Phototherapy and Exchange Transfusion Guidelines for Preterm Infants < 35 Weeks Gestational Age

Use total bilirubin (add conjugated and unconjugated bilirubin). If conjugated bilirubin is > 50% of total serum bilirubin, consult staff physician to determine levels for therapy.

PHOTOTHERAPY INITIATION LEVELS

Total serum bilirubin (TSB) (micromol/litre)

- **For infants > 1000 grams use INTENSIVE phototherapy (irradiance ~30µW/cm2/nm)**
- **For infants ≤ 1000 grams use STANDARD phototherapy (irradiance ~10µW/cm2/nm) unless TSB is rapidly rising or TSB continues to rise while receiving phototherapy** (less irradiance used to reduce risk of oxidative tissue injury by phototherapy in extremely immature infants)

Gestational Age (weeks)	Age in Hours	<24 hours	24-48 hours	49-72 hours	> 72 hours
	<28 0/7 and at risk*	70	80	80	90
	<28 0/7	80	90	90	100
	28 0/7 to 29 6/7 and at risk*	80	90	90	100
	28 0/7 to 29 6/7	90	100	120	140
	30 0/7 to 31 6/7 and at risk*	90	100	120	140
	30 0/7 to 31 6/7	100	120	140	170
	32 0/7 to 33 6/7 and at risk*	100	120	140	170
	32 0/7 to 33 6/7	100	130	170	200
	34 0/7 to 34 6/7 and at risk*	110	140	170	200
	34 0/7 to 34 6/7	110	160	210	230

EXCHANGE TRANSFUSION LEVELS

Total serum bilirubin (TSB) (micromol/litre)

- Exchange transfusion is recommended for infants whose TSB levels continue to rise to exchange levels despite receiving intensive phototherapy to the maximal surface area
- Exchange transfusion is recommended if infant shows signs of acute bilirubin encephalopathy (hypertonia, arching, retrocollis, opisthotonos, high-pitched cry); even if below exchange levels (but note that these signs can be subtle in very low birth weight infants and may be difficult to detect)

Gestational Age (weeks)	Age in Hours	<24 hours	24-48 hours	49-72 hours	> 72 hours
	<28 0/7 and at risk*	190	190	210	220
	<28 0/7	190	200	210	240
	28 0/7 to 29 6/7 and at risk*	200	200	210	220
	28 0/7 to 29 6/7	200	210	220	240
	30 0/7 to 31 6/7 and at risk*	220	220	230	260
	30 0/7 to 31 6/7	220	230	260	270
	32 0/7 to 33 6/7 and at risk*	240	240	260	300
	32 0/7 to 33 6/7	240	250	290	300
	34 0/7 to 34 6/7 and at risk*	250	260	290	310
	34 0/7 to 34 6/7	260	270	310	320

*INFANTS AT GREATER RISK for BILIRUBIN TOXICITY

Risk factors for bilirubin toxicity include:

- serum albumin level < 25 g/L
- rapidly rising TSB levels, greater than 8.5 micromol/litre/hour suggesting haemolytic disease
- clinically unstable infants*

***Clinically unstable infants**:

if one or more of the following in the preceding 24 hours:

- blood pH < 7.15
- blood culture positive sepsis
- apnea and bradycardia requiring cardio-respiratory resuscitation (bagging and/or intubation)
- hypotension requiring pressor treatment
- mechanical ventilation at time of blood sampling

Providing and Discontinuing Phototherapy

- The purpose of phototherapy is to prevent the need for exchange transfusion. With phototherapy, the serum bilirubin should decrease by approximately 20-35 micromol/litre in 4-6 hours.
- **Use gestational age for the first 7 days of age and then postmenstrual age for determining phototherapy initiation levels**. For example, if the infant is born with a gestational age of 29 2/7 weeks, use the 28 0/7 to 29 6/7 weeks category until the infant is 7 days of age; then after 7 days of age, use the TSB level for 30 0/7 weeks.
- **Discontinuing phototherapy:** discontinue phototherapy when the TSB is 20-35 micromol/litre below the initiation level. Check TSB 6-12 hours after discontinuing phototherapy to assess for rebound.

Rationale for Levels (see reverse for references)

- Treatment thresholds are based on published expert opinion that utilized best available, but limited data.
- Phototherapy levels in the first 24 hours of age were adapted from National Institute for Health and Clinical Excellence (NICE) United Kingdom (U.K.) guidelines.
- Phototherapy levels between 24 and 72 hours of age were adapted from a combination of NICE guidelines and Maisels et al (2012) guidelines.
- Exchange levels before 72 hours of age were adapted from Maisels et al (2012) guidelines.
- Phototherapy and exchange levels beyond 72 hours of age, (EXCEPT for GA 34 weeks): levels were adapted from Maisels et al (2012) guidelines as these treatment thresholds are lower than NICE guidelines.
- Phototherapy and exchange levels beyond 72 hours, for gestational age (GA) 34 weeks: levels were adapted to align with AAP/CPS levels for GA ≥35 weeks.

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References

Phototherapy table adapted from:

1. Maisels MJ, Watchko JF, Bhutani VK, Stevenson DK. An approach to the management of hyperbilirubinemia in the preterm infant less than 35 weeks of gestation. Journal of Perinatology (2012) 32, 660–664.
2. National Institute for Health and Clinical Excellence. Neonatal Jaundice. National Institute for Health and Clinical Excellence, 2010, www.nice.org.uk/CG98
3. Morris BH, Oh W, Tyson JE, Stevenson D, Phelps DL, O'Shea TM et al. Aggressive vs conservative phototherapy for infants with extremely low birth weight. New Engl J Med 2008; 359: 1885–896.
4. Fetus and Newborn Committee, Canadian Pediatric Society. Guidelines for detection, management and prevention of hyperbilrubinemia in term and late preterm newborn infants (35 or more weeks' gestation). Paediatric Child Health 2007;12 (suppl B):401-7.
5. American Academy of Pediatrics. Subcommittee on hyperbilirubinemia. Clinical practice guideline: management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. Pediatrics 2004; 114: 297–316.

Exchange transfusion table adapted from:

1. Maisels MJ, Watchko JF, Bhutani VK, Stevenson DK. An approach to the management of hyperbilirubinemia in the preterm infant less than 35 weeks of gestation. Journal of Perinatology (2012) 32, 660–664.
2. Fetus and Newborn Committee, Canadian Pediatric Society. Guidelines for detection, management and prevention of hyperbilrubinemia in term and late preterm newborn infants (35 or more weeks' gestation). Paediatric Child Health 2007;12 (suppl B):401-7.
3. American Academy of Pediatrics. Subcommittee on hyperbilirubinemia. Clinical practice guideline: management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. Pediatrics 2004; 114: 297–316.