

**QUICK REFERENCE
FOR HEALTHCARE PROVIDERS**

MANAGEMENT OF NEONATAL JAUNDICE

(Second Edition)



Ministry of Health
Malaysia



Malaysian Paediatric
Association



Perinatal Society of
Malaysia



Academy of
Medicine Malaysia

KEY MESSAGES

1. Neonatal jaundice (NNJ) is common in newborn babies. Severe NNJ can lead to acute & chronic bilirubin encephalopathy.
2. NNJ within 24 hours of life is abnormal and needs urgent attention.
3. Assess all babies for jaundice at every opportunity. Methods include visual assessment, transcutaneous bilirubinometer (TcB) or total serum bilirubin (TSB)
4. The adequacy of breastfeeding, weight & hydration status of all babies should be assessed during the first week of life. Refer babies with weight loss $\geq 7\%$ of birth weight for further evaluation.
5. Screen all babies for Glucose-6-phosphate dehydrogenase (G6PD) deficiency. Babies with G6PD deficient should be admitted for the first five days of life.
6. Start phototherapy when TSB reaches the phototherapy threshold. The threshold is lower in preterm & low birth weight babies.
7. Consider exchange transfusion (ET) when TSB reaches the ET threshold. This should follow a standardised protocol & be supervised by experienced personnel.
8. Babies discharged <48 hours after birth should be seen by a healthcare provider in an ambulatory setting or at home within 24 hours of discharge.
9. Continue breastfeeding in babies with jaundice. Provide adequate lactation support to all mothers, particularly those with preterm babies.
10. Babies with acute bilirubin encephalopathy (ABE) should have long-term follow-up to monitor for neurodevelopmental sequelae. Auditory Brainstem Response testing should be done within the first three months of life.

Risk factors for severe NNJ

- Prematurity
- Low birth weight
- Jaundice in the first 24 hours of life
- Mother with Blood Group O or Rhesus Negative
- G6PD deficiency
- Rapid rise of total serum bilirubin
- Sepsis
- Excessive weight loss
- High predischarge bilirubin level
- Cephalohaematoma or bruises
- Lactation failure in exclusive breastfeeding
- Baby of diabetic mothers
- Siblings with history of severe NNJ

This Quick Reference (QR) provides key messages & a summary of the main recommendations in the Clinical Practice Guidelines (CPG) Management of Neonatal Jaundice (Second Edition).

Details of the evidence supporting these recommendations can be found in the above CPG, available on the following websites:

Ministry of Health Malaysia: <http://www.moh.gov.my>

Academy of Medicine Malaysia: <http://www.acadmed.org.my>

Malaysian Paediatric Association: <http://www.mpaweb.org.my>

Perinatal Society of Malaysia: <http://www.perinatal-malaysia.org>

CLINICAL PRACTICE GUIDELINES SECRETARIAT

Health Technology Assessment Section

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- This QR & its CPG do not address prolonged jaundice.

Home visits by healthcare providers during postnatal period

- Home visits should be done for all newborns on day 1, 2, 3, 4, 6, 8, 10 & 20.
- If jaundice is detected, TSB should be measured & managed accordingly.

Laboratory investigations to be considered for severe or early-onset NNJ

- G6PD test (if not screened)
- Mother's & baby's blood group
- Direct Coombs test
- Full blood count \pm peripheral blood picture
- Reticulocyte count
- Septic workup (if infection is suspected)

Indications for referral to hospital

- Onset of jaundice within 24 hours of life
 - Rapidly rising TSB of greater than 6 mg/dL/day (103 μ mol/L/day)
 - Clinical jaundice below umbilicus (if till the soles of the feet - urgent referral for possibility of ET)
 - G6PD deficiency (if not previously hospitalised)
 - Clinical symptoms/signs suggestive of sepsis
- Bilirubin-Induced Neurologic Dysfunction (BIND) score may be used in babies with severe NNJ to assess the severity & progression of ABE.

