New 2022 AAP Hyperbilirubinemia **Guideline: What PCPs Need to Know**

[Your name and credentials here]

VIP Pediatric Acute Care Quality Network National Quality Improvement Collaborative LIGHT





- To discuss key changes in the 2022 AAP hyperbilirubinemia guideline that affect outpatient newborn care
- To briefly explain the underlying evidence (when available)

We will not discuss every single action statement



KEY CHANGE #1: PHOTOTHERAPY THRESHOLDS

No more low / medium / high risk





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KEY CHANGE #1: EVIDENCE

- New treatment thresholds still by "expert opinion"
- Overtreatment with previous thresholds
 - Denmark, $2000-2007^{1}$ (N = 502,766 infants \geq 35 wks)
 - N = 224 with TSB \geq 26.3 mg/dL (450 $\mu mol/L)$
 - 3 cases of kernicterus (2 ABO, 1 G6PD def; peak TSB 38.1, 42.9, 57.1 mg/dL)
 - Northern CA, $1995-2011^{2-4}$ (N = 525,409 infants ≥ 35 wks)
 - N = 47 with TSB \ge 30 mg/dL³
 - 3 cases of kernicterus (2 G6PD def, 1 in-utero volvulus & DIC; peak TSB 48.5, 49.1, 28.4 mg/dL)
 - Increased risk of cerebral palsy or hearing loss only at ≥ 10 mg/dL above 2004 exchange level! ^{2,4}

KEY CHANGE #1: EVIDENCE

- Small increased risk of epilepsy among children (boys) treated with phototherapy
 - Adjusted hazard ratio 1.98 (1.4-2.78), only seen in boys (Maimburg et al, *Epilepsy Research* 2006)
 - aHR 1.22 (1.05-1.42), higher in boys (Newman et al, *Pediatrics* 2018)



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KEY CHANGE #1: PHOTOTHERAPY THRESHOLDS

Phototherapy thresholds by gestational age



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Phototherapy thresholds by gestational age



KEY CHANGE #2: NEUROTOXICITY RISK FACTORS

Slightly different neurotoxicity risk factors (in addition to gestational age)

2004 AAP

- Hemolytic disease
- Asphyxia
- Significant lethargy
- Temperature instability
- Acidosis
- Sepsis
- Albumin < 3.0 g/dL



KEY CHANGE #2: NEUROTOXICITY RISK FACTORS

Slightly different neurotoxicity risk factors (in addition to gestational age)

2004 AAP

- Hemolytic disease
- Asphyxia
- Significant lethargy
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2022 AAP

- Hemolytic disease
- Significant clinical instability in the previous 24 hours
- Sepsis
- Albumin < 3.0 g/dL



KEY CHANGE #3: POST-DISCHARGE FOLLOW-UP

No more nomogram / risk zones (i.e. low intermediate risk, high intermediate risk etc.)





KEY CHANGE #3: POST-DISCHARGE FOLLOW-UP

- Follow-up based on how many mg/dL away from phototherapy threshold
 - For infants who have *not* received phototherapy

Phototherapy threshold minus TcB or TSB		Discharge Recommendations				
0.1-1.9 mg/dL	Age <24 hours	Delay discharge, consider phototherapy, measure TSB in 4 to 8 hours				
	Age≥24 hours	 Measure TSB in 4 to 24 hours^a Options: Delay discharge and consider phototherapy Discharge with home phototherapy if all considerations in the guideline are met Discharge without phototherapy but with close follow-up 				
2.0-3.4 mg/dL	Regardless of age or discharge time	TSB or TcB in 4 to 24 hours ^a				
3.5-5.4 mg/dL	Regardless of age or discharge time	TSB or TcB in 1-2 days				
5.5-6.9 mg/dL	Discharging <72 hours	Follow-up within 2 days; TcB or TSB according to clinical judgment ^b				
	Discharging ≥72 hours	Clinical judgment ^b				
≥7.0 mg/dL	Discharging <72 hours	Follow-up within 3 days; TcB or TSB according to clinical judgment ^b				
	Discharging ≥72 hours	Clinical judgment ^b				





KEY CHANGE #3: EVIDENCE Predicting the Need for Phototherapy After Discharge

Michael W. Kuzniewicz, MD, MPH, abd Jina Park, MD, Hamid Niki, MS, Eileen M. Walsh, RN, MPH, Charles E. McCulloch, PhD, Thomas B. Newman, MD, MPH

	Fragueney (9/)	Odde Dation (DE% CI)	Predicted Probabi	lity of Exceeding Photo	otherapy Threshold ^b	
	Frequency (%)	Udds Katio (95% CI)	Within 24 h, %	Within 48 h, %	Ever (<30 d), %	
Δ-TSB (mg/dL below the AAP phototherapy threshold)						
0 to -1	611(0.4)	120.44 (96.78–149.89)	49	55	56	
<−1 to −2	2240 (1.5)	51.35 (43.94–60.01)	24	34	36	
<-2 to -3	5911 (4.0)	16.69 (14.44–19.29)	6	13	16	
<-3 to -4	14 078 (9.5)	4.58 (3.95–5.31)	0.4	3	5	
<-4 to -5	30 355 (20.5)	Reference	n/a	0.4	1.1	
<-5 to -6	38 612 (26.1)	0.14 (0.1–0.19)	n/a	0.03	0.2	
<-6 to -7	26 102 (17.6)	0.03 (0.01–0.06)	n/a	n/a	0.03	
<-7	30 253(20.4)	0.007 (0.002–0.029)	n/a	0.008	0.008	
				America	n Academy	



