Wrightington, Wigan and Leigh Teaching Hospitals
NHS Foundation Trust

Title of Guideline	Neonatal Guideline Management of Jaundice
Contact Name and Job Title (Author)	Dr Ghattamaneni
Division & Speciality	Surgery Child Health
Guideline Number	CG15-061
Version Number	3.1
Date of Review	January 2027
Approving Committee(s)	Child Health Clinical Cabinet
Date of Approval	January 2024
Explicit definition of patient group to which it applies	Child Health
Abstract	
Statement of evidence base of the guideline Evidence Base (1-5)	

1a	Meta analysis of RCT
1b	At least 1 RCT
2a	At least 1 well designed controlled study without randomisation
2b	At least 1 other well designed quasi experimental study
3	Well designed non-experimental descriptive studies (ie comparative/ correlation and case studies)
4	Expert committee reports or opinions and/ or clinical experiences of respected authorities
5	Recommended best practice based on the clinical experience of the guideline developer

Consultation Process	Clinical Cabinet
Target audience	
This guideline has been registered with the trust. However clinical guidelines are guidelines only. The interpretation and application of the clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date.	

JAUNDICE

Introduction

Jaundice is one of the most common conditions needing medical attention in newborn babies. It refers to the yellow colouration of the skin and the sclerae (whites of the eyes) caused by the accumulation of bilirubin in the skin and mucous membranes. It is caused by a raised level of bilirubin in the body, known as hyperbilirubinaemia.

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. For most babies, jaundice is not an indication of an underlying disease, and this early jaundice (termed 'physiological jaundice') is usually harmless.

Breastfed babies are more likely than bottle-fed babies to develop physiological jaundice within the first week of life. Jaundice persisting beyond the first 14 days – is also seen more commonly in breastfed babies. Prolonged jaundice is usually harmless, but can sometimes be an indication of serious liver disease.

Jaundice has many aetiologies including blood group incompatibility (most commonly rhesus or ABO incompatibility), other causes of haemolysis (breaking down of red blood cells), sepsis (infection), liver disease, bruising and metabolic disorders. Deficiency of a particular enzyme, glucose-6-phosphate-dehydrogenase, can cause severe neonatal jaundice. Glucose-6-phosphate-dehydrogenase deficiency is more common in certain ethnic groups and runs in families.

Bilirubin is mainly produced from the breakdown of red blood cells. Red cell breakdown produces unconjugated (or 'indirect') bilirubin, which circulates mostly bound to albumin although some is 'free' and hence able to enter the brain. Unconjugated bilirubin is metabolised in the liver to produce conjugated (or 'direct') bilirubin which then passes into the gut and is largely excreted in stool. The terms direct and indirect refer to the way the laboratory tests measure the different forms. Some tests measure total bilirubin and do not distinguish between the two forms.

In young babies, unconjugated bilirubin can penetrate the membrane that lies between the brain and the blood (the blood–brain barrier). Unconjugated bilirubin is potentially toxic to neural tissue (brain and spinal cord). Entry of unconjugated bilirubin into the brain can cause both short-term and long-term neurological dysfunction (bilirubin encephalopathy). The term kernicterus is used to denote the clinical features of acute or chronic bilirubin encephalopathy, as well as the yellow staining in the brain associated with the former. The risk of kernicterus is increased in babies with extremely high bilirubin levels. Kernicterus is also known to occur at lower levels of bilirubin in term babies who have risk factors, and in preterm babies.

This guidance is is based on evidence where it is available and on consensus-based practice where it is not. In 2016, we reviewed the evidence on tests for recognising neonatal jaundice, bilirubin thresholds for retesting, and the type and procedure for phototherapy.

How to measure the bilirubin level

Use serum bilirubin measurement for babies:

- in the first 24 hours of life or
- who have a gestational age of less than 35 weeks.

In babies who have a gestational age of 35 weeks or more and who are over 24 hours old:

- use a transcutaneous bilirubinometer to measure the bilirubin level
- if a transcutaneous bilirubinometer is not available, measure the serum bilirubin
- if a transcutaneous bilirubinometer measurement indicates a bilirubin level greater than 250 micromol/litre, measure the serum bilirubin to check the result

Use serum bilirubin measurement if bilirubin levels are at or above the relevant treatment thresholds for their age, and for all subsequent measurements.