BIND Score

Clinical Signs	BIND Score
Mental Status	
Normal	0
Sleepy but arousable; decreased feeding	1
Lethargy, poor suck &/or irritable/jittery with strong suck	2
Semi-coma, apnoea, unable to feed, seizures, coma	3
Muscle Tone	
Normal	0
Persistent mild to moderate hypotonia	1
Mild to moderate hypertonia alternating with hypotonia, beginning arching of neck & trunk on stimulation	2
Persistent retrocollis & opisthotonus - bicycling or twitching of hands & feet	3
Cry Pattern	
Normal	0
High pitched when aroused	1
Shrill, difficult to console	2
Inconsolable crying or cry weak or absent	3

TOTAL BIND SCORE

Advanced ABE (score 7 - 9): urgent bilirubin reduction intervention is needed to prevent further brain damage & reduce the severity of sequelae

Moderate ABE (score 4 - 6): urgent bilirubin reduction intervention is likely to reverse this acute damage

Mild ABE (score 1 - 3): subtle signs of ABE

TSB levels for phototherapy & ET in babies ≥ 35 weeks gestation

Age	LOW RISK >38 weeks & well		MEDIUM RISK >38 weeks with risk factors or 35 - 37 weeks + 6 days & well		HIGH RISK 35 - 37 weeks + 6 days with risk factors	
	Conventional Phototherapy - TSB in mg/dL ($\mu\text{mol/L}$)	ET - TSB in mg/dL ($\mu\text{mol/L}$)	Conventional Phototherapy - TSB in mg/dL ($\mu\text{mol/L}$)	ET - TSB in mg/dL ($\mu\text{mol/L}$)	Conventional Phototherapy - TSB in mg/dL ($\mu\text{mol/L}$)	ET - TSB in mg/dL ($\mu\text{mol/L}$)
<24*						
24	9 (154)	19 (325)	7 (120)	17 (291)	5 (86)	15 (257)
48	12 (205)	22 (376)	10 (171)	19 (325)	8 (137)	17 (291)
72	15 (257)	24 (410)	12 (205)	21 (359)	10 (171)	18.5 (316)
96	17 (291)	25 (428)	14 (239)	22.5 (385)	11 (188)	19 (325)
>96	18 (308)	25 (428)	15 (257)	22.5 (385)	12 (205)	19 (325)

- Start intensive phototherapy at a TSB level of 3 mg/dL (51 $\mu\text{mol/L}$) above the level for conventional phototherapy or when TSB increasing at >0.5 mg/dL (8.5 $\mu\text{mol/L}$) per hour
- Risk factors are isoimmune haemolytic disease, G6PD deficiency, asphyxia & sepsis.

*Jaundice appearing within 24 hours of life is abnormal & needs further evaluation.

Requirements for effective phototherapy

- Irradiance of phototherapy units should be checked regularly
 - Irradiance of minimum of 15 $\mu\text{W/cm}^2/\text{nm}$ for conventional phototherapy
 - Irradiance of minimum of 30 $\mu\text{W/cm}^2/\text{nm}$ for intensive phototherapy
- Distance of the light source not exceeding 30 - 50 cm from the baby

Care of babies during phototherapy

- Babies should be regularly monitored for vital signs including temperature & hydration status.
- Babies should be adequately exposed.
- Babies' eyes should be covered to prevent retinal damage.
- Breastfeeding should be continued.

ET guidelines for babies ≥ 35 weeks gestation

- ET if baby shows signs of ABE or if TSB ≥ 5 mg/dL (85 $\mu\text{mol/L}$) above the ET levels.
- ET if TSB rises to ET levels despite intensive phototherapy in hospitalised babies.
- For readmitted babies without signs of ABE, if the TSB is above the ET levels, repeat TSB every 2 - 3 hours & consider ET if the TSB remains above the levels indicated after intensive phototherapy for 6 hours.

TSB levels for phototherapy & ET in babies 23 - 34 weeks gestation

Age	23 weeks		24 weeks		25 weeks	
Hours of life	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)
<24*						
24	4.1 (70)	7.6 (130)	4.1 (70)	7.9 (135)	4.7 (80)	8.2 (140)
48	5.9 (100)	10.5 (180)	6.5 (110)	10.9 (185)	6.5 (110)	11.1 (190)
72	7.9 (130)	13.5 (230)	8.2 (140)	14.0 (240)	8.8 (150)	14.6 (250)
96	7.6 (130)	13.5 (230)	8.2 (140)	14.0 (240)	8.8 (150)	14.6 (250)

