LRI Children's Hospital

Prolonged Jaundice - Assessment & Investigations

Staff relevant to:	Medical and Nursing staff
Team approval date:	January 2025
Version:	5
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Written by: Reviewed by:	Mehul Joshi Mehul Joshi & Nadeem Muhammad
Trust Ref:	C17/2017

1. Introduction and Who Guideline applies to

Definition:
Jaundice persisting beyond two weeks of age in term infants or after three weeks in preterm infants (born at less than 37 weeks gestation).
15% - 20% of all normal, healthy babies remain jaundiced at two weeks of age. Up to 5% of all normal, healthy babies remain jaundiced at 3 three weeks of age.

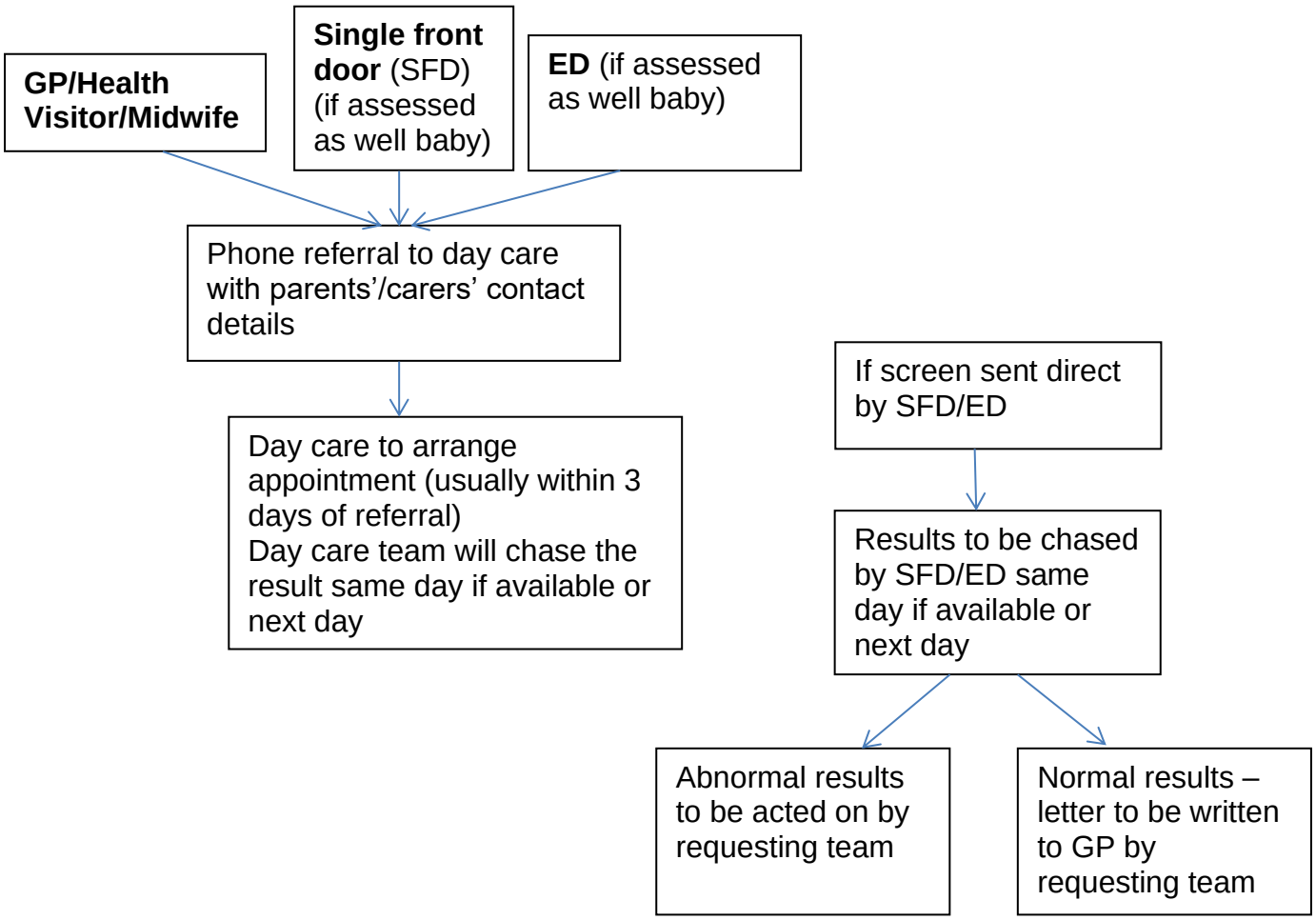
• BUT – persisting jaundice especially beyond this age may indicate serious disease. Therefore, all babies with jaundice after this age must be investigated whatever the absolute level of bilirubin. The most important distinction to make is if the jaundice is unconjugated or conjugated and whether liver function is normal or abnormal.

