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Management of Neonatal Jaundice Guideline	
Summary statement: How does the document support patient care?	This guideline provides guidance on the recognition, assessment and treatment of neonatal jaundice in babies from birth to 28 days.
Staff/stakeholders involved in development:	Paediatric Consultants, Paediatric Registrars, Senior Paediatric Nurses, Senior Midwifery staff.
Division:	Women and Children's
Department:	Neonatology
Responsible Person:	Chief of Service
Author:	Community Midwifery Matron/ Consultant Paediatrician
For use by:	All staff involved in the management of neonatal jaundice.
Purpose:	To provide evidence based guidance on neonatal jaundice.
This document supports:	NICE CG98 Jaundice in newborn babies under 28 days (2016)
Key related documents:	**UH Sussex West Neonatal/Maternity Guidelines:** CG18006 NIPE SOP , CG1102 guideline for admission to neonatal or transitional care-version , CG1134 postnatal care , CG1150 support for parents of babies-with a poor prognosis
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Version	Date	Author	Status	Comment
1.0	August 2012	N M Brennan, Adil Siddiqui	Archived	Amended section on exchange to make it clearer that IVIG should be considered.
2.0	July 2015	N M Brennan,	Archived	
3.0	June 2018	N Brennan. JOGG	Archived	Extension given to await Paediatric Guideline Group.
4.0	March 2019	G. Addision peer reviewed by N. Brennan	Archived	Addition of appendix 4.
5.0	March 2022	V. Sharp, Consultant Paediatrician J. Collard, Clinical Effectiveness Support Midwife.	Archived	• Antenatal review for anticipated haemolytic disease from maternal antibodies. • Midwife to perform transcutaneous biliometer reading in babies jaundiced beteen 24-72 hrs and refer to paed if indicated. • Exchange transfusions to be performed in tertiary unit. • Guideline reassessed against NICE CG98 • Reformatted to Trust Standard and gender neutral terms added.
5.1	November 2022	G. Thompson, Clinical Educator	Live	Inclusion of nursery nurses. Clarification of 'grey' areas re-written to be clearer

The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician.

If in doubt contact a senior colleague or expert

Index

Management of Neonatal Jaundice Guideline

1.0 Aim of this document

To provide evidence-based guidance on the recognition and management of neonatal jaundice in babies from birth to 28 days.

2.0 Scope

This guideline applies to:

- Midwives
- Neonatal staff
- Paediatricians
- Nursery nurses

3.0 Responsibilities

Midwives, neonatal staff & paediatricians:

- To access, read, understand and follow this guidance.
- To use their professional judgement in application of this guideline.

Management:

- To ensure the guideline is reviewed as required in line with Trust and National recommendations.
- To ensure the guideline is accessible to all relevant staff.

4.0 Abbreviations used in this guideline

ETCOc - End-tidal carbon monoxide	**DAT -** Direct Antiglobulin Test
PCV - Packed-Cell Volume	**IVIG -** Intravenous Immunoglobulin
FBC - Full Blood Count	**SONet -** Southampton Oxford Retrieval Team
TMBU - Trevor Mann Baby Unit	**DGH -** District General Hospital
IVIG - Intravenous immunoglobulins	

5.0 Introduction

- Jaundice is one of the most common conditions needing medical attention in newborn babies.
- Approximately 60% of term and 80% of preterm babies develop jaundice in the first week of life, and about 10% of breastfed babies are still jaundiced at 1 month of age. In most babies early jaundice is harmless. However, a few babies will develop very high levels of bilirubin, which can be harmful if not

treated.

- Clinical recognition and assessment of jaundice can be difficult, particularly in babies with dark skin tones. Once jaundice is recognised, there is uncertainty about when to treat, and there is widespread variation in the use of phototherapy and exchange transfusion.
- This guideline provides guidance on the recognition, assessment and treatment of neonatal jaundice in babies from birth to 28 days and aligns with NICE CG98: Jaundice in newborn babies under 28 days.

6.0 Key priorities for implementation

6.1 Antenatal

If there is anticipated haemolytic disease from maternal antibodies antenatally, these antenatal women/people should always be discussed with local paediatrician if the plan is to birth in a DGH. If born at a DGH, consider commencing phototherapy soon as possible after birth while awaiting formal SBR results on the baby within 1-2hrs of birth.

They are high risk for needing intravenous immunoglobulins (IVIG) and exchange transfusion so the recommendation is to birth in a tertiary centre unless antibodies are felt to be minimal and of low risk of inducing haemolysis.

6.2 Postnatal

Parents/carers should be given information about neonatal jaundice. This can be written and /or verbal.

Information should include:

- Risk factors for developing jaundice.
- How to check the baby for jaundice.
- What to do if they suspect jaundice.
- The importance of recognising jaundice in the first 24 hours and of seeking urgent medical advice.
- The importance of checking the baby's nappies for dark urine or pale chalky stools.
- The fact that neonatal jaundice is common and reassurance that it is usually transient and harmless.
- Reassurance that breastfeeding can usually continue.
- Encourage mothers of breastfed babies with jaundice to breastfeed frequently, and to wake the baby for feeds if necessary.
- Provide lactation/feeding support to breastfeeding mothers whose baby is visibly jaundiced.
- Please note that sunlight is not a treatment for hyperbilirubinaemia.

