THAMES VALLEY & WESSEX NEONATAL OPERATIONAL DELIVERY NETWORK

WESSEX CARE PATHWAY FOR TERM INFANTS REFERRED WITH BILIOUS VOMITING FOR EXCLUSION OF MALROTATION	
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Related documents	**References** 1. **Malrotation of the intestine,** Torres A.M, Ziegler M.M, World Journal of Surgery, 1993, Vol 17, pp 326 -333. (Incidence) 2. **Colour of bile vomiting in intestinal obstruction in the newborn: questionnaire study,** Walker, G M et al, British Medical Journal, 2006, Vol 332, pp1363-1365. 3. **Bilious Vomiting in the newborn: how often is it pathologic?** Godbole P., Stringer M.D, Journal of paediatric Surgery, 2002 Vol 37, pp 909 -911. 4. **Green for danger! Intestinal malrotation and volvulus,** Williams H, Archives of disease in Childhood Education and Practice Edition, 2007, Vol 92, ep 87-91. 5. **Testicular Torsion: A race against time,** Kapoor S, International Journal of Clinical Practice, 2008, Vol 62, pp 821-827. 6. **2013/14 NHS standard contract for neonatal critical care retrieval (transport)** 7. **The burden of excluding malrotation in term neonates with bile stained vomiting,** Drewett M, Johal N, Keys C, Hall N, Burge D Pediatr Surg Int Feb 2016
Implications of race, equality & other diversity duties for this document	**This guideline must be implemented fairly and without prejudice whether on the grounds of race, gender, sexual orientation, or religion.**

Wessex Care Pathway for Term Infants referred with Bilious Vomiting for Exclusion of Malrotation

Contents

Executive Summary

Malrotation results from a failure of the gastrointestinal tract to complete normal rotation and fixation as it returns to the abdominal cavity at eight to ten weeks gestation. The incidence of malrotation is estimated at 1:500 live births[1]. However acute presentation in the neonatal period is estimated in our network to be about 1:6000. The most concerning feature is the lack of fixation which may permit the small bowel to twist around its narrow base with possible compromise to the superior mesenteric artery (volvulus). The tighter the twist, the more the midgut suffers from obstruction of the lumen, obstruction of venous and lymphatic return, and obstruction of arterial inflow, thus threatening midgut viability. Unless treated in a timely manner there may be extensive ischaemic damage and loss of small bowel resulting in short gut syndrome and parenteral nutrition dependence or death.

The purpose of this care pathway is to provide guidance for the multi-disciplinary team to ensure optimal management of a term neonate referred to the neonatal/paediatric surgical service for exclusion of malrotation and volvulus in the presence of bilious vomiting.
A UHS review demonstrated that out of 166 patients referred with bilious vomiting for exclusion of malrotation by upper GI contrast approximately 10% had malrotation. Although most of these patients at laparotomy did have concomitant volvulus only a small number had ischaemic bowel resection. One baby died. The main issue with this pathology is the identification of the baby who has ischaemic bowel and predicting how long from first presentation it takes to develop dead gut[6].
Prediction and identification of these infants is challenging; complete examination and assessment by a senior clinician should be undertaken prior to referral. In well infants contrast studies should be undertaken in local hospitals wherever it is possible to achieve this in a timely fashion.

1.0 Introduction

Early consideration for the need for surgical intervention may mean the difference between intestinal salvage and catastrophe. Any term neonate with bilious vomiting should have the diagnosis of malrotation and volvulus considered and this presentation mandates immediate assessment and evaluation. In the absence of a clear explanatory diagnosis a safe approach is to rule out the possibility of malrotation. The gold standard investigation for this is an upper gastrointestinal contrast study, by a consultant paediatric radiologist, to determine duodeno-jejunal position. If clinical and abdominal signs warrant, immediate emergency surgery should be undertaken.

It is reported that 30% of neonatal malrotation cases present in the first three to seven days of life and fifty percent by one month of age. Bilious vomiting is usually the initial symptom, but abdominal distention is often absent. Typically, these infants will have passed meconium. If there is associated volvulus causing ischaemic damage there may be progression to abdominal distension, the baby will become unwell with unstable haemodynamics and a metabolic acidosis may develop. Blood may be passed per rectum or be seen in gastric aspirates.

