

# Embrace Surgical Transfer Guidelines for Newborns

Reference: EMB1800  
Written by: Cath Harrison  
Peer reviewer Steve Hancock  
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## Purpose

Guidance for the referral and stabilization of newborns transferred with surgical conditions for potential surgical procedures.

## Intended Audience

Embrace clinical staff and referral hospital clinical staff.

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## INTRODUCTION

## REFERRAL

Referrals for surgical patients come through Embrace Yorkshire & Humber Infant & Children Transport Service (Embrace) if transfer is anticipated.

For surgical referrals from Sheffield Teaching Hospital Jessop Wing requiring emergency surgery at Sheffield Childrens Hospital NHS Foundation Trust (SCH), the referral should be made by telephone and the call conference should include a surgeon, anaesthetist, neonatologist and the Embrace consultant.

If intensive care is required the NICU Consultant will also be asked to join the call to provide advice. General Surgical patients will not be refused without discussion with the General Surgical Consultant on call and the Consultant will always be contacted for decisions about patient transfer after 2200 hours.

Time critical surgical neonatal patients will routinely be transferred by Embrace. In exceptional circumstances, when a transport team is not immediately available, the referring hospital team may be required to transfer the patient. Guidance is available (**appendix 2**).

## 1. GENERAL STABILIZATION PROCEDURES FOR ALL SURGICAL BABIES

### 1.1 Airway and Breathing

Some conditions require specific considerations to stabilise A and B without compromising stability. See below for details.

#### **Pain assessment**

- Consider IV paracetamol and/or morphine infusion

### 1.2 Circulation

- 2 points of secure i.v. access or a double lumen UVC
- Keep nil by mouth
- Indwelling 8 or 10 g gastric tube (Replogle tube if available for suspected oesophageal atresia/ trachea-oesophageal fistula (OA/TOF))
  - Position confirmed by X-ray or acid positive pH paper
  - On free drainage
  - Frequent aspiration
  - If baby premature and small, consider smaller size gastric tube
- IV fluid management
  - Remember maintenance fluids and replacement fluids for losses
  - Maintenance - 10% glucose with additives or 10% glucose and 0.45% sodium chloride
  - We do not infuse TPN during transfer
  - Losses from gastric tubes – If loss is greater than 20 ml/kg over 24 hours replace with 0.45% sodium chloride or 0.9% sodium chloride (with 20mmol/litre potassium chloride) Please discuss with accepting surgical consultant

- Fluid boluses for hypovolaemia - use 0.9% sodium chloride or 4.5% human albumin solution (babies will be losing protein-rich fluid from gut)
- Beware of excessive fluid losses, e.g. in gastroschisis, exomphalos and necrotising enterocolitis (NEC)

### 1.3 X-ray and radiology

- X rays and radiology images to be sent to receiving unit by PACS
- Alternatively hard copies or a CD must be transferred with the baby

### 1.4 Drugs

- Antibiotics – should be discussed with accepting surgical team
- Morphine infusion preferred for sedation and/or analgesia
- Ensure Vitamin K has been prescribed and administered IM or IV prior to transfer in **all** surgical babies. Document this clearly

### 1.5 Parents

- Ensure maternal blood is taken for cross-matching – appropriate bottle, fully labelled by hand (**appendix 1**)
- 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
- Please ensure contact details are documented clearly

### 1.6 Stability

- 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 Consultant Surgeon / Neonatologist and Embrace Consultant at the receiving hospital

### 1.7 During transfer

- Avoid hypothermia in all circumstances - minimum interference reduces temperature stress on infant
- Continually assess circulatory status
- Consider further fluid boluses
- Consider inotropes

## 2. SPECIFIC CONDITIONS

### 2.1 Oesophageal atresia / tracheo-oesophageal fistula (OA/TOF)

Airway and breathing:

- Avoid ventilation if possible - inspiratory gases take path of least resistance (= through fistula) and may cause significant abdominal distension (or perforation). This can lead to a **life threatening** splinting of the diaphragm and failure to ventilate/oxygenate

- If ventilation needed - urgent consultation with Consultant Neonatologist / Surgeon on-call
- This is now a time critical transfer and the baby must be moved as soon as possible to avoid prolonged ventilation prior to surgery