6.3 Risk factors for jaundice

- Gestational age under 38 weeks
- A previous sibling with neonatal jaundice requiring phototherapy
- Visible jaundice in the first 24 hours of life.
- Mother's/birthing parent's intention to breastfeed exclusively – ensure adequate support is offered to all women/birthing parents that are intending to breastfeed exclusively.

In all babies:

- Check whether there are risk factors.
- Examine the baby for jaundice at each contact, especially in the first 72 hours.

6.4 Additional care

Ensure babies with any of the above risk factors for jaundice receive an **additional visual inspection** by a healthcare professional **during the first 48 hours of life**.

6.5 Visual inspection for Jaundice

Parents, carers and healthcare professionals should all look for jaundice (visual inspection) in babies. When performing a visual inspection:

- Check the naked baby in bright and preferably natural light.
- Examination of the sclerae, gums and blanched skin is useful across all skin tones.
- Do not rely on visual inspection alone to estimate the bilirubin level in a baby with suspected jaundice.

6.6 Jaundice within 24 hours of birth

- **Babies who appear jaundiced on visual inspection pre 24hrs always need to be assessed by a paediatrician.** Refer for urgent Paediatric review (within 2 hours) to exclude pathological causes of jaundice.
- Measure and plot serum bilirubin immediately and repeat 6 hourly until the level is both below the treatment threshold and stable and/or falling.
- Babies observations should be recorded in full on NEWTT 4 hourly
- Please note that measurement of jaundice levels using a transcutaneous bilirubinometer is contraindicated in infants less than 24 hours age

6.7 Jaundice between 24-72 hours of birth

- Measure and record the bilirubin level urgently (within 6 hours) in all babies more than 24 hours old with suspected or obvious jaundice.

- Between 24-72hrs to be seen and checked by a midwife first and a transcutaneous biliorubinometer or heel prick reading taken if transcutaneous bilirubinometer not available or infant less than 35 weeks.
- Refer for paediatric review if unwell and/or over phototherapy line or any other concerns.
- A full set of observations should be performed and recorded 4 hourly on a NEWTT chart

6.8 Measuring the bilirubin level

Babies who are not visibly jaundiced should not have bilirubin levels routinely measured.

When measuring the bilirubin level in babies that are visibly jaundiced:

- Use a transcutaneous bilirubinometer in babies with a gestational age of 35 weeks or more and postnatal age between 24-72 hours.
- If a transcutaneous bilirubinometer is not available, the serum bilirubin level or gas bilirubin level should be checked within 6 hours.
- If a transcutaneous bilirubinometer measurement indicates a bilirubin level greater than 250 micromol/litre check the result by measuring the serum bilirubin or gas bilirubin level.
- Always use serum bilirubin or gas bilirubin measurement as first line measurement to determine the bilirubin level in babies:
    - With jaundice in the first 24 hours of life.
    - Less than 35 weeks gestational age.
    - Babies at or above the relevant treatment thresholds according to transcutaneous bilirubinometer reading for their postnatal age, and for all subsequent measurements.
- Do not use an icterometer to measure bilirubin levels in babies.

The following should not be used to predict significant hyperbilirubinaemia:

- Umbilical cord blood bilirubin level.
- End-tidal carbon monoxide (ETCOc) measurement.
- Umbilical cord blood direct antiglobulin test (DAT) (Coombs' test).

7.0 Use of Treatment Threshold Graphs

7.1 Instructions

Treatment threshold graphs will help staff assess whether babies with jaundice should be given phototherapy or exchange transfusion. Graphs relating to each gestational age (from 23 - less than 38 weeks) can be accessed directly from the NICE website or are available on the postnatal wards and Neonatal units. These graphs are only suitable for babies up to 14 days of age.

The selected graph should be kept with the baby's notes. Plot the baby's bilirubin level on the graph against the baby's age. Each line on the horizontal (x) axis is equal to 6 hours and each vertical line.

(y) is equal to 10 micromol/litre. Assess whether the threshold for either phototherapy or exchange transfusion has been reached. Shade the single or multiple cells to show the type of phototherapy that the baby is receiving on each day.

Note: The graph that reflects the baby's gestational age at birth should always be used i.e. not corrected when the baby reaches 7 days of age (e.g. for a baby born at 35 weeks, always use 35 week gestation chart).

Treatment threshold graphs showing bilirubin thresholds for phototherapy and exchange transfusion in babies with hyperbilirubinaemia for different gestational ages are available in a separate file from:

Tools and resources | Jaundice in newborn babies under 28 days | Guidance | NICE

Do not use the albumin/bilirubin ratio when making decisions about the management of hyperbilirubinaemia.

Do not subtract conjugated bilirubin from total serum bilirubin when making decisions about the management of hyperbilirubinaemia (see management thresholds in the threshold table and the treatment threshold graphs).