Assessment, Diagnosis and Management of neonatal jaundice

- Clinically well babies
- Gestational age of 38 weeks or more
- >24hrs old, and who have a
- Bilirubin level **< treatment line but within 50 micromol/litre**

➔➔➔

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 who intends to exclusively breastfeed)

• within 24 hours for babies without risk factors. [new 2016]

- Clinically well babies
- Gestational age of 38 weeks or more
- >24hrs old, and who have a
- Bilirubin level **< treatment line by > 50 micromol/litre**

➔➔➔

do not routinely repeat bilirubin measurement. [new 2016]

- Do not use phototherapy in babies whose bilirubin does not exceed the phototherapy threshold levels in the threshold table and the treatment threshold graphs. [2010]

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

Neonatal Jaundice is hyperbilirubinemia in a baby less than 28 days old. The investigations and treatment of depend on the timing of when the jaundice is noted, the level of the bilirubin as well as the gestational age and the time of delivery.

Jaundice Presenting <24 Hours of Age

- ***Causes: Appendix 1***

Haemolysis - e.g., rhesus and ABO incompatibility, Kell, Duffy, congenital spherocytosis, sepsis/ congenital infection causes conjugated hyperbilirubinaemia at birth

- ***Investigations:***

Serum bilirubin and CRP
FBC and film
Maternal and infant blood groups
Coombs test

- ***Occasionally:***

A/B haemolysins - maternal
G6PD deficiency
Blood culture if septic

- ***Treatment***

See treatment algorithms

Acute Severe Jaundice
Infants identified on postnatal wards or at home who have bilirubin levels above the exchange line should be:

- admitted to NICU (Consultant to be informed)
- provided with phototherapy (see Phototherapy Pathway) and IV fluids to rehydrate on admission
- bloods for exchange transfusion should be ordered immediately
- repeat bilirubin levels hourly and if falling quickly to below the exchange line then continue with phototherapy otherwise proceed with exchange as soon as blood available
- notify Consultant before proceeding with exchange transfusion

Jaundice Presenting 1-14 Days Of Age

- ***Causes:***

Non pathological:
- Physiological
- Prematurity

Pathological:
- Continuing haemolysis
- Infection (acquired or congenital)
- Galactossaemia/other metabolic causes
- Polycythaemia
- Extensive bruising