1.2 Scope

This care pathway is applicable to term infants, defined as ≥35/40 and weighing ≥1.8kg. They are referred from a local NNU to UHS via SONeT hub by a senior clinician who feels exclusion of malrotation is required. Infants who are in a neonatal unit or up to 10 days if admitted from home qualify to be considered for the rapid assessment pathway or be admitted to NNU at UHS. Term infants older than 10 days who have been home will be considered for admission to either G4SUN ward or PICU at UHS, as clinically appropriate.

The pathway may be applicable to preterm infants, but the rapid assessment pathway can only apply to infants ≥35/40 and weighing ≥1.8kg, therefore preterm infants would be referred for admission to NNU at UHS.

Admission criteria are in accordance with the neonatal unit (NU) operational policy and Paediatric Intensive Care Unit (PICU) facilities for surgical neonates. It should not be applied to the assessment and management of preterm infants with bilious aspirates.

1.3 Purpose

The purpose of this care pathway is to provide guidance for the multi-disciplinary team to ensure optimal management of a neonate referred to the neonatal/paediatric surgical service for exclusion of malrotation in the presence of bilious vomiting.

2.0 Definitions

Bilious vomiting	Emesis containing green bile suggestive of bowel obstruction distal to the ampulla of Vater[1]	
Malrotation	Failure during embryonic development of normal rotation of the midgut	
Volvulus	Twisting of part of the intestine	
Parenteral Nutrition	Nutrition provided by central intravenous route	PN
Upper Gastrointestinal contrast study	An upper gastrointestinal (UGI) series is an investigation performed under X-ray looking at the upper and middle sections of the gastrointestinal tract	UGI
SONeT	Southampton Oxford Neonatal Transport service	
UHS	University Hospital Southampton NHS Foundation Trust	

3.0 Roles and Responsibilities

All staff involved in the care of the newborn within the Wessex Neonatal Operational Delivery Network should be aware of this Care Pathway. Most referrals should be made by the neonatologist or paediatrician responsible for the initial care and assessment of the newborn baby. Malrotation with or without volvulus is one possible cause of bile vomiting in the newborn although studies have shown many infants with bile vomiting do not have surgical pathology[2].

All babies with suspected surgical pathology will have a designated Consultant Paediatric Surgeon, with joint responsibility with a Consultant Neonatologist if admitted to the neonatal unit, in accordance with operational policy. If surgical pathology is excluded, it is the responsibility of the paediatric surgical team to handover responsibility for ongoing management as applicable and document this accordingly.

4.0 Guideline Key Principles

Criteria for referral to the surgical team

In the presence of malrotation +/- volvulus ninety five percent of term infants develop bilious vomiting. Bile vomit is described as green emesis (see Appendix 2). The surgical literature states any term neonate with bilious vomiting mandates immediate assessment and evaluation[4] and should have this diagnosis considered.

The decision to refer an infant with bilious vomiting for exclusion of malrotation is a clinical one and should be made by a senior neonatologist / paediatrician. All infants should be clinically assessed by a senior clinician, including an abdominal X-ray. It is the responsibility of the neonatologist / paediatrician at the local hospital to determine if a baby who they have assessed requires assessment for exclusion of malrotation by means of an upper GI contrast study. An UGI contrast examination should be considered and undertaken in the local hospital in well infants where possible before a decision is made to refer the baby.

Process of making surgical referrals

It is recommended that the time between reaching criteria for surgical referral and being in a position to have a laparotomy should be no more than six hours[5].

Surgical referrals should only be made to the SONeT service, referrals made directly to the surgical team will not be accepted.

1. Infant to be assessed by senior clinician at local hospital, **all infants must be discussed with DGH consultant** prior to referral.
2. Infant to have abdominal X-ray prior to referral and this made available to the Southampton team via PACS.
3. Contact SONeT to make referral – this will be with Surgical Registrar or Consultant, Medical Consultant, SONet doctor and nurse and the local referring clinician.
4. During this call, the decision will be made as to whether the infant will be accepted for transfer and whether suitable for the rapid assessment pathway.
5. If no bed available on NNU then a possibility of a bed on PICU should be investigated by the surgical team prior to transfer. If no bed is available on either NNU/PICU then transfer to another tertiary unit may be required. This decision should be jointly made by the surgical consultant and the SONeT clinical team.

Initial management

- A size 8 nasogastric tube should be placed for gastric decompression to prevent further vomiting and aspiration. This should be done before any diagnostic or therapeutic manoeuvres are performed.
- Intravenous access should be established for administration of intravenous fluids.
- Resuscitation fluids administered as clinically indicated.
- Blood gas obtained.