7.2 Babies who have a bilirubin level below the treatment level

In babies who are clinically well, have a gestational age of 38 weeks or more and are more than 24 hours old, and who have a bilirubin level that is below the phototherapy threshold but within 50 micromol/litre of the threshold, repeat bilirubin measurement as follows:

- Within 18 hours for babies with risk factors for neonatal jaundice (those with a sibling who had neonatal jaundice that needed phototherapy or a mother/birthing parent who intends to exclusively breastfeed).
- Within 24 hours for babies without risk factors.
- If the bilirubin level that is below the phototherapy threshold by more than 50 micromol/litre, do not routinely repeat bilirubin measurement.
- If the bilirubin level remains within 50micromol/litre of the threshold continue to monitor each serum bilirubin level every 18-24 hours until more than 50micromol/litre below treatment line.

8.0 Phototherapy

8.1 Parental information

Offer parents or carers information about treatment for hyperbilirubinaemia, ensuring they have a copy of the leaflet 'Jaundice Information for Parents'. Discuss with the parents:

- Why phototherapy is being considered.
- Anticipated duration of treatment.
- Why phototherapy may be needed to treat significant hyperbilirubinaemia.
- The possible adverse effects of phototherapy.
- The need for eye protection and routine eye care.
- Reassurance that short breaks for feeding, nappy changing and cuddles will be encouraged.
- Encourage mothers of breastfed babies with jaundice to breastfeed frequently, and to wake the baby for feeds if necessary.
- Provide support with breastfeeding.
- What might happen if phototherapy fails.
- Rebound jaundice.
- Potential long-term adverse effects of phototherapy.
- Potential impact on breastfeeding and how to minimise this.

8.2 General care of the baby during phototherapy

- Place the baby in a supine position unless other clinical conditions prevent this.
- Ensure baby wearing nappy and eye protection only
- Perform routine eye care.
- Commence hotcot at 37^{o}C alongside phototherapy treatment to support babies thermoregulation. Maintain cot at 37^{o}C provided babies temperature is 36.5-37.5^{o}C. Seek paediatric review if temperature outside of expected range.
- Discontinue hot cot once phototherapy treatment completed and infant fully dressed
- Use tinted head boxes as an alternative to eye protection in term babies undergoing conventional ‘blue light’ phototherapy.
- Ensure treatment is applied to the maximum area of skin.
- Monitor hydration by monitoring feeding and assessing wet nappies.
- Weigh all babies daily. A baseline weight should be taken on commencement of phototherapy.
- Support parents and carers and encourage them to interact with the baby.

8.3 Equipment:

- Ensure all phototherapy equipment is maintained and used according to the manufacturers' guidelines.
- Phototherapy lamps should be placed directly above the cot/infant at a safe distance (approximately 30cm above however exact measurement no longer required).
- Use incubators or bassinets according to clinical need and availability.
- Do not use white curtains routinely with phototherapy as they may impair observation of the baby.

8.4 Starting phototherapy

- Use serum bilirubin measurement and the treatment thresholds in the threshold table (see Appendix 1) and treatment threshold graphs when considering the use of phototherapy.
- In babies with a gestational age of 38 weeks or more whose bilirubin is in the 'consider phototherapy' category in the threshold table, repeat the bilirubin measurement in 6 hours regardless of whether or not phototherapy has subsequently been started.
- During phototherapy repeat serum bilirubin measurement 4–6 hours after initiating phototherapy then every 6–12 hours when the serum bilirubin level is stable or falling.
- Perform a full set of observations every 4 hours and record results on NEWTT chart. Escalate any concerns to paediatric team when indicated.

8.5 During phototherapy:

- Using clinical judgement, encourage short breaks (of up to 30 minutes) for breastfeeding, nappy changing and cuddles.
- Continue lactation/feeding support.
- Do not give additional fluids to babies who are breastfed. Maternal expressed milk is the additional feed of choice if available, and when additional feeds are indicated.
- Perform a full set of observations every 4 hours and record on NEWTT chart. Escalate abnormal findings to paediatric team when indicated.
- Weigh infant daily and refer CG1129 Guideline for newborn feeding.

8.6 During intensified phototherapy:

- Do not interrupt phototherapy for feeding but continue administering intravenous/enteral feeds.
- Continue lactation/feeding support so that breastfeeding can start again when treatment stops. Maternal expressed milk is the additional feed of choice if available, and when additional feeds are indicated.

Perform formal assessment:

- Clinical examination
- Serum bilirubin
- PCV
- Blood group of mother and baby
- Direct Antiglobulin Test (DAT)

Consider:

- FBC + blood film

- Blood glucose-6-phosphate taking account of ethnic origin
- In an unwell baby microbiological cultures of blood, urine and cerebrospinal fluid.

8.7 Type of phototherapy to use

(A) Single phototherapy treatment for term babies:

Use conventional **'blue light' phototherapy** as treatment for jaundice in babies with a gestational age of 37 weeks or more **unless**:

- The serum bilirubin level is rising rapidly (more than 8.5 micromol/litre per hour).
- When infant is more than 72 hours old and serum bilirubin level is within 50 micromol/litre below the threshold for which exchange transfusion (see the threshold table).

