMATIC HERNIA

- Intubate as soon as diagnosis is made, without using bag and mask ventilation, using adequate sedation and paralysis

- “gentle ventilation” to avoid barotrauma or pneumothorax (no hyperventilation)
- ventilate in 100% O<sub>2</sub> regardless of saturations
- **10 F nasogastric tube**
  - on continuous drainage
  - aspirate at least every 10 minutes to decompress stomach
- Surfactant not indicated, unless ≤ 32 weeks
- **During transfer**
  - keep baby sedated and paralysed
  - carefully observe for the possible occurrence of pneumothorax (unaffected side)

<b>PNEUMOTHORAX/PNEUMOMEDIASTINUM</b>
---------------------------------------

- **Pneumothorax which is not under tension and causing minimal symptoms**
  - formal drainage must be done as risk of requiring drainage in transit is always real
- **Tension pneumothorax during transfer**
  - = catastrophic event causing sudden and severe deterioration
  - perform needle aspiration immediately
- **Pneumomediastinum**
  - chest drain has very limited value
  - place infant in ambient oxygen concentration of 100% to enhance absorption of gas collection

<b>CHOANAL ATRESIA</b>
------------------------

- If bilateral, infant is unable to breathe through nose
- Oro-pharyngeal airway (appropriately sized Guedel) must be provided - secure in place with tape
- Avoid feeding for at least 2 hours prior to transfer
- Close observation of breathing pattern during transfer is essential

<b>PIERRE ROBIN/MICROGNATHIA</b>
----------------------------------

- If significant respiratory distress then place oro-pharyngeal airway (appropriately sized Guedel) or consider naso-pharyngeal airway; secure for transfer

- If endotracheal intubation is considered, this must be discussed with referring or receiving Consultant before any attempt is made to intubate. This can be extremely difficult, ask for help from experienced local anaesthetist
- Nurse + transfer infant in prone position, as this usually improves airway patency

<p style="text-align: center;"><b>NEURAL TUBE DEFECTS</b> <b>MENINGOCELE, ENCEPHALOCELE</b></p>
---

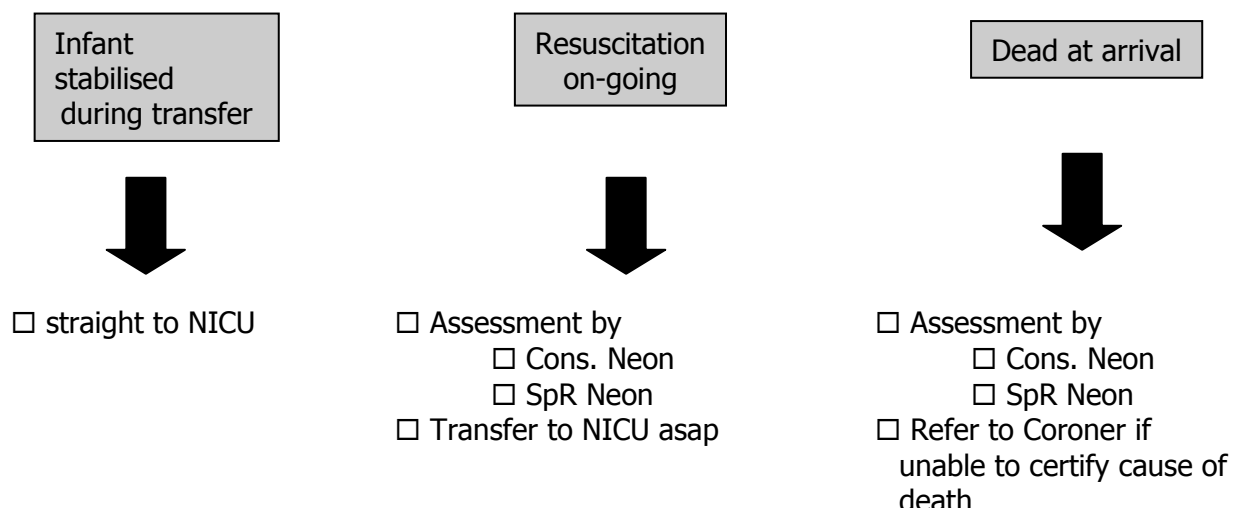
- Sterile dressing if sac is ruptured
- Nurse infant in prone position to prevent pressure on lesion
- Cover back in cling film - prevent stool contamination/ can use Gelaperm/ gauze and light bandage
- Start iv Amoxicillin and Gentamicin

## MANAGEMENT OF MAJOR ADVERSE EVENTS DURING NEONATAL TRANSFER

- Do not undertake transfer until infant is haemodynamically stable. Stabilisation may take several hours.
- When stabilisation is difficult to achieve or when transfer is inherently time-critical (life saving treatment only available at destination hospital):
  - o Ask for help - liaise with LTH Consultant Neonatologist on call - discuss whether you should contact LRH Cardiologist or Surgeon as well.
  - o Remember that, once you set off, all clinical responsibility ultimately rests with the Consultant Neonatologist in charge of the team undertaking the transfer.
  - o Always inform parents their baby may not survive the transfer (in the event it is decided to go ahead with the transfer)



- o Inform LTH Consultant Neonatologist on call
  - o discuss/ask for advice
  - o if transfer into LTH → continue journey to LTH
  - o if back transfer to DGH → return to LTH
  - o give estimate arrival @ LTH
  - o discuss whether consultant presence or that of Neonatal SpR is required upon arrival at A&E
- o Inform A&E of situation (☎ 0113 392 25512 or 22516)
- o Minimise any delay



- Always counsel parents
- Feedback to DGH
- Document all events & communication & timing

# LEEDS TEACHING HOSPITALS NHS TRUST

## IN UTERO TRANSPORT

### CRITERIA

The following list of criteria is offered as a guide and is to be considered when determining the need for In Utero Transport. Each situation is unique and nothing can substitute for the individual physician's evaluation and judgement.

#### 1. Fetal Conditions

- 1.1. Need for antenatal fetal evaluation when there is a question about the fetal condition or welfare
- 1.2. Congenital anomalies that require urgent surgery when born (e.g. Gastroschisis, omphalocele)
- 1.3. Complicated antenatal genetic problems
- 1.4. Iso-immunization with hydrops
- 1.5. Severe IUGR with oligohydramnios

#### 2. Maternal Conditions

- 2.1. Premature rupture of membranes (between 24 and 34 weeks)
- 2.2. Preterm labour (between 24 and 34 weeks)
- 2.3. Severe (but stable) pre-eclampsia or other hypertensive complications

#### 3. Exclusion criteria

- 3.1. Mum >3cm dilated and contracting
- 3.2. Fetal distress
- 3.3. Unstable pre-eclampsia or other maternal condition e.g. APH

Note that if Mum does not delivery within 12-24 hours after transfer, the neonatal cot will most likely be no longer available and Mum and/or (newborn) infant may need to be transferred out again.

This is an obstetric decision and the above is for information only. The neonatal transport team should not make the final decision re suitability of in utero transfer.

## REFERENCES AND FURTHER READING

- The Handbook of Neonatal Transport: Edited by R.J Madar, C.A Skeoch. A Guide for Scotland. P Booth (on behalf of the Scottish Neonatal Consultants Group)
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