Emergency Transfers

Currently transfer of a well infant with bilious vomiting is not considered to be of a time critical nature nationally.[6] SONeT will retrieve the infant in an appropriate timeframe based primarily on the clinical condition of the infant and on discussion with the surgical team.
Users of SONeT service ensure that all referral requests are made to SONeT hub in a timely manner.

1. Each case will be individually triaged to determine the urgency of transfer and escort for transfer. Local teams usually have responsibility to transfer neonates admitted from home to paediatric wards. Currently it is recommended that such admissions are discussed on a case-by-case basis.

2. In case SONeT is busy with other time critical transfer at the time of request and baby is considered unwell; the SONeT contingency plan will be followed.

3. If the infant is to be transferred by the local team

- Call ambulance control centre (local Trust to insert code e.g., #5012 or 01273 486465)
- Request “999 HCP Immediate Blue Light Transfer”. This indicates to the control centre that it is a health care professional requesting immediate transfer by ambulance of a patient requiring emergency treatment.
- There is no need to request a specific ambulance base/equipment or personnel (if you do, this may cause delay)
- Give the call handler the name and age of patient, whether they are ventilated or not, who will be accompanying them and their destination. No further information is required.

Rapid Assessment Pathway

Infants over 35 weeks and 1.8kgs who are deemed to be clinically well with no other medical concerns and are being referred solely for exclusion of malrotation may be suitable for a rapid assessment pathway (Appendix 1). If accepted on this pathway the pathway should be followed. Infants not accepted for this pathway should be transferred to NNU at PAH in accordance with SONeT standard operating procedures.

Surgical review following admission

Following arrival at UHS all infants should have an assessment by a senior clinician. It is anticipated that this will be by the paediatric surgical registrar but in certain circumstances may be undertaken by another member of the clinical team e.g., SONeT registrar or paediatric surgical consultant. For infants on the rapid assessment pathway, the principal purpose of this review is to confirm that UGI contrast is required and that the baby does not require immediate surgery. Infants will be reviewed by the surgical team in a timely manner in accordance with the clinical condition of the infant.

Upper Gastrointestinal Imaging

The gold standard is that UGI contrasts are undertaken by a Consultant Paediatric Radiologist. Requests should be made to the radiology department by the surgical team following assessment of the infant, as outlined below. The paediatric radiology team at UHS accept that these studies should be performed in a timely manner and will prioritise according to clinical need.

Requests should be made by the surgical team directly to the on call paediatric radiologist. The radiology registrar/consultant will then organise accordingly and liaise back to the surgical team.

Management following surgical assessment and contrast study

Infants who have a surgical diagnosis will be managed by the paediatric surgical team. Infants requiring immediate surgery should be transferred to the operating theatre as soon as possible. If this is not possible immediately, care in an alternative location (e.g., PICU) may be required.

If no surgical problem is identified consideration will be made by the surgical team as to where ongoing management is best placed. For infants on the rapid assessment pathway this will typically be repatriation to the referring hospital. Timing of repatriation will be dependent on the SONeT activity and in accordance with SONeT transfer policy. If repatriation is not immediate consideration will be made by the UHS teams as to where the infant is best placed until repatriation can occur.

There may be a small number of infants who do not have an immediate surgical diagnosis in whom it is desirable to have a period of ongoing assessment at UHS, these infants should be cared for on NNU at PAH whenever possible.