Single phototherapy treatment for preterm babies:

Use either fibreoptic phototherapy or conventional **'blue light' phototherapy** as treatment for significant hyperbilirubinaemia in babies less than 37 weeks **unless**:

- The serum bilirubin level is rising rapidly (more than 8.5 micromol/litre per hour)
- When infant is more than 72 hours old and serum bilirubin level is within 50 micromol/litre below the threshold for which exchange transfusion (see the threshold table).

(B) Continuous multiple phototherapy treatment for term and preterm babies:

Initiate continuous multiple phototherapy to treat all babies **if any of the following** apply:

- The serum bilirubin level is rising rapidly (more than 8.5 micromol/litre per hour).
- When infant is more than 72 hours old and serum bilirubin level is within 50 micromol/litre below the threshold for which exchange transfusion (see the threshold table).
- The bilirubin level fails to respond to single phototherapy (serum bilirubin level continues to rise or remains static) within 6 hours of starting single phototherapy.

8.8 Stopping Phototherapy

- Stop phototherapy once serum bilirubin has fallen to a level at least 50 micromol/litre below the phototherapy threshold (see threshold table and treatment threshold graphs).
- Check for rebound of significant hyperbilirubinaemia with a repeat serum bilirubin measurement 12–18 hours after stopping phototherapy. Babies do not necessarily have to remain in hospital for this to be done.

9.0 Indications for Exchange Transfusion and Immunoglobulin

9.1 Factors that influence the risk of kernicterus

Babies with jaundice as being at increased **risk of developing kernicterus** if they have any of the following:

- A serum bilirubin level more than 340 micromol/litre in term babies.
- A rapidly rising bilirubin level more than 8.5 micromol/litre per hour.
- Clinical features of acute bilirubin encephalopathy : lethargy, irritability, abnormal muscle tone and posture, temporary cessation of breathing (apnoea) and convulsions.

9.2 Use a double-volume exchange transfusion to treat babies:

- Whose serum bilirubin level indicates its necessity (see threshold table)

And/or

- With clinical features and signs of acute bilirubin encephalopathy.

9.3 Intravenous immunoglobulin

Use intravenous immunoglobulin (IVIG) (500 mg/kg over 4 hours) as an adjunct to continuous multiple phototherapy in cases of Rhesus haemolytic disease or ABO haemolytic disease when the serum bilirubin continues to rise by more than 8.5 micromol/litre per hour.

Offer parents or carers information on IVIG including:

- Why IVIG is being considered.
- Why IVIG may be needed to treat significant hyperbilirubinaemia.
- The possible adverse effects of IVIG.
- When it will be possible for parents or carers to see and hold the baby.

10.0 Exchange transfusion

This should be performed in a tertiary unit and at no point should it be considered in a local DGH without (in the very least) clear conversations with tertiary centres first (SONet or TMBU).

Offer parents or carers information on exchange transfusion including:

- The fact that exchange transfusion requires that the baby be admitted to an intensive care bed.
- Why an exchange transfusion is being considered.
- Why an exchange transfusion may be needed to treat significant hyperbilirubinaemia.

- The possible adverse effects of exchange transfusions.
- When it will be possible for parents or carers to see and hold the baby after the exchange transfusion.

During exchange transfusion DO NOT:

- Stop continuous multiple phototherapy.
- Perform a single-volume exchange.
- Use albumin priming.
- Routinely administer intravenous calcium.

Following exchange transfusion:

- Maintain continuous multiple phototherapy.
- Measure serum bilirubin level within 2 hours and manage according to threshold table and treatment threshold graphs.

11.0 Care for babies with prolonged jaundice

For babies who remain jaundiced at 10 days and are otherwise well and gaining weight, the midwife should review on day 14 (for term) and day 21 (if received phototherapy and/or preterm) and refer to the prolonged jaundice clinic if the jaundice persists (see below).

In preterm and term babies with prolonged jaundice (jaundice lasting **more than 14 days in term** babies and **more than 21 days in preterm** babies):

- Look for pale chalky stools and/or dark urine that stains the nappy.
- Measure the **conjugated bilirubin.**
- Carry out a FBC and a blood group determination (mother and baby) and DAT (Coombs' test). Interpret the result taking account of the strength of reaction, and whether mother/birthing parent received prophylactic anti-D immunoglobulin during pregnancy.
- Carry out a urine culture.
- Ensure that **routine metabolic screening** has been performed.
- Follow **expert advice** about care for babies with a **conjugated bilirubin level more than 25 micromol/litre.**

(See Appendix 2 and Appendix 3)

12.0 Audit

Suggested audit questions:

- Parents of infants identified at risk of neonatal jaundice were provided with information and advice.
- Infants with jaundice appearing in the first 24 hours of life were referred for immediate paediatric review.
- Parents of infants diagnosed with jaundice were provided with information and advice on care and treatment for jaundice.