This guideline applies to all caring for infants presenting with prolonged jaundice.

Related Documents

Aseptic Non Touch Technique UHL Guideline B20/2013
Consent to Examination or Treatment UHL Policy A16/2002
Infection Prevention UHL Policy B4/2005
Jaundice - Neonatal UHL Childrens Hospital Guideline C32/2019
Jaundice in Newborn Babies UHL Obstetric Guideline C47/2019

2. Pathway for referral for prolonged jaundice screen:



Routine screens take place on LRI Children's Day Care – based on ward 28, Ext 16317 (referrals in daytime hours only).

If screen has been done on Single Front Door/ED i.e. overnight, requests on ICE (ICE/Nervecentre->Path order sets->Childrens->Prolonged jaundice screen, plus blood film, urine MC&S etc. if indicated as below). SFD teams will be responsible for following up tests and results need to be acted on by the requesting team (If screen is done by ED team, they will handover to SFD team for the results to be chased). **This to be highlighted to on call consultant during handover and added on to chasing result book at SFD/Wards.**

If further advice required- can contact prolonged jaundice registrar/co-ordinator Dr Muhammad Nadeem or Consultant Dr M Joshi.

2.1 CLINICAL ASSESSMENT OF BABIES WITH PROLONGED JAUNDICE:

Detailed History & Examination (will be performed by day care nursing staff as this is nurse led clinic)

1. Birth history: Gestation, delivery details, Neonatal issues, Vitamin K and Newborn blood spot screen (Guthrie).
2. Risk Factors: Maternal blood group, previous pregnancies, previous rhesus or ABO incompatibility, maternal infections.
3. Feeding: Amount, frequency, milk type.
4. Weight- Weight gain/loss.
5. **Colour of stool – yellow/ pale, chalky** (If yes then please seek urgent senior medical advice from the on call paediatric registrar/prolonged jaundice registrar/lead)
6. Colour of urine (concern if dark urine that stains the nappy)
7. Any other concern
8. **Has the Newborn blood spot screen been done**? (This ensures that neonatal screening for common conditions has been done).

Examination:

1. Clinically well or unwell
2. Observations-Temperature, Heart rate, respiratory rate, saturations
3. Active-Yes/ No
4. Alert- Yes/No
5. Moist mucous membranes- Yes/ No
6. Baby jaundiced- Yes/No.

If unwell child/fever/ any concerns then will need urgent medical review- to discuss with paediatric registrar (mobile/bleep) – ward registrar (mobile-07870822354) to be contacted (9am-5pm) first and on call registrar (SFD-mobile- 07960873483) out of hours (5pm onwards).

- **Clinically very important to rule out Biliary Atresia**

Routine Investigations:

1st line investigations-

Split SBR (Total and Conjugated Bilirubin)- **Orange (Lithium Heparin)**
Full Blood Count (FBC)-**Red top (EDTA)**,
DAT (Direct Antiglobulin Test)- **Red (EDTA)**

Total **2 Red (EDTA)** and **1 Orange (Lithium Heparin)** bottle

Urine C/S – **only if** poor feeding, vomiting, lethargy, not regained birth weight, fever etc.
TFT (Thyroid function test) – **only if no** newborn blood spot screening (Guthrie) test done- **Orange (Lithium Heparin)**

If unwell baby/fever then will need urgent medical review- to discuss with paediatric registrar – ward registrar (mobile- 07870822354) to be contacted (9am-5pm) first and on call registrar (SFD- mobile- 07960873483) out of hours (5pm onwards)

Blood test results are chased by Children's Day Care Team usually same day if available or next day. They will liaise with prolonged jaundice lead/co-ordinator for any queries with regards to abnormal results for further management.