Age	26 weeks		27 weeks		28 weeks	
Hours of life	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)
<24*						
24	4.7 (80)	8.2 (140)	4.7 (80)	8.2 (140)	5.3 (90)	8.8 (150)
48	7.0 (120)	11.7 (200)	7.6 (130)	12.0 (205)	7.6 (130)	12.3 (210)
72	9.4 (160)	15.2 (260)	10.0 (170)	15.8 (270)	10.5 (180)	16.4 (280)
96	9.4 (160)	15.2 (260)	10.0 (170)	15.8 (270)	10.5 (180)	16.4 (280)

Age	29 weeks		30 weeks		31 weeks	
Hours of life	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)
<24*						
24	5.3 (90)	8.8 (150)	5.6 (95)	8.8 (150)	5.9 (100)	9.1 (155)
48	8.2 (140)	12.9 (220)	8.5 (145)	12.9 (220)	9.1 (155)	13.5 (230)
72	11.1 (190)	17.0 (290)	11.7 (200)	17.5 (300)	12.3 (210)	18.1 (310)
96	11.1 (190)	17.0 (290)	11.7 (200)	17.5 (300)	12.3 (210)	18.1 (310)

Age	32 weeks		33 weeks		34 weeks	
Hours of life	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)	Phototherapy - TSB in mg/dL (µmol/L)	ET - TSB in mg/dL (µmol/L)
<24*						
24	5.9 (100)	9.4 (160)	5.9 (100)	9.4 (160)	6.5 (110)	10.0 (170)
48	9.4 (160)	14.0 (240)	10.0 (170)	14.3 (245)	10.0 (170)	14.6 (250)
72	12.9 (220)	18.7 (320)	13.5 (230)	19.3 (330)	14.6 (240)	20.0 (340)
96	12.9 (220)	18.7 (320)	13.5 (230)	19.3 (330)	14.6 (240)	20.0 (340)

*Jaundice appearing within 24 hours of life is abnormal & needs further evaluation.

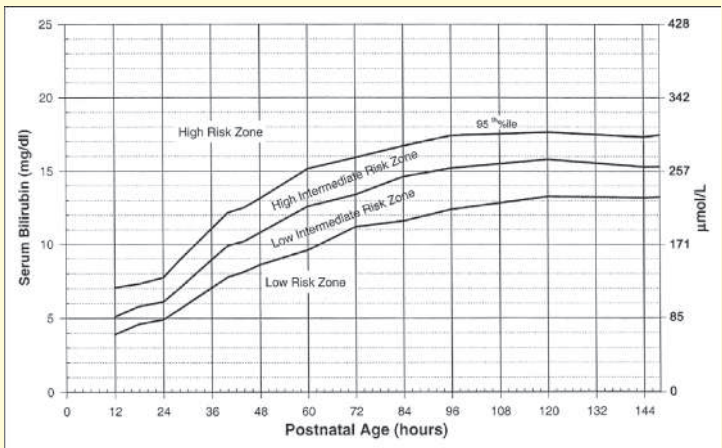
Predischarge screening

- Predischarge screening should be used to prevent severe NNJ in late preterm & term babies.
 - Clinical risk factor assessment or/ & predischarge bilirubin levels (TcB or TSB) can be used as predischarge screening.

A. Clinical risk factors to be considered with predischarge TcB or TSB levels:

1. Isoimmune (ABO or Rhesus) haemolytic disease, G6PD deficiency or other haemolytic diseases
2. Exclusive breastfeeding, if nursing is not going well, &/or weight loss is >8 - 10%
3. Previous sibling with jaundice
4. Cephalhaematoma or significant bruising
5. East Asian race

Nomogram for Predischarge Screening



Nomogram for designation of risk at ≥ 36 weeks' gestational age with birth weight ≥ 2000 g or ≥ 35 weeks' gestational age with birth weight ≥ 2500 g

1. Babies with gestational age 35 - 37 weeks WITH clinical risk factors in (A) & predischarge TcB/TSB in the following risk zones:

Predischarge TcB /TSB Risk Zone	Action	Interval to repeat TSB
High Risk	<ul style="list-style-type: none"> • Check TcB/TSB against phototherapy guidelines • Start phototherapy as needed 	4 - 8 hours
High Intermediate Risk	<ul style="list-style-type: none"> • Check TcB/TSB against phototherapy guidelines • Start phototherapy as needed 	4 - 24 hours
Low Intermediate Risk	If discharging in <72 hours, follow-up within 2 days	Within 2 days at follow-up
Low Risk	If discharging in <72 hours, follow-up within 2 days	If jaundiced at follow-up