References

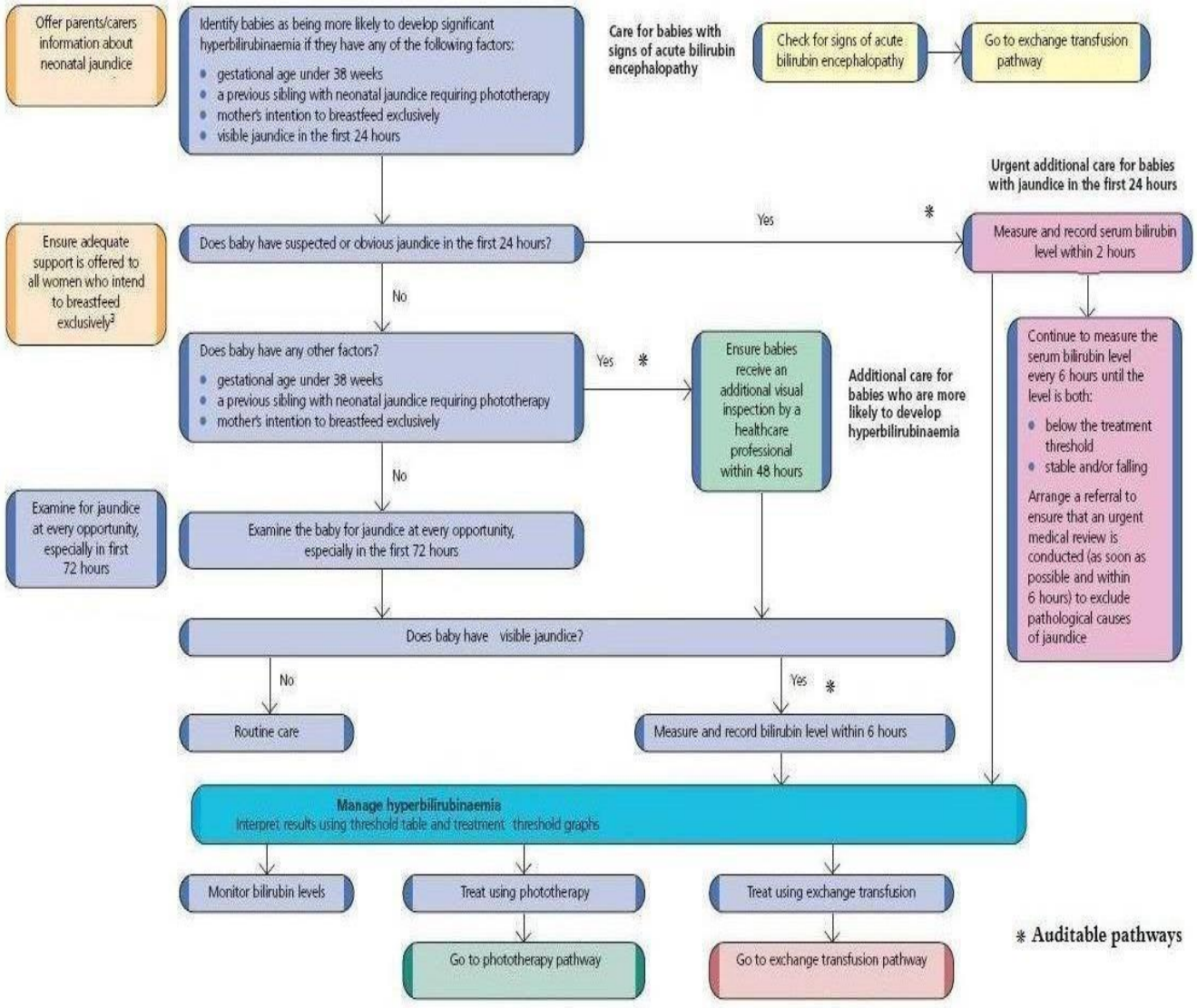
National Institute for Health and Clinical Excellence (NICE) (2010) Neonatal Jaundice. London: NICE. Updated 2016. Available at: www.nice.org.uk

Appendix 1: Threshold table (babies 38 weeks or more gestational age)