Circulation:

- As above
- Insert Replogle tube (or 10G gastric tube)
  - In pouch
  - On continuous drainage + aspirate and flush 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 secretions present every 20-30 minutes

Drugs:

- If ventilated, commence morphine infusion for sedation and consider muscle relaxation for transfer

During transfer:

- Baby to be nursed prone if possible
- Try to keep infant comfortable (crying promotes gastric distension and subsequent regurgitation / aspiration)
- Attach Replogle tube to Atrium drain on continuous suction (**Appendix 3**)
- If excess secretion, may need to stop to flush tube with sodium chloride and use "bulb" mechanism for further suction
- Do not leave syringe attached to the replogle tube as this will alter suctioning ability

## 2.2 Abdominal wall defects: gastroschisis / exomphalos / ectopic bladder

Airway and breathing:

- These infants rarely need intubation and ventilation for transfer unless co-morbidities lead to respiratory compromise

Circulation:

- as above

Drugs:

- Start first line antibiotics plus metronidazole

Exposed viscera:

- Cover with plastic/cling-film (does not need to be sterile)
- Contra-indicated: cotton wool and sodium chloride soaks
- Exomphalos with intact sac must be handled with extreme care to prevent rupture, avoid pressure and kinking, and prevent stool contamination of the defect
- Ectopic bladder - gelaperm is more gentle

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 and BP monitoring

### 2.3 Abdominal distension / suspected bowel obstruction

#### Airway and breathing:

- Consider intubation and ventilation if abdominal distension compromising respiratory status
- If ventilation problematic and chest movement difficult to achieve despite high pressure, discuss with consultant surgeon re abdominal drain
- Check blood gas including lactate

#### Circulation:

- as above
- These babies can lose a lot of fluid and need close monitoring
- Assess and correct shock with fluid boluses
- May need inotropes

#### During transfer:

- Nurse in supine position
- If abdominal distension significant - close observation for hypoxia (due to splinting effect) and raise head of mattress to try and improve respiratory status.

### 2.4 Necrotising enterocolitis (NEC)

#### Airway and breathing:

- Ventilate if hypotensive or acidotic

#### Circulation:

- As above
- Fluid loss can be an issue – consider fluid boluses after assessment of circulatory status
- Check FBC, clotting and consider administration of FFP/extra Vitamin K/platelets/blood
- If UAC/UVC in situ, do not remove

#### Drugs:

- Start first line antibiotics plus metronidazole (e.g. IV Amoxicillin + Gentamicin plus Metronidazole)
- Remember pain relief - may need morphine bolus and then continuous infusion and/or IV paracetamol

### 2.5 Congenital diaphragmatic hernia

Usually antenatally diagnosed with planned delivery in a tertiary centre.

#### Airway and breathing:

- Insert a 8-10 g gastric tube immediately, aspirate and leave on free drainage
- Intubate as soon as diagnosis is made, **without using bag and mask** ventilation, using adequate sedation and muscle relaxation

- "Gentle ventilation" to avoid barotrauma or pneumothorax (no hyperventilation). This technique will necessitate relatively higher CO<sub>s</sub> levels to be tolerated.
- Surfactant **not** indicated, unless less than 33 weeks gestation
- Monitor pre- and post-ductal saturations
- Ventilate in 100% O<sub>2</sub> regardless of saturations
- May require nitric oxide for pulmonary hypertension

Circulation:

- As above
- UVC and UAC desirable
  - NGT on continuous drainage
  - Aspirate at least every 10 minutes to decompress stomach
- Achieve good blood pressure with use of inotropes- dopamine and dobutamine to support blood pressure

Drugs:

- Commence on morphine infusion
- Commence on atracurium infusion or regular pancuronium

During transfer:

- Nitric oxide
- Keep baby sedated and muscle relaxed
- Maintain good BP - preferably with arterial monitoring
  - Adjust inotropes to achieve this
- Carefully observe for the possible occurrence of pneumothorax (unaffected side)

- See Embrace CDH guideline

## 2.6 Pneumothorax / pneumomediastinum

Airway and breathing:

- If under tension the air leak must be drained by needle thoracocentesis.
- Maintain airway patency and support respiratory drive prior to considering formal drainage, unless under tension and patient in extremis
- Pneumothorax which is not under tension and causing minimal symptoms:
  - Formal drainage **must** be done if ventilated or on CPAP because risk of tension is significant
  - Seldinger drain catheter placement is preferred
  - Secure catheter with large Opsite dressing
  - Use Atrium pneumostat in transit
- Tension pneumothorax during transfer:
  - = Catastrophic event causing sudden and severe deterioration
  - Perform needle thoracocentesis aspiration **immediately**
- Pneumomediastinum:
  - Chest drain has very limited value
  - Place infant in ambient oxygen concentration of 100% to enhance absorption of gas collection

Circulation:

- As above

Drugs:

- Remember analgesia for insertion and post-insertion of drains.

During transfer:

- Chest drain catheter must be securely fixed in position prior to transfer - large Opsite dressing
- Chest drain catheter must be attached to an Atrium pneumostat

## 2.7 Choanal atresia

Airway and breathing:

- If bilateral, infant is unable to breathe through nose
- Oro-pharyngeal airway (appropriately sized Guedel) **must** be provided - secure in place with tape

Circulation:

- As above

During transfer:

- Close observation of breathing pattern during transfer is essential

## 2.8 Pierre Robin / micrognathia

Airway and breathing:

- 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 Transport Consultant before any attempt is made. This can be extremely difficult - ask for help from referring unit Consultants in neonatology/paediatrics, anaesthetics, ENT

During transfer:

- Nurse and transfer infant in prone position, as this usually improves airway patency

## 2.9 Neural tube defects: meningocele / encephalocele

Airway and breathing:

- Maintain open airway
- Ventilation not usually required
- If associated hydrocephalus and large head size, airway positioning is important

Drugs:

- Start first line antibiotics e.g IV Amoxicillin + Gentamicin

Position:

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

During transfer:

- Nurse infant in prone position to prevent pressure on lesion



## Appendix 1

### Preparing a neonatal patient for emergency transfer

The transport medicine environment is challenging. For transfer to occur safely your patient may need interventions that would not be performed if the patient remained in your hospital. To minimise the time the Embrace team needs to prepare the patient for transport, please consider the following check list before the team arrives. **Additional resources are available at [www.embrace.sch.nhs.uk](http://www.embrace.sch.nhs.uk)**

#### Documentation and communication (\*as appropriate)

- Be prepared to verbally handover to the Embrace team
- Update the parents on the baby's condition and the plans for transfer
- Photocopies of recent relevant notes, recent investigation results, drug chart, TPN prescription\*
- Badger summary or transfer letter with relevant history
- Highlight/document any safeguarding concerns\*
- Transfer relevant radiology to receiving hospital by PACS (CD or hard copy are alternatives)
- Maternal blood sample (6ml EDTA)- fully labelled with request form
  - First name
  - Last name
  - Date of birth
  - NHS number
  - Date & time of sample
  - Name and signature of person taking sample

#### Patient preparation

- Neo-Fit device to secure ETT, use a "Push Test" to ensure the tube does not move. Confirm and document position on CXR (T2 ideal for transfer)
- Stabilised on a suitable mode of ventilation
- Recent blood gas and blood glucose \*
- Gastric tube in situ and secured\*
- Minimum 2 points of IV access, well secured
- If umbilical lines are indicated:
  - Double lumen UVC
  - UVC position checked and documented – not in heart or liver
  - UAC position checked and documented – 'high' (T6-T9) or 'low' (below L3)
- Prepare suitable maintenance fluids, and all other infusions in 50ml fully labelled syringes
- TPN cannot be infused during transfer
- Complete urgent transfusion of blood products and order any anticipated products necessary for transfer.
- Maintain temperature above 36.5 °C (unless therapeutically cooled)
- Follow TOBY guidance for passive therapeutic cooling including rectal temperature monitoring

