

Neonatal jaundice

Clinical Guideline Presentation v3.0



45 minutes

Towards CPD Hours

References:

Queensland Clinical Guideline: Neonatal jaundice is the primary reference for this package.

Recommended citation:

Queensland Clinical Guidelines. Neonatal jaundice clinical guideline education presentation E22.7-1-V3-R27. Queensland Health. 2022.

Disclaimer:

This presentation is an implementation tool and should be used in conjunction with the published guideline. This information does not supersede or replace the guideline. Consult the guideline for further information and references.

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Objectives



- Understand common causes of jaundice
- Identify babies at risk of jaundice (hyperbilirubinaemia)
- Understand investigations required and management of jaundice
- Identify complications of conjugated and unconjugated hyperbilirubinaemia
- Consider discharge planning strategies

Abbreviations

CF	Cystic fibrosis
CMV	Cytomegalovirus
DAT	Direct antiglobulin test (also known as Coombs test)
FBC	Full blood count
G6PD	Glucose-6-phosphate dehydrogenase deficiency
LFT	Liver function tests
RBC	Red blood cell
Rh D	Rhesus type D
TFT	Thyroid function tests
TcB	Transcutaneous bilirubin
TSB	Total serum bilirubin
USS	Ultrasound scan

Incidence

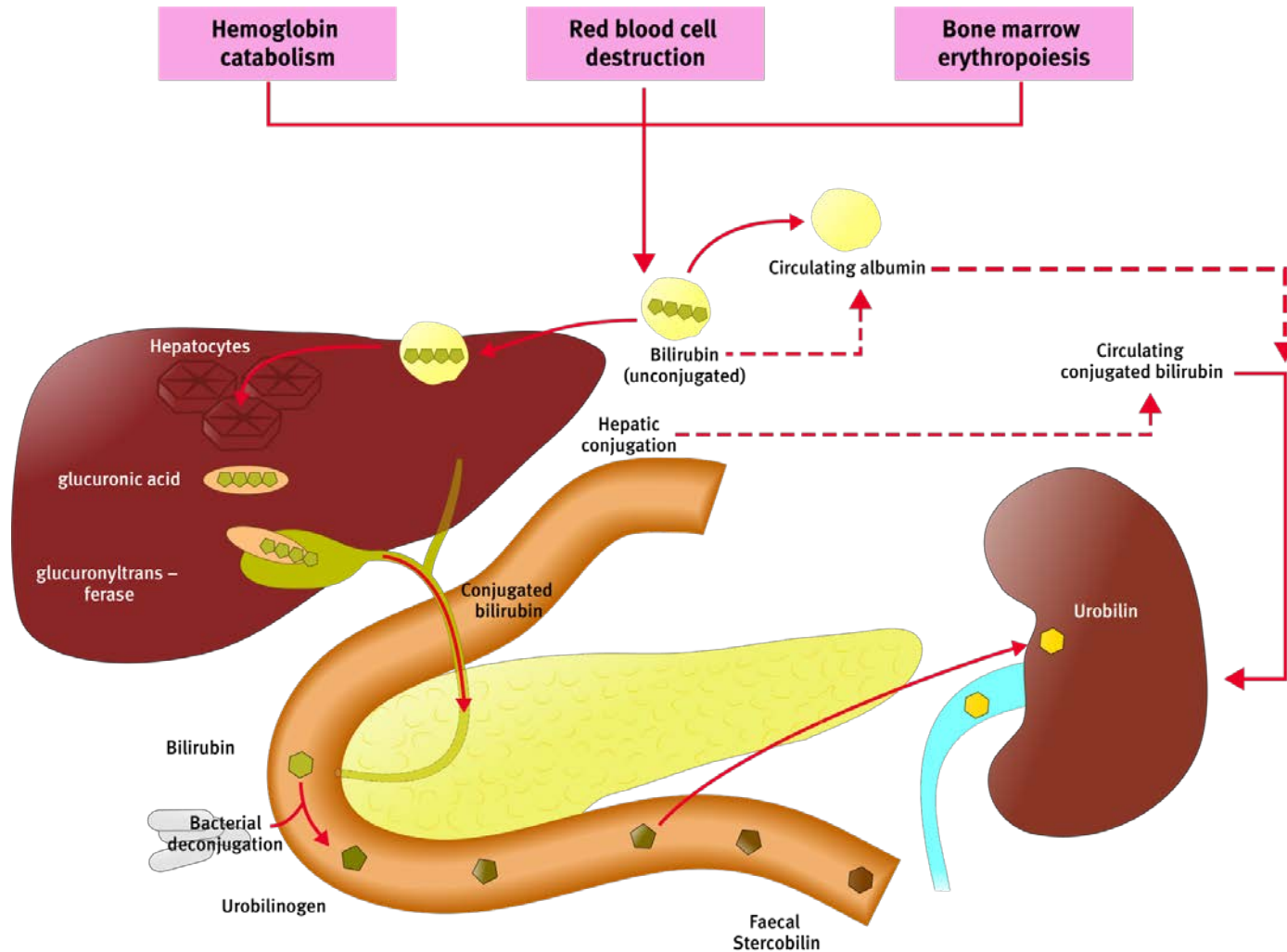
- One of the most common conditions requiring medical attention in newborn babies
- Occurs in approximately 60% of term and 80% of preterm babies in the first week of life
- 3.6% of all babies born in Queensland (2020) had phototherapy