2nd line investigations-

If Direct (Conjugated) Bilirubin level >25 micromol/L irrespective of total SBR level – URGENT DISCUSSION WITH MEDICAL TEAM (prolonged jaundice lead/co-ordinator/paediatric registrar on call
Will need further extensive investigations as mentioned below- CONJUGATED

If SBR >300 AND direct (conjugated) bilirubin <25 micromol/L
Repeat LFT with Split SBR (and FBC if DAT positive- **Red(EDTA)** in 1 week time.
Total **1 Orange (Lithium Heparin)**

2.2 UNCONJUGATED

If jaundice is unconjugated (SBR <300 and direct bilirubin <25 micromol/L) and other results are normal then it requires no further action. In most cases, the cause is likely breast milk jaundice.

Mild jaundice

- If baby is clinically well, investigations normal, SBR <300
- Discharge back to GP

Moderate jaundice

- SBR >300
- Rest of investigations normal
- Arrange for repeat LFT & split bilirubin in 1 week time – Daycare
- Request DAT(if not done) and repeat FBC, retic count, blood film to rule out haemolysis
- Consider TFT, Urine c/s
- Consider G6PD screen
- Also consider investigations to rule out:
    1. Ongoing haemolysis - D/W haematologist
    2. Criggler-Najjar syndrome

See appendix for further guidance and interpretation

2.4 CONJUGATED

Babies with conjugated hyperbilirubinaemia (**direct or conjugated bilirubin is more than 25 micromol/L – NICE definition of significant conjugated jaundice**) should have more extensive **urgent** investigations. Exact investigations will vary depending on the clinical findings. **The priority is to exclude biliary atresia, as this requires surgical intervention to correct the congenital defect as soon as possible to improve the prognosis, ideally before 8 weeks of age.**

Direct–total bilirubin ratio can be highly variable and hence an unreliable indicator of pathology.

(Refer to appendix-3 -BCH/ BSPGHAN summary of investigations)

- **URGENT MEDICAL REVIEW** (same day if possible or earliest next day after being aware of the results and discussion with parents) AND to request an urgent **Ultrasound liver/biliary tract to rule out Biliary Atresia.**
- **As baby with conjugated hyperbilirubinemia will need urgent review, blood tests, USS investigation and ongoing discussion with BCH liver team- to consider review at SFD and admission on same day or earliest possible next day (after being aware of the results and discussion with parents).**

- **Clotting screen (identifying and correcting clotting abnormalities early to prevent intracranial haemorrhage)**
- **Blood glucose**
- LFT, split SBR, Bone profile, Gamma GT, AST, Urea and electrolytes (U&Es)
- FBC, DAT (if not done before)
- Gal-1-PUT (Galactosemia)
- Thyroid function test
- Tyrosinemia screen-Serum amino acids
- Alpha 1 Anti trypsin levels and phenotype
- Immuno Reactive Trypsin
- TORCH screen- discuss with virology regarding sample
- Urine c/s
- Urine organic acids (with succinyl acetone), reducing substances

Urgent advice should be sought form the Children's Liver Team at Birmingham Children's Hospital by bleeping the on call liver reg.
For non-urgent advice you can email the liver team on **bwc.bchliveradvice@nhs.net**

BCH Liver Unit Referral Form-
https://bwc.nhs.uk/liver-unit/

If suspecting biliary atresia, urgent fasting abdominal USS to look at the biliary structures and consider HIDA scan.

Make sure you liaise with the Hepatologist at Birmingham Children's Hospital. Consider sending karyotype and Molecular genetics if dysmorphic features present. Request Eye opinion, ECHO and X-ray of the Vertebra if you suspect Alagille's syndrome.

3. Education and Training

There is no new education, training requirements or skills required to implement the guideline.

4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Audit to review investigation and management of babies present with prolonged jaundice	Discussing results of audit and learning from it	M Joshi/ M Nadeem	2 yearly	Departmental audit meetings

5. Supporting References

1. NICE 2010/cg98 (updated October 2023) Jaundice in newborn babies under 28-days www.nice.org.uk/guidance/cg98

2. QMC, Nottingham Prolonged Neonatal Jaundice, December 2020: L Wells, D Wood, J Sussens.

3. Royal London Hospital, Prolonged Jaundice pathway, April 2020: A Riddell, C Mulvenna, M Sohail, S Beebeejaun, A Jain.

4. Prolonged Jaundice Screen Proforma, Royal Alexandra Childrens Hospital, Brighton, 2019: M Rahman, M Lazner.

5. G155(P) Prolonged jaundice clinic: are we doing too many tests?
   SF Beebeejaun, Y Young2, A Jain
   http://dx.doi.org/10.1136/archdischild-2020-rcpch.126
   Arch Dis Child 2020;105(Suppl 1):A1–A238

6. Archives of Disease in Childhood Feb 2016 Is screening for urine infection in well infants with prolonged jaundice required? Local review and meta-analysis of existing data. S Steadman, I Ahmed, K McGarry, S V Rasiah.

