

# Weight-Based Approach to Phototherapy Initiation in Preterm Infants

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## Abbreviations:

LBW- Low Birth Weight, less than 2500 grams  
VLBW- Very Low Birth Weight, less than 1500 grams  
ELBW- Extremely Low Birth Weight, less than 1000 grams

## Introduction:

Hyperbilirubinemia is a common problem in neonates. Established guidelines are available for phototherapy (PTx) treatment for neonates greater than 35 weeks<sup>1</sup> but data is scarce about the guidelines in preterm infants less than 35 weeks.<sup>2</sup> In preterm infants, weight rather than gestational age is used for certain calculations and therapeutic interventions. Therefore, there is a need for a weight-based guideline for PTx. We present a simple weight-based approach to the initiation of PTx in preterm infants.

We used the percent body weight as a factor determining the need for phototherapy. For infants < 750 grams, we used 1% of body weight, 0.75% for 751-1500 grams and 0.5% for 1501-2500 grams (Appendix).

Maisels et al.<sup>2</sup> approach for phototherapy for premature infants is a practical option but the ranges for phototherapy initiation in this guideline are very narrow. We compared our weight-based approach with their data. The table depicts our findings. For each gestation, we selected the corresponding mean weight using the Fenton chart for boys. We used the boys' chart for uniformity. As noted in the Table, our ranges were close to the

ranges reported by Maisels et al.<sup>2</sup>, however, with a broader scale.

The approach to the treatment of hyperbilirubinemia with PTx can be conservative or aggressive, depending upon the ranges of TSB used.<sup>3</sup> When we compared our approach to the Norwegian guidelines<sup>4</sup>, we noted our strategy to be conservative. In conclusion, the weight-based approach, by using percent body weight as a factor, to initiate phototherapy in preterm infants is a simple way of managing hyperbilirubinemia. Further studies should be done to investigate the validation of this approach.

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## Footnote (Tips):

- If TSB is greater than cBili, start Phototherapy (PTx)
- Start single PTx, irradiance of 15-20  $\mu\text{W}/\text{cm}^2/\text{nm}^*$
- If TSB level is 50% above the cBili, start double PTx, ir-

Gestational age (Weeks)	Initiate Phototherapy Total Serum Bilirubin (mg/dL) (Maisels et al <sup>2</sup> )	Mean weight for Gestational age (Grams)	Initiate Phototherapy Total Serum Bilirubin (mg/dL) Weight-based approach
< 28 0/7	5-6	500-1100	5-8.2
28 0/7-29 6/7	6-8	1101-1400	8.2-10
30 0/7-31 6/7	8-10	1401-1750	8.7-10
32 0/7-33 6/7	10-12	1751-2200	8.7-11
34 0/7-34 6/7	12-14	2201-2500	11-12.5

Table 1: Key Driver diagram

## Appendix

### Factor = Percent Body Weight (BW)

500-750 grams, 1% of BW

751-1500 grams, 0.75 % of BW

1501-2500 grams, 0.5% of BW

#### Example 1:

Birth weight (BW) = 1300 grams, % birth weight factor = 0.75%

Total Serum Bilirubin (TSB) = 6.2 mg/dL.

Calculated Bili-Photo level (cBili) = Weight x % BW factor

=1300 x 0.75/100 = 9.7

Interpretation: cBili > TSB

Plan: No Phototherapy (TSB of 6.2 is < 9.7 cBili), Follow bili in 4 hours

#### Example 2:

Birth weight (BW) = 1800 grams, % birth weight factor = 0.5%

Total Serum Bilirubin (TSB) = 11 mg/dL.

Calculated Bili-Photo level (cBili) = Weight x % BW factor

=1800 x 0.5/100 = 9

Interpretation: cBili < TSB

Plan: Start Phototherapy (TSB is > cBili), Follow bili in 4 hours

#### Example 3:

Birth weight (BW) = 600 grams, % birth weight factor = 1%

Total Serum Bilirubin (TSB) of 7 mg/dL.

Calculated Bili-Photo level (cBili) = Weight x % BW factor

=600 x 1/100 = 6

Interpretation: cBili < TSB

Plan: Initiate PTx with single light, irradiance of 15-20  $\mu\text{W}/\text{cm}^2/\text{nm}$ , Check TSB in 4 hr.

- radiance of 20-30  $\mu\text{W}/\text{cm}^2/\text{nm}$
- If TSB is 100% above the cBili, start triple PTx, irradiance of 30-40  $\mu\text{W}/\text{cm}^2/\text{nm}$
- Check TSB in 4 hr. Expected decline is 0.2-0.5 mg/dL per hour.
- A decline in TSB indicates adequate PTx.
- If TSB continues to trend down, start weaning PTx, Double  $\rightarrow$  Single  $\rightarrow$  Discontinue.

- If TSB is up, add another light. Follow TSB in 4 hrs.
- If TSB continues to incline up despite intensive PTx, consider Exchange transfusion.
- Follow gestational-aged based exchange transfusion guidelines, Maisels et al. 2
- \*Irradiance range of 15-40  $\mu\text{W}/\text{cm}^2/\text{nm}$ , Morris et al. 3

**References:**

1. *Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation. Pediatrics. 2004;114:297-316. DOI: 10.1542/peds.114.1.297*
2. *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. J Perinatol. 2012; 32:660-4 DOI: 10.1038/jp.2012.71*
3. *Morris BH, Oh W, Tyson JE, Stevenson DK, Phelps DL, O'Shea TM, et al; NICHD Neonatal Research Network. Aggressive vs. Conservative Phototherapy for Infants with Extremely Low Birth Weight. N Engl J Med. 2008; 359:1885-1896. DOI: 10.1056/NEJMoa0803024*
4. *Bratlid D, Nakstad B, Hansen TW. National guidelines for treatment of jaundice in the newborn. Acta Paediatr. 2011;100:499-505. DOI: 10.1111/j.1651-2227.2010.02104.x*

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