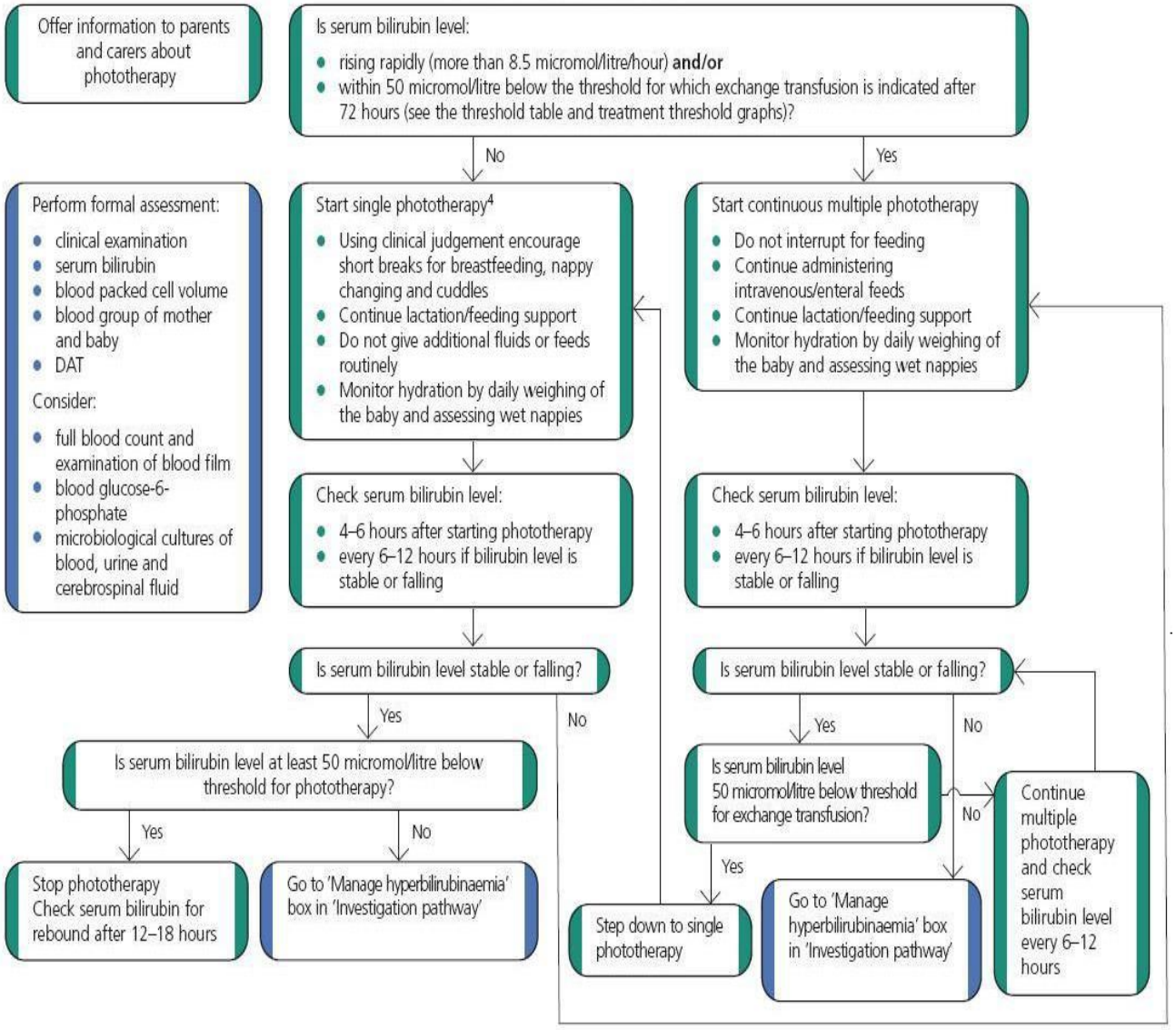
NICE CG98 Jaundice in newborn babies under 28 days - Threshold Table

Age (hours)	Bilirubin measurement (micromol/litre)			
0	–	–	> 100	> 100
6	> 100	> 112	> 125	> 150
12	> 100	> 125	> 150	> 200
18	> 100	> 137	> 175	> 250
24	> 100	> 150	> 200	> 300
30	> 112	> 162	> 212	> 350
36	> 125	> 175	> 225	> 400
42	> 137	> 187	> 237	> 450
48	> 150	> 200	> 250	> 450
54	> 162	> 212	> 262	> 450
60	> 175	> 225	> 275	> 450
66	> 187	> 237	> 287	> 450
72	> 200	> 250	> 300	> 450
78	–	> 262	> 312	> 450
84	–	> 275	> 325	> 450
90	–	> 287	> 337	> 450
96+	–	> 300	> 350	> 450
Action	↓ Repeat bilirubin measurement in 6–12 hours	↓ Consider phototherapy and repeat bilirubin measurement in 6 hours	↓ Start phototherapy	↓ Perform an exchange transfusion unless the bilirubin level falls below threshold while the treatment is being prepared