Pathogenesis of hyperbilirubinaemia

- Occurs due to an imbalance between bilirubin production, conjugation and elimination
- Unconjugated bilirubin:
 - Accumulates in the blood due to red cell destruction
 - Binds to albumin and is converted to conjugated bilirubin in the liver
- Conjugated bilirubin is water soluble and eliminated in urine and stools

Bilirubin



Risk factors

Maternal risk factors	Neonatal risk factors
• ABO and Rh D type	• Feeding: breastmilk, delayed gut colonisation, inadequate breastmilk or formula intake
• Genetic	• Haematological: haemolysis, polycythaemia, haematoma
• Diabetes	• Gastroenterological: bowel obstruction
• Previous baby with jaundice	• Infection
	• Male
	• Prematurity



Pathological jaundice

Early presentation (before 24 hours of age) or high peak level

Context	Causes
• Level of free bilirubin (unbound to albumin) increases risk of developing acute and chronic encephalopathy • Exacerbated by acidosis/hypoxia, hypothermia, hypo-albuminaemia, infection, some medications	• Haemolysis: (e.g. bruising, haemorrhage, isoimmunisation) • Decreased conjugation of bilirubin: (e.g. congenital hypothyroidism) • Decreased excretion of bilirubin: (e.g. biliary atresia, cystic fibrosis (CF))

Physiological jaundice

Jaundice onset after 24 hours and resolving early

Context	Causes
• Transient—resolves in first week to 10 days (term baby) or 3 weeks (preterm baby) • Mostly benign • Investigate and treat unwell, jaundiced baby for underlying disease	• Physiological due to increased volume and decreased life span of RBC • Common in breastfeeding babies

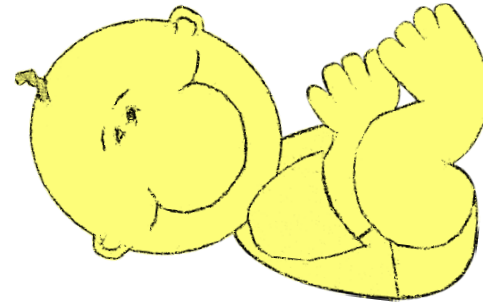
Prolonged jaundice

Jaundice onset after day 14

Context	Causes
• Jaundice after day 14 in term babies and day 21 in preterm babies • Usually harmless but may be indicative of more serious disease	• Unconjugated: (e.g. inadequate nutrition and hydration, breast milk) • Conjugated: (e.g. congenital hypothyroidism) • Unconjugated and/or conjugated: (e.g. haemolytic disease, G6PD)

Assessment of jaundice

- Examine all babies for jaundice:
 - Every 8 to 12 hours in the first 72 hours of life
 - Before discharge
- Do not rely on visual examination to assess level of jaundice
 - Use TcB or measure TSB

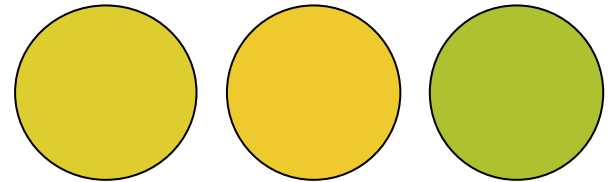


Jaundice appears cephalocaudal and regresses in reverse order

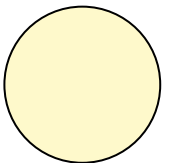
Signs of jaundice

- Lethargy
- Feeding: poor intake, breastmilk
- Weight loss greater than 10%
- Urine: output and colour
- Stools: colour
- Pale stools and dark urine:
 - Investigate for biliary atresia