7. Archives of Disease in Childhood Volume 96;1 NICE recommendations for the formal assessment of babies with prolonged jaundice: too much for well infants? M E Rodie, A Barclay, C Harry, J Simpson

   October 2010Archives of Disease in Childhood 96(1):112-3

8. Archives of Disease in Childhood Volume 97;1 Investigating prolonged jaundice in healthy breastfed infants- time to change current practice? S Sampath, R Puttha, APJ Thomson, A Thirumurugan

9. BMJ 2010;340:c2409 Neonatal jaundice: summary of NICE guidance Rodie M Millar AJW, Sharif K. Surgery for Biliary Tract Problems in Children. Paediatrics and Child Health. 2008:18(6):278-282

10. Conjugated Hyperbilirubinaemia. Paediatrics and Child Health. Gupte G. 2008:18(10):474-476

11. Direct bilirubin levels observed in prolonged neonatal jaundice: a retrospective cohort study. : Hodgson JM, Van Someren VH, Smith C, et al. BMJ Paediatrics Open 2018;2:e000202. doi:10.1136/bmjpo-2017-000202

12. Guideline for the investigation of neonatal conjugated jaundice (BSPGHAN), December 2016.

    https://bspghan.org.uk/hepatology-guidelines

6. Key Words

Jaundice, Hyperbilirubinaemia, Bilirubin, Unconjugated, Conjugated

DAT- Direct Antiglobulin Test

SFD- Single Front Door (Paed ED)

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title) Mehul Joshi – Consultant	**Executive Lead** Chief medical officer
Details of Changes made during review: **V5-** NICE guidance update October 2023- reviewed for compliance and amended. BCH liver unit referral form link included	

Appendix-1 (Common abnormal results and action plan)
(As per discussion with haematology team)

Neutrophil count:

If the neutrophil count is:

- > 1.0 it does not need repeating
- 0.5-1.0 repeat in 4 weeks
- <0.5 repeat in 2 weeks

After repeating twice, if it still remains abnormal then to refer to haematology team.

Haemoglobin:
If the haemoglobin in less than 10g/dl then repeat the haemoglobin in 1 week to ensure the levels are not dropping rapidly. Consider iron and folic acid supplementation.

Platelet count:

- <100- discuss with prolonged jaundice team (lead/co-ordinator or paediatric registrar on call) – repeat in 1-2 weeks
- <150- repeat in 2 weeks
- <800 – does not need repeating
- >800- then to repeat in 2-4 weeks' time. If better then no further monitoring needed.
- >1000 then to discuss with haematology as likely require urgent repeating and further management as per haematology.

Appendix-2 (BCH/ BSPGHAN summary of investigations)

Conjugated jaundice: Summary of Investigations
Revised December 2016

	Test	Date	Result
Stool Colour			
Haematology	Fbc		
	Reticulocytes		
	Group and Coombs		
	INR / PT		
	APTT / fibrinogen		
Biochemistry	Blood sugar / BM		
	U and E albumin bicarb		
	Bone profile		Ca PO4 ALP
	Bilirubin		Total conjugated
	Liver enzymes		ALT AST GGT
	Lipid profile		Cholesterol triglycerides
Metabolic	Galactosaemia		
	Alpha-1-antitrypsin		
	Plasma amino acids		
	Urine amino acids		
	Urine organic acids		
	Ward test protein		
Endocrine	Thyroid function		
	Cortisol		
	Short Synacthen test*		
Microbiology	Blood culture		
	Urine culture		
	TORCH serology		
	Hepatitis serology		
	Urine CMV		
Imaging	Fasting US scan		Liver
			Spleen
			Ascites
			Gall bladder
			Biliary tree
	Isotope scan*		
	CXR / spine X ray*		
Ophthalmology*			
Other*			

* Second line as appropriate