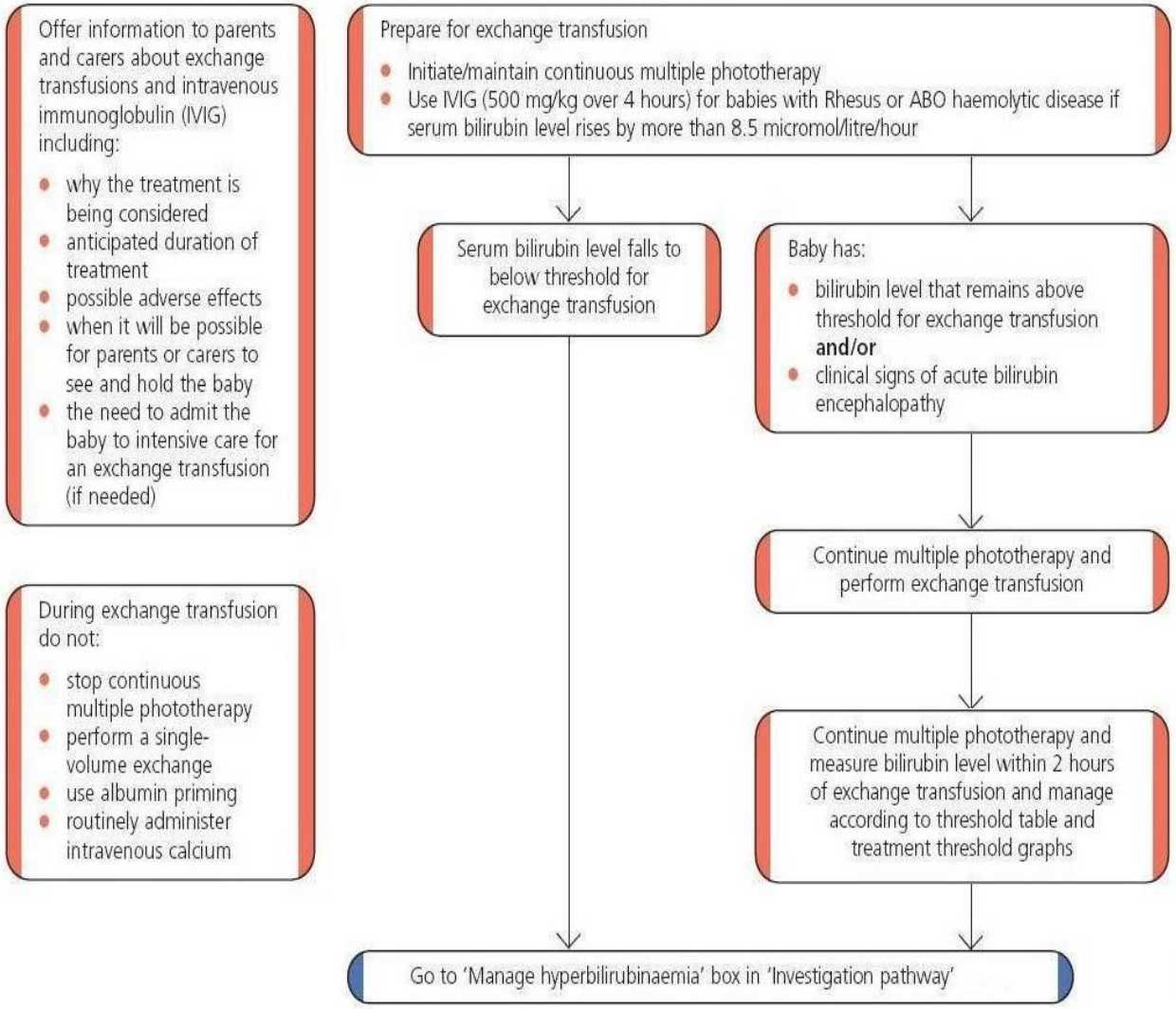
Appendix 2: Investigation Pathway



Appendix 3: Phototherapy Pathway



Appendix 4: Exchange Transfusion Pathway



Appendix 5: Investigation of unconjugated prolonged jaundice

	Date Performed	Specimen required	Result
Split Bilirubin and LFTs			
INFECTIVE CAUSES			
Urine Culture (clean catch) *Send to lab ONLY if nitrites/leucocytes (+)ve*		Urine specimen in sterile pot	
Gal – 1- PUT if strong clinical indication (ie coagulopathy, profound hypoglycaemia, mixed hyperbilirubinemia, consanguinity, dysmorphic infant, non-pigmented stools)		D/w lab about sending specimen directly to the Evelina for quick	
HAEMOLYSIS			
FBC + Film			
BG + DAT			
G6PD (for Mediterranean, Asian, Chinese and Afrocarribean)			

Appendix 6a: Investigation of Conjugated Jaundice

Introduction

This aid to current investigations of conjugated hyperbilirubinaemia is aimed at General Paediatricians, who would typically perform the first line investigations of jaundiced babies before/during discussion with a specialist unit. **It is vital that sick infants and those with pale stools are discussed early with a liver unit** even while awaiting the results of first line investigations. In some cases direct referral to a supra regional liver unit is appropriate to exclude the diagnosis of biliary atresia as quickly as possible.

Guidelines

A split bilirubin (total and conjugated) should be checked on any baby who remains jaundiced after 2 weeks of life (3 weeks for preterm infants). If the conjugated fraction is ≥ 25 (NICE Guideline) µmol/L ***and*** > 20% of total bilirubin then investigations for possible liver disease should be instigated. Liver disease in the newborn can present as:

- An ill infant with liver failure (deranged clotting unresponsive to intravenous vitamin K).
- Neonatal hepatitis syndrome.
- Biliary obstruction (pale stools).

Early discussion with a supra regional liver unit is necessary for infants presenting with neonatal liver failure or possible biliary obstruction**.** Do not delay discussion while waiting for the results of all first line investigations.

It is particularly important to diagnose ***treatable causes*** of liver disease:

- Sepsis, galactosaemia, tyrosinaemia, endocrine disorders.
- Surgical causes - biliary atresia, choledochal cyst.

It is also important to prevent ***serious complications*** of cholestasis:

- Intracranial bleeding from malabsorption of vitamin K
- Hypoglycaemia

A table is provided below for the results of these investigations. This table can be appended to any transfer/referral letter.