OKAY: Yellow (breast feeding) or bright yellow/green (formula feeding) stools



NOT OKAY:
If stools are pale or urine is dark coloured
further investigations required



Total serum bilirubin (TSB)

Measure total, conjugated and unconjugated bilirubin

- Measure if jaundiced baby:
 - Less than 24 hours of age
 - Less than 35 weeks gestation
- Plot on nomogram
- Repeat TSB according to nomogram



Transcutaneous bilirubin (TcB)

- Reduces the number of invasive blood tests
- Suitable for babies:
 - Greater than 35 weeks gestational age
 - Older than 24 hours of age



Not recommended

- During phototherapy
- After phototherapy
- After exchange transfusion
- Prolonged jaundice
- Conjugated bilirubinaemia

Initial investigations

- Check maternal antenatal screening:
 - Blood group, Rh D type, red cell antibodies
- Total serum bilirubin
- FBC
- Blood group compatibility:
 - ABO and Rh D type, DAT

Additional investigations

Consider as indicated:

Electrolytes/urea

- Infection C-reactive protein
 - Blood culture and sensitivity
 - Urine microscopy and culture
 - Congenital infections—signs suggestive of history, severe jaundice, elevated conjugated bilirubin, thrombocytopenia
- Inborn errors of metabolism—unwell with severe jaundice
- Albumin/LFT



Investigations for prolonged jaundice

Aspect	Considerations
Progression of early jaundice	History, weight gain, feeding, bilirubin level (total/conjugated/unconjugated), FBC, LFT, TFT
Recurrent or new presentation of jaundice	Urine microscopy and culture, CMV, reducing substances, FBC and reticulocytes, consider G6PD, repeat neonatal screening test
Unwell baby	Urine microscopy and culture, CMV, reducing substances, colour of stools, abdominal USS, sweat test and genetic markers for CF, inborn errors of metabolism (e.g. CF, hypothyroidism, galactosaemia)
Genetic	Family history, investigate as indicated for RBC metabolism disorders, glucuronyl transferase deficiency disorders, red cell membrane disorders



Nomogram

- Hour-specific graph based on TSB
- Monitors trend of TSB or TcB
- Use nomogram appropriate for baby's age in hours, gestational age and birth weight
- Re-check TSB as per nomogram
 - Cease phototherapy when TSB greater than 50 micromol/L below phototherapy treatment line



Nutrition - newborn

Breastfeeding

- Encourage 8–12 feeds/day initially
- Supplementary feed not recommended
- Offer expressed breastmilk if extra fluids required

Formula feeding

- Educate parents about adequate intake

Intravenous fluids

- Only if clinically indicated



Phototherapy

- Commence as indicated by nomogram
- Spectral power increases with increased skin exposure
- Irradiance maximised by minimising the distance between the baby and the light source
- Use additional light sources for intensive phototherapy

Phototherapy continued

- Clinical response depends on:
 - Efficiency of the phototherapy unit
 - Rate of bilirubin production and bilirubin excretion
- Blue-green light in 460–490 nanometres emission spectrum is most effective
- Measure spectral output of light source
 - Maximise spectral power by increasing skin exposure
 - Maximise irradiance by reducing distance between baby and light source