#### On arrival, the Embrace team will:

- Introduce themselves, take handover and assess the patient
- Review copies of patient documentation, charts and drug card
- Contact the Embrace Consultant as required
- Ensure patient is prepared for transfer
  - Transport monitoring
  - Check ETT and IV access are correctly positioned and well secured
  - Check all prescriptions, infusions and swap to transport pumps
  - Stabilise on transport ventilator and perform a blood gas
  - Transfer to the transport incubator/baby pod and secure baby and equipment
- Communicate with parents and discuss travel arrangements

- One parent may be able to travel with their baby but mothers must be:
  - Discharged fully from in-patient maternal care
  - At least 24 hours post vaginal delivery
  - At least 72 hours post LSCS
  - Physically able to walk and climb steps into ambulance independently

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For further information or assistance please call Embrace to speak directly to a Transport Consultant  
**0114 268 8180**

## Appendix 2

### Preparing a patient for a time critical one-way transfer by the referring hospital team

The transport medicine environment is challenging particularly for time critical transfers. For transfer to occur safely your patient may need interventions that would not be performed if the patient remained in your hospital. To minimise the time needed to prepare the patient for transport, please consider the following check list.

**Remember to always involve Embrace from the time of seeking specialist advice in order to facilitate the most efficient and appropriate transfer for your patient.**

Further resources to support this process, including the Safe Transfer Of Paediatric Patients (STOPP) tool are available at [www.embrace.sch.nhs.uk](http://www.embrace.sch.nhs.uk)

#### Documentation and communication (\*as appropriate)

- Update the parents on the child's condition and the plans for transfer
- Photocopies of recent relevant notes, recent investigation results, drug chart\*
- Highlight/document any safeguarding concerns\*
- Transfer relevant radiology to receiving hospital by PACS (CD or hard copy are alternatives)
- Maternal blood sample (6ml EDTA) - fully labelled with request form (babies under 3months) \*
  - First name
  - Last name
  - Date of birth
  - NHS number
  - Date & time of sample
  - Name and signature of person taking sample

#### Patient preparation

- ETT secured using tape (Elastoplast/zinc oxide), confirm tube does not move with a "push test"
- Confirm and document position on CXR (T2 is ideal for transfer)
- On transport ventilator with continuous ETCO<sub>2</sub> monitoring
- Recent blood gas demonstrating adequate gas exchange and normal blood glucose
- Adequate analgesia, sedation and muscle relaxation\*
- Gastric tube\*
- Minimum 2 points of IV access, well secured
- Maintenance fluids and all other infusions fully labelled
- Pupillary responses monitored and recorded regularly
- Seizures controlled and metabolic causes excluded
- Maintain temperature above 36.5 °C (unless therapeutically cooled)
- Adequate patient monitoring for transport – ECG, BP, SaO<sub>2</sub>, ETCO<sub>2</sub>, Temp
- Patient and equipment adequately secured for transport
- Emergency airway and breathing equipment
- Adequate gas supply available for journey
- Emergency fluids and drugs
- Assess risk of staff involved in transfer and consider change of personnel if inexperienced or fatigued

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**Appendix 3**

***TOFS = REPLOGLE = ATRIUM (mini 500)***

NNU continuous Replogle suctioning pressure equates to 3-4 cmh<sub>2</sub>O  
Transport options until now  
Intermittent @ either 80mmhg-Lowest Laerdal suction OR manual aspiration



***Join the Revolution.***



***Atrium mini 500 = attenuated suction pressure 20cmH<sub>2</sub>O***

***Instructions for assembly overleaf***

***JH Dec 2010***

- Attach rubber tubing (*this is in the box & latex free*) to Atrium chest drain and the end of the replogle tube.



*Then either*

- Attach to portable suction unit with suction tubing to the suction entry port on the top of the Atrium drain and set to 80mmhg and apply continuous suction.(suction unit may eventually cut out if it gets hot, leave for a few minutes then restart)

*Or*

- Attach a suction bulb to the suction entry port on the top of the Atrium drain and manually squeeze intermittently as required.



*hand squeezed from your seated position if required*



*Secure to Trolley with Velcro straps supplied*

***Remember Position & secure your equipment where you can reach it without unbuckling & leaving your seat... You still need to flush with saline.***