Contact Details for Supra regional Liver Units		
Paediatric Liver Service		
King's College Hospital, London		
Phone	020 3299 9000	Bleep 426 between 9 am and 5 pm
Fax	020 3299 3564	Bleep 235 between 5 pm and 9 am

Appendix 6b: First Line Investigations

These refer to the well-baby with prolonged conjugated jaundice.

Haematology:

- Full blood count & reticulocyte count
- Group and Coomb's
- **INR, prothrombin time (if prolonged give IV vitamin K 300micrograms/kg and repeat 12 hours later. If still prolonged contact a Liver Unit**)
- APTT, Fibrinogen

Biochemistry:

- Na, K, Urea, Creatinine, Bicarbonate
- Ca, Phosphate
- Total & conjugated bilirubin
- ALT/AST, Alk Phos, Gamma GT, Albumin
- Cholesterol, triglycerides
- Blood sugar &/or BM's pre feed in the first 24 hours of admission

Infections:

- Blood cultures
- Urine culture and CMV
- Serology (IgM to Toxoplasma, rubella, CMV, Herpes)
- Hepatitis A, B, and C serology

Metabolic:

- Immunoreactive trypsin (up to 8 weeks) or sweat test
- Galactose-1-phosphate uridyl transferase
- Alpha 1-antitrypsin level and phenotype
- Plasma and urine amino acids
- Urine organic acids (succinyl acetone)
- Ward test urine for protein

Endocrine:

- Thyroid function tests
- Cortisol (preferably after 4 hour fast); if low, perform short synacthen test

Ultrasound scan of Abdomen after 4 hour fast:

- Presence of gall bladder
- Presence of choledochal cyst

Consultant to see stool colour (save specimen)

Patient Details / Sticker Name: **Date of Birth:** **Hospital Number:**			**Conjugated Hyperbilirubinaemia First Line Invetigations**		
Lab	**Investigation**	**Bottle**	**Notes/ Turnaround time**	**Date sent**	**Result**
Blood Tests					
Haematology	FBC & Reticulocytes	**EDTA**			Hb: Retic Count: WCC: Differential: Plts:
	Clotting	**Citrate**			APTT: PT: Fibrinogen:
	DAT	**EDTA**			
	Group and Save	**EDTA**			
Biochemistry	LFTs (inc GGT & split bilirubin)	**Serum**			AST/ALT: GGT: Alk Phos: Albumin: Total bili: Conj Bili:
	U&Es (inc Mg)	**Serum**			Na: K: Ca: Phos: Mg: Urea: Creat:
	Bicarbonate	**Serum**			
	Thyroid Function	**Serum**			
	Alpha 1-antitrypsin	**Serum**	In house <7d		
	Cortisol (9:00am)	**Serum**			
	Galactosaemia Screen	**Serum**	Guy's biochem (020 718		
	Succinyl acetone (tyrosinaemia screen)	**Blood spot**	Wellchild Lab (020 7188 0159)		
	IRT/Sweat test	**Blood spot**			
Biochemistry FASTING	Glucose	**Fluoride**			
	Lactate	**Fluoride**			
	3-hydroxybutyrate	**Fluoride**	Bristol (0117 3238383) 2 weeks		
	Free fatty acids	**Fluoride**			
	Amino Acids	**Serum**			
	Lipid profile	**Serum**			Chol: Trig:
	Vitamin A&E	**Serum**	Southampt on (0238 079 6438)		
Serology/ Microbiology	Blood cultures	**Culture**			
	TORCH screen (IgMs)	**Serum**			Toxo: Rubella: CMV: HSV:
	Hep A/B/C	**Serum**			
Urine tests					
Urine	Organic acids		In House		
	Amino acids (with blood sample)		Bristol (0117 3238383) 2 weeks		
	Protein:Creatinine				
	Reducing substances				
	MC&S				
Other Tests					
Radiology	Liver/Abdo USS				

Appendix 6c: Second Line Treatments

As indicated by history, examination, results of first line investigations and/or following discussion with a specialist consultant.

Hepatobiliary scintography: pretreat with phenobarbitone 5mg/kg nocte for at least 3 days and continue to scan until 24 hours post isotope, if there has been no excretion before then. Discuss with nuclear medicine early as isotope requires ordering.

Syphylis serology
Viral PCR (e.g. herpes, CMV)

Ophthalmology review: embryotoxon, chorioretinitis, septo-optic dysplasia

XR spine for butterfly vertebrae: Alagille syndrome

Cardiology opinion if murmur auscultated

Test for rare disorders:

- Ammonia, pyruvate
- Very long chain fatty acids
- Urine and serum for inborn errors of bile salt metabolism
- Acyl carnitines
- Alpha foetoprotein
- Isoelectric focusing of transferrin
- White cell enzymes for glycogen or lysosomal storage disease
- CSF for protein and lactate
- Tubular reabsorption of phosphate
- Ferritin and transferring saturation
- MRI head
- Muscle biopsy for mitochondrial cytopathy
- Bone marror for storage disorders
- Skin biopsy for fibroblast culture

Appendix 7: Neonatal referral pathway into hospital from community with suspected jaundice