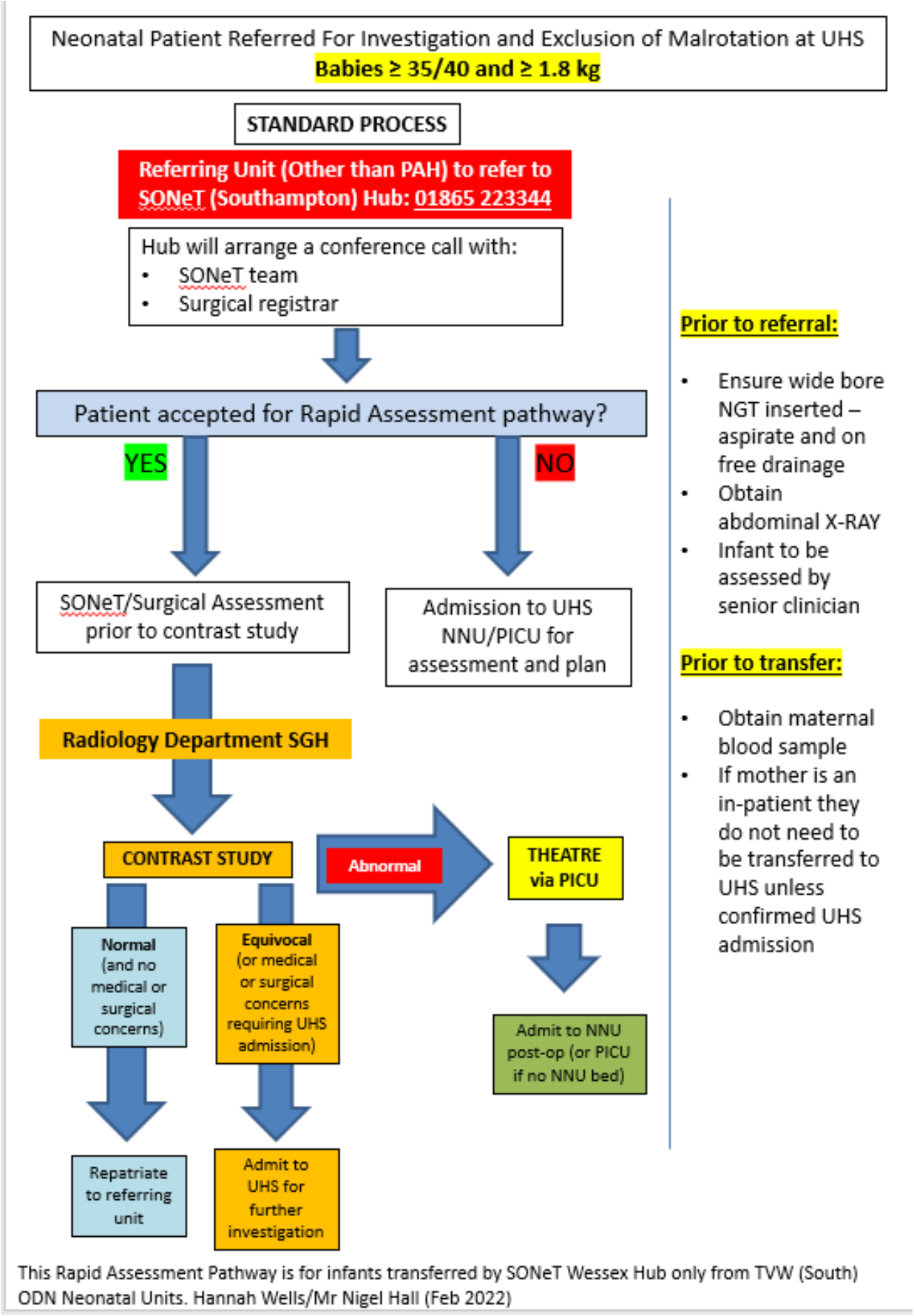
5.0 Arrangements for Review of the Policy

This policy will be reviewed every 3 years as appropriate.

Version Control:

Version	Date	Details	Author(s)	Comments
1	Feb '15	Final for ratification	Melanie Drewett	Wessex Neonatal Clinical Forum
1.7	Jan '17	Updated to reflect the Network Transport Services. Document reviewed and Emergency Transfer (page 6) revised by Dr Puddy and Mr Keys.	Melanie Drewett Mr Charles Keys Dr Victoria Puddy	Approved by TV&W Neonatal ODN Governance Group
1.8	Mar '17	Transposed to the Network format. Link for the Related Trust Documents removed as not available outside UHS, therefore Dr Victoria Puddy removed from the Author list.	Melanie Drewett Mr Charles Keys Dr Victoria Puddy	Updated as requested
1.9	Apr '17	Network Manager/Chair to approve	Melanie Drewett Mr Charles Keys	Approved
2.0	Feb '22	Updated with Rapid Assessment Pathway (appendix 1) Entire document reviewed and updated accordingly.	Hannah Wells Mr Nigel Hall	Circulated Dec 22 and finalised for ratification Jan 23
Review Date: January 2026				

Appendix 1: Rapid Assessment Pathway for Exclusion of Malrotation (≥35/40 and ≥1.8kg)



This Rapid Assessment Pathway is for infants transferred by SONeT Wessex Hub only from TVW (South) ODN Neonatal Units. Hannah Wells/Mr Nigel Hall (Feb 2022)

Appendix 2 – Green vomiting as reflected by boxes 5 - 8.

Fig 1: BMJ. Jun 10, 2006; 332(7554): 1363. Ref (2)

It is generally advocated that there should be prompt assessment of any infant with green vomiting (5-8).

Note yellow vomiting does not exclude mechanical obstruction.