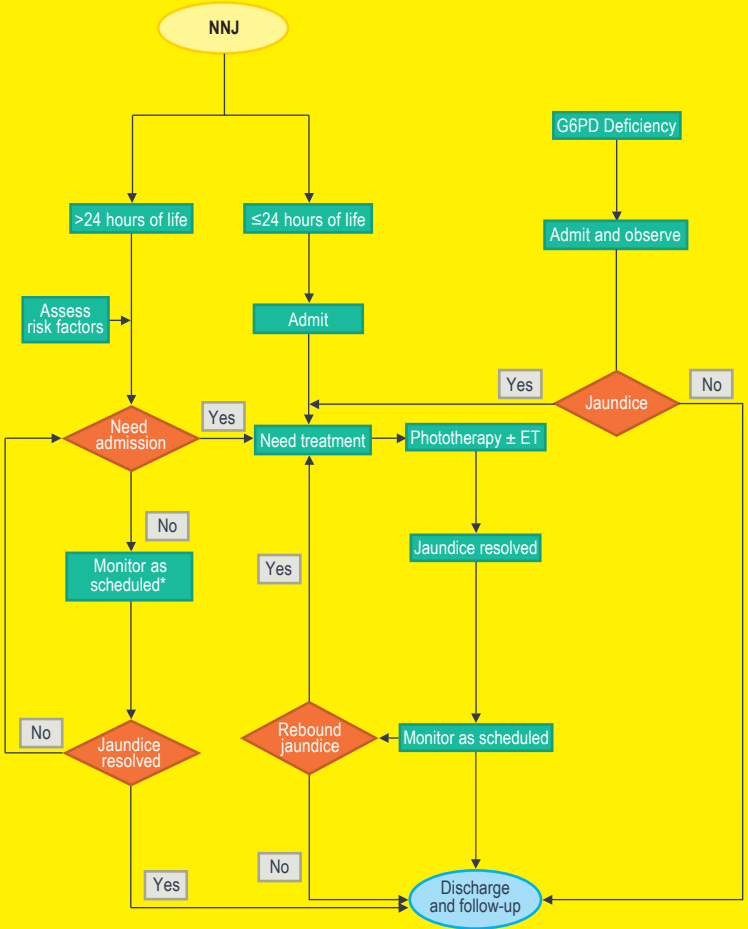
2. Babies with gestational age 35 - 37 weeks with NO clinical risk factors in (A) OR with gestational age ≥ 38 weeks WITH clinical risk factors in (A) & predischarge TcB/TSB in the following risk zones:

Predischarge TcB /TSB Risk Zone	Action	Interval to repeat TSB
High Risk	<ul style="list-style-type: none"> • Check TcB/TSB against phototherapy guidelines • Start phototherapy as needed 	4 - 24 hours
High Intermediate Risk	<ul style="list-style-type: none"> • Check TcB/TSB against phototherapy guidelines • Start phototherapy as needed 	24 hours
Low Intermediate Risk	If discharging in <72 hours, follow-up within 2 days	If jaundiced at follow-up
Low Risk	If discharging in <72 hours, follow-up within 2 days	If jaundiced at follow-up

3. Babies with gestational age ≥ 38 weeks with NO clinical risk factors in (A) & predischarge TcB/TSB in the following risk zones:

Predischarge TcB /TSB Risk Zone	Action	Interval to repeat TSB
High Risk	<ul style="list-style-type: none"> • Check TcB/TSB against phototherapy guidelines • Start phototherapy as needed 	4 - 24 hours
High Intermediate Risk	Follow-up in 2 days	2 days
Low Intermediate Risk	If discharging in <72 hours, follow-up in 2 - 3 days	If jaundiced at follow-up
Low Risk	If discharging in <72 hours, follow-up in 2 - 3 days	If jaundiced at follow-up

ALGORITHM ON MANAGEMENT OF NEONATAL JAUNDICE



*If jaundice persists beyond 14 days in term babies & 21 days in preterm babies, further evaluation for prolonged jaundice is needed.