- ***Investigations (to be undertaken if treatment needed)***

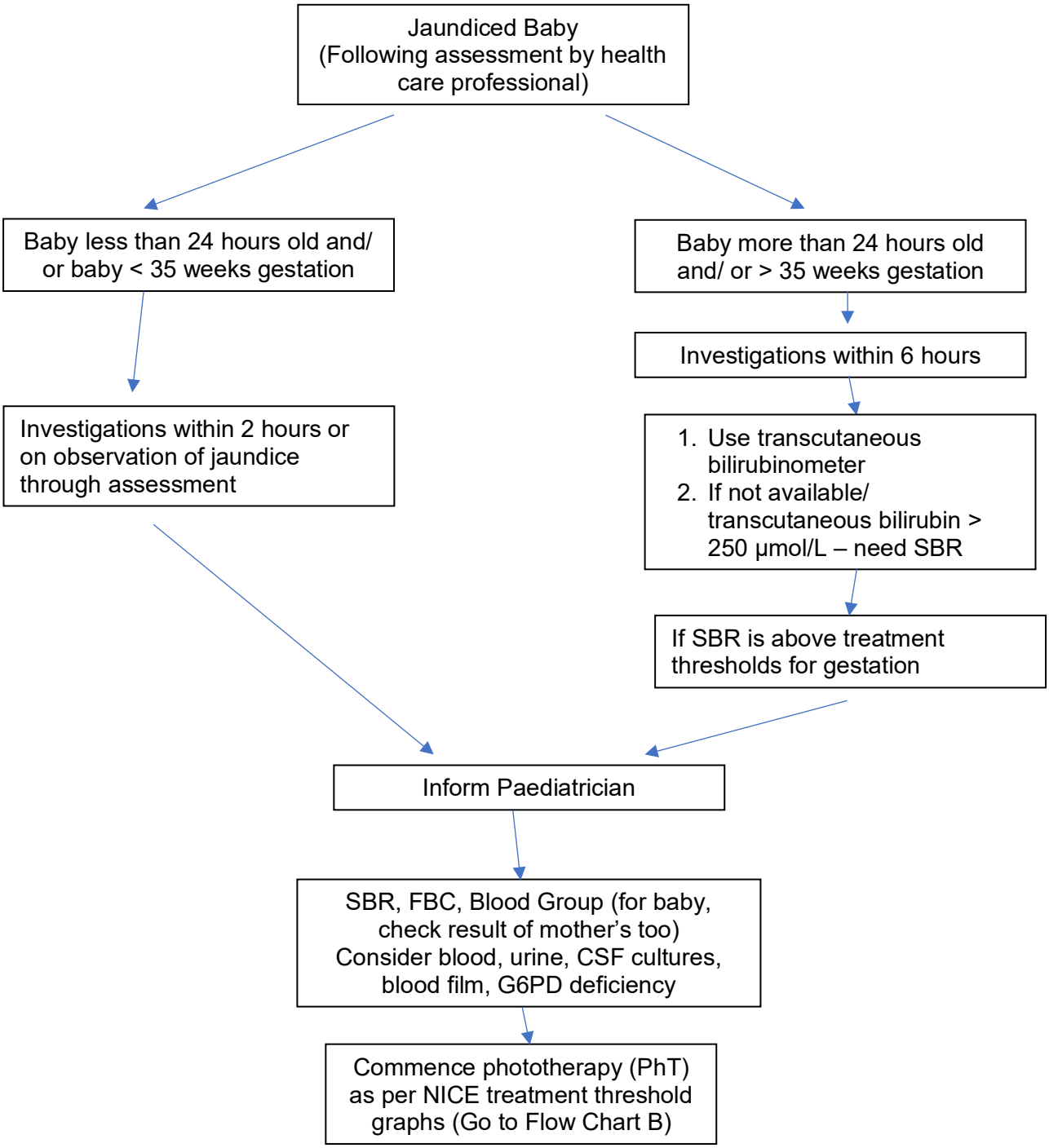
Serum bilirubin and CRP
FBC and film
Maternal and infant blood groups
Coombs test
Infection screen - blood/urine/viral cultures and
Occasionally metabolic profile