How does phototherapy work

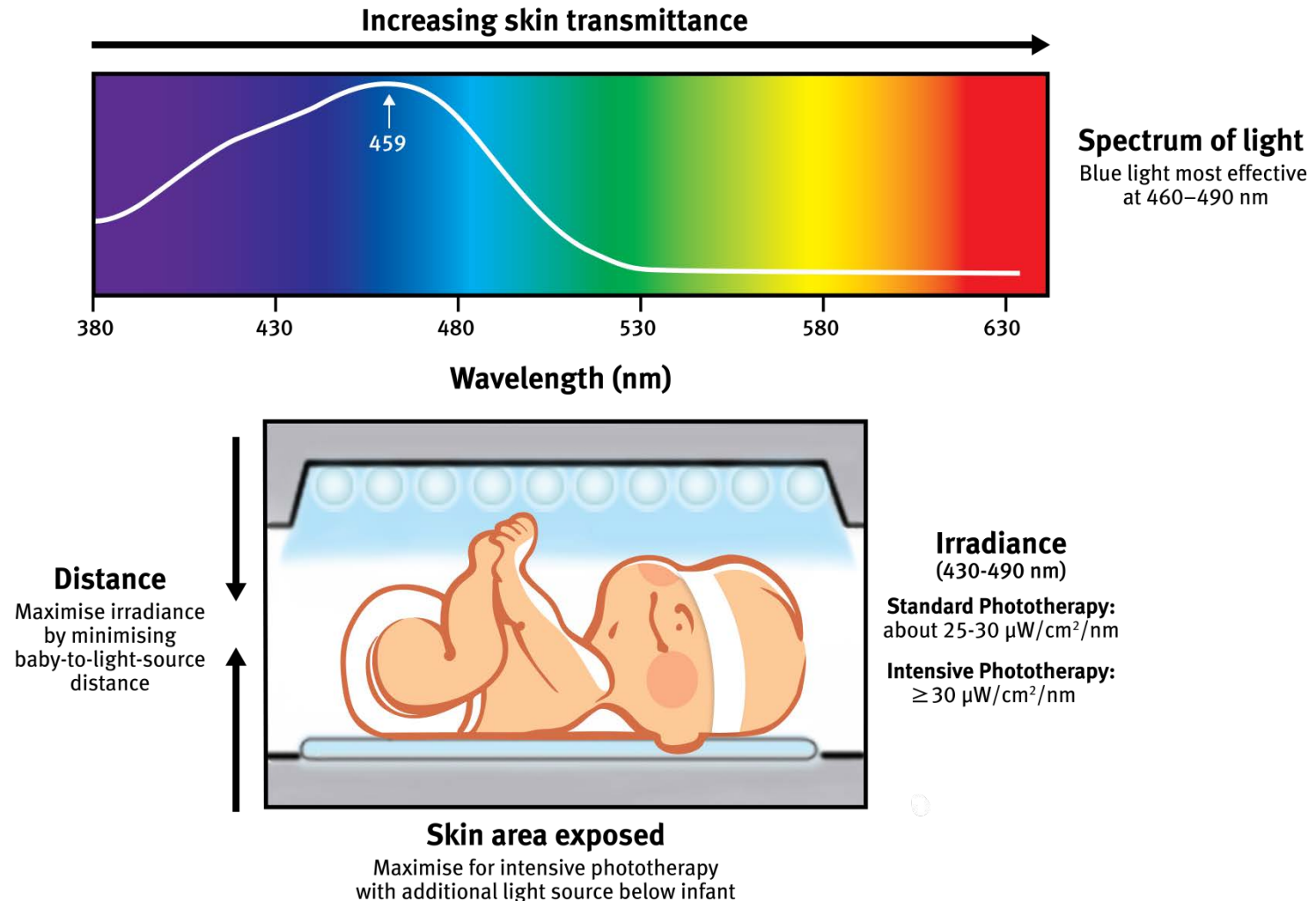
Causes a chemical reaction

Bilirubin in the skin absorbs light and converts bilirubin molecules to photoisomers



Photoisomers are excreted in bile or urine

Efficacy of phototherapy



Care during phototherapy

- Nurse baby in nappy only
- Use eye protection
- Check baby's temperature
- Interrupt phototherapy for feeding/parental attachment when bilirubin decreasing



Exchange transfusion

Medical emergency

Indications

- TSB continues to rise despite phototherapy
- Baby shows signs of acute bilirubin encephalopathy

Transfusion

- Use plasma that is O Rh D negative or relevant antigen negative, CMV negative (if available), irradiated
- Exchange double the baby's blood volume

Risks

- Fluid overload, metabolic imbalance, necrotising enterocolitis, infection, thrombocytopenia, coagulopathy, air embolism, thrombosis

Hyperbilirubinaemia complications

- Bilirubin encephalopathy due to lipid soluble bilirubin crossing blood brain barrier
- Bilirubin induced neurological disorder (BIND)—severe and irreversible; diagnosis based clinical observation and history
- Bilirubin induced auditory toxicity due to effect on neural cells of auditory pathway

Bilirubin encephalopathy

- Complication of unconjugated hyperbilirubinaemia
- Lipid soluble and can cross the blood-brain barrier
- Results in:
 - Acute and then chronic bilirubin encephalopathy
 - Kernicterus
- Australian incidence is 9.4/100 000 live births

Discharge planning

- Identify at risk babies
 - Consider pre-discharge measurement of TcB
- Provide written and verbal information to parents
- Review:
 - Baby less than 72 hours of age at discharge within 2 days of going home
 - Jaundice increasing or presents after 10 days
 - Poor feeding or losing weight
 - Pale stools, dark urine