- ***Treatment***

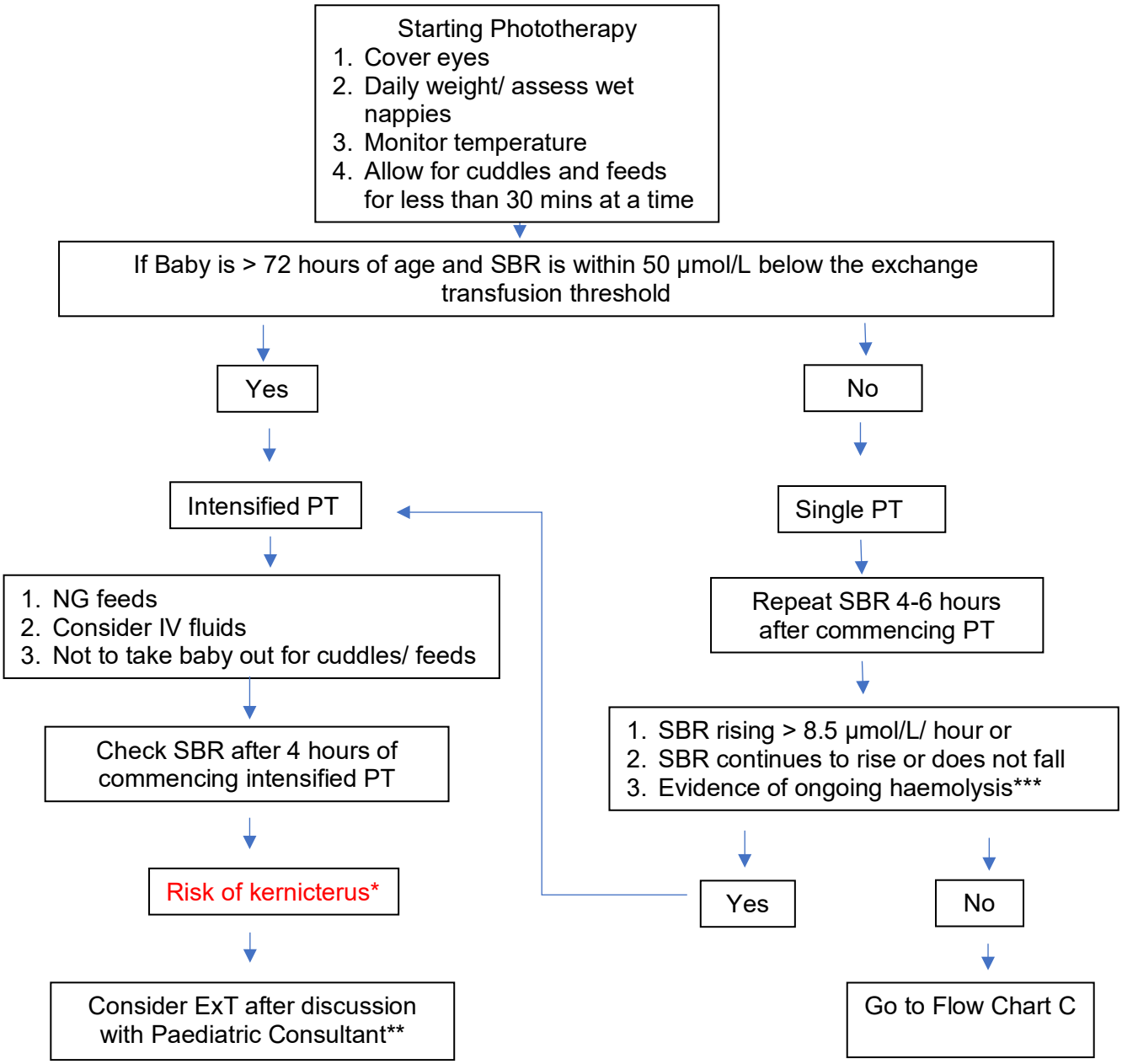
Phototherapy if required - use appropriate chart for gestation (See algorithm on Page 5)
Exchange transfusion in the presence of confirmed haemolysis (follow hyperlink to full exchange transfusion guideline on page 3)

- Many misconceptions about jaundice and the treatment may prevail. It is vital to ensure parents are given the correct information. The parent information leaflet should be offered to all parents of babies treated with phototherapy and verbal explanation should be given to explain the reason for the treatment and possible consequences of untreated hyperbilirubinaemia (risk of kernicterus). In addition ensure that none of the following are used to treat jaundice of the newborn; agar, albumin, barbiturates, charcoal, cholestyramine, clofibrate, D penicillamine, glycerin, manna, metalloporphyrins, riboflavin, traditional Chinese medicine, acupuncture or homeopathy (NICE 2010)

Flow Chart A: Algorithm for assessment and treatment of neonatal jaundice



Flow Chart B:

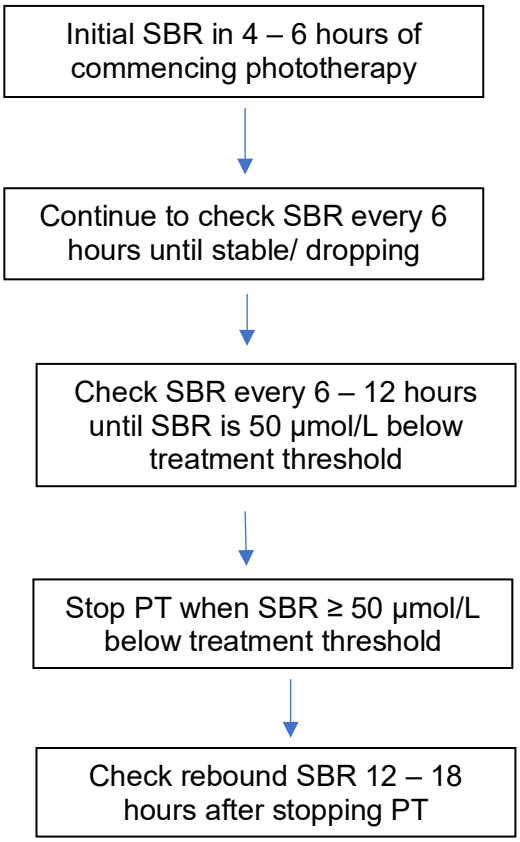


*Serum bilirubin level greater than 340 µmol/L in babies with a gestational age of 37 weeks or more, or rapidly raising at rate >8.5 µmol/L /hour or clinical features of acute bilirubin encephalopathy

** **Refer to CG15-060 Management of Jaundice at the Exchange Transfusion Level**

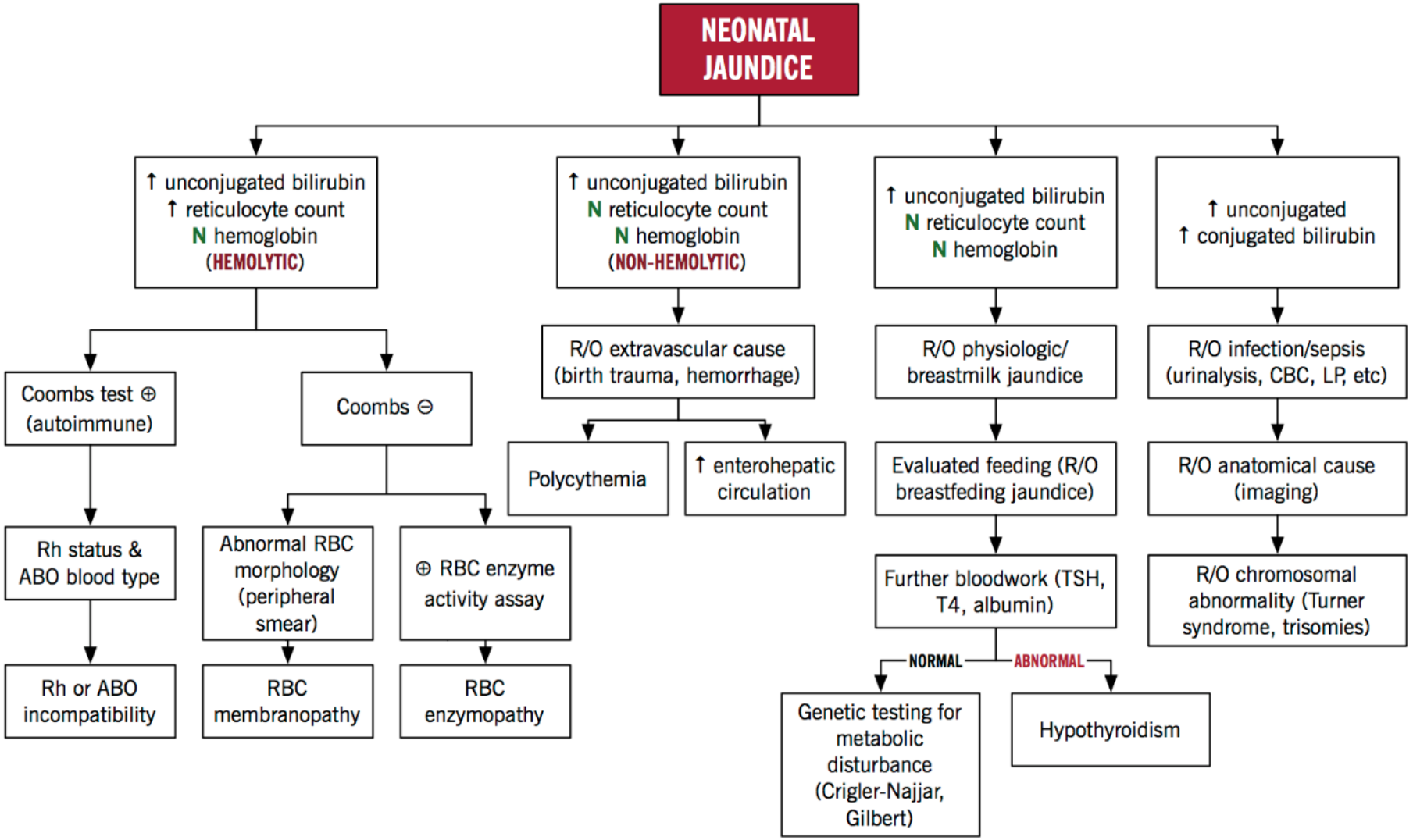
***Use immunoglobulin (IVIG) (500 mg/kg over 4 hours) as an adjunct to continuous multiple phototherapy in cases of Rhesus haemolytic disease or ABO haemolytic disease when the serum bilirubin continues to rise by more than 8.5 µmol/L per hour.

Flow Chart C: Monitoring and discontinuing phototherapy



- For babies discharged from Rainbow ward, for whom it is deemed it appropriate for the bilirubin to be checked at home, please follow the agreed flow chart D (Pg 8) to arrange this testing. Please note, it is the responsibility of the medical staff to follow up the bilirubin of discharged babies in liason with the midwives and to treat accordingly, with reference to the appropriate treatment threshold graph.

Appendix 1: Pathological Jaundice Causes:



Appendix 2:

Prolonged Jaundice: See CG15-176 Neonatal Guideline Prolonged Jaundice

Summary of Investigations for Neonatal Jaundice

Jaundice clinically apparent within 24 hours of birth	**Significant Jaundice first clinically apparent day 2 – 14**	**Significant Jaundice clinically persisting beyond day 14 (term infants), day 21 (preterm infants) – Prolonged Jaundice**	
-FBC and blood film -Bilirubin -Maternal and infant blood group -Direct Coomb's Test	-FBC and blood film -Bilirubin -Maternal and infant blood group -Direct Coomb's Test -LFT -U&E if needs phototherapy	-FBC and blood film -Bilirubin: direct and indirect -Maternal and infant blood group -Direct Coomb's Test -Urine Culture -Urine reducing substances -Thyroid function tests	
Consider	**Consider**	**If Conjugated jaundice**	**If Unconjugated jaundice**
-G6PD -Pyruvate kinase -Blood culture -Urine culture -CRP -Urine reducing substances	-Split Bilirubin -G6PD -Pyruvate Kinase -Urine Culture -Blood Culture -CRP -Urine reducing substances -GAL-1-PUT	-LFT -Coagulation profile -USS liver -GAL-1-PUT -Alpha-1-antitrypsin -TORCH screen -Urine CMV -CF DNA -Urine for organic and amino acids -HIDA scan if USS liver abnormal	-G6PD -Pyruvate kinase -GAL-1-PUT if bottle fed

Appendix 3: Results of Investigations for Jaundiced Neonates

Print off and insert this sheet into the medical records

Patient Name	**DOB**	**Hospital Number**	
Investigation	**Date sample taken**	**Result obtained. If not done, reason for not doing**	
		Date	**Result**
Serum bilirubin (Direct and Indirect)			
FBC and blood film			
Maternal and infant blood groups			
Coomb's Test			
Blood culture (if septic)			
Urine culture			
G6PD			
Pyruvate kinase			
LFT			
Gamma GT			
Coagulation profile			
Alpha-1-antitrypsin			
GAL-1-PUT			
TSH/ T_4			
Urine reducing substances			
Serum amino acid profile			
Congenital infection screen including hepatitis screen			
CF DNA/ IRT			
USS liver			
HIDA scan			

Appendix 4: Tools and resources | Jaundice in newborn babies under 28 days | Guidance | NICE

References:

https://www.nice.org.uk/guidance/cg98/evidence/full-guideline-245411821