COMPARISON TO 2004 CURVES





ONLINE RESOURCES



https://bilitool.org/

PediTools clear tools for pediatic providers	PedTools What's new About PedTools Contact us Sitemap (OS Fentor 2013	Weeka (35-42) 37 *	Days (0-6) 0 *	mgis. (0-50)	Bartoon Leve	Hours (0-168)	OR Get age from dates
Age and Bilirubin	*NEW* AAP 2022 Hyperbilirubinemia management guidelines		Calculate	d results for the da	Calculat	te Clear	
Gestation at birth (weeks) Age (1 to 336 hours) Bilirubin (mg(dL)	Calculator and clinical decision support for the AAP 2022 guidelines for the management of hyperbilirubinemia in		Neurotoxi risk factor	sity Start s' phototherapy?	NCNC Phototherapy Threshold	NCNC Exchange Transfusion Threshold	Within 2 mg/dL of Exchange Translusion Threshold?
Neurotoxicity risks No risk factors ANY risk factors Show	th newborns 35 or more weeks of cestation.		ABSENT	No	12.6	19.6	No
Not scale Okutomatic Full-sized (336 hours) Not choice Original publication (PediTools custom States)	Features		PRESEN	t No	10.5	16.0	No
Optional age calculator	 Risk curve by gestational age at birth Neurotoxicity risk factors absent, present, or both 		For comp guideline	arison purposes. In phototherapy three	ere are approxim holds (see also)	nete American Academ AAP's published guidel	y of Pediatrical 2022 ines)
Date of birth UNIZINGUZZ, 12330 PM	Original and easier to interpret output		Neurolosi	sily risk. Start	AAP Photome	rapy	
Calculate age	Zoomed in and 0 to 336 hour plots Plot multiple time points to assess		ABSENT	No No	12.7		

https://peditools.org/bili2022/

https://phototherapyguidelines.com



NEW RECOMMENDATION #1: TSB AFTER TCB

^{KAS6} • Obtain total serum bilirubin (TSB) when transcutaneous bilirubin (TcB) is within 3 mg/dL of the phototherapy threshold or if TcB \geq 15 mg/dL

Discrepancies Between Transcutaneous and Serum Bilirubin Measurements

James A. Taylor, MD^a, Anthony E. Burgos, MD^b, Valerie Flaherman, MD^c, Esther K. Chung, MD, MPH^d, Elizabeth A. Simpson, MD^e, Neera K. Goyal, MD^f, Isabelle Von Kohorn, MD, PhD^g, Nui Dhepyasuwan, MEd^h, for the Better Outcomes through Research for Newborns Network

OBJECTIVE: To characterize discrepancies between transcutaneous bilirubin (TcB) measurements and total serum bilirubin (TSB) levels among newborns receiving care at multiple nursery sites across the United States.

METHODS: Medical records were reviewed to obtain data on all TcB measurements collected during two 2-week periods on neonates admitted to participating newborn nurseries. Data on TSB levels obtained within 2 hours of a TcB measurement were also abstracted. TcB – TSB differences and correlations between the values were determined. Data on demographic information for individual newborns and TcB screening practices for each nursery were also collected. Multivariate regression analysis was used to identify characteristics independently associated with the TcB – TSB difference.

RESULTS: Data on 8319 TcB measurements were collected at 27 nursery sites; 925 TSB levels were matched to a TcB value. The mean TcB – TSB difference was 0.84 ± 1.78 mg/dL, and the





NEW RECOMMENDATION #2: REBOUND BILIRUBIN

- Rebound bilirubin timing based on age at phototherapy initiation and concern for hemolysis
- Risk factors for rebound hyperbilirubinemia¹:
 - -Younger gestational age
 - -Hemolytic disease
 - -Younger age at phototherapy initiation
 - -Ending TSB closer to phototherapy threshold



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¹Chang et al. *Pediatrics*, 2017

NEW RECOMMENDATION #2: REBOUND BILIRUBIN





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NEW RECOMMENDATION #3: HOME PHOTOTHERAPY

Guidelines for Home Phototherapy

- Gestational age \geq 38 weeks
- No neurotoxicity risk factors
- \geq 48 hours old
- No previous phototherapy

No neurotoxicity risk factors

No hemolysis

- TSB no more than 1 mg/dL above the phototherapy threshold
- Clinically well



OTHER CONSIDERATIONS: FEEDING

- *Suboptimal intake jaundice*: preferred term over "breastfeeding jaundice"
 - Hyperbilirubinemia risk is increased in infants feeding < 8 times a day (Chen et al, *Pediatr Int* 2015)
 - Monitor for signs of adequate intake: urine output, transitional stools, normal weight loss (<75th percentile per NEWT tool), swallowing at the breast



OTHER CONSIDERATIONS: FEEDING

- Supplementation "may be considered" an alternative to phototherapy in the breastfed infant with history consistent with *suboptimal intake hyperbilirubinemia* and "a bilirubin approaching or at phototherapy threshold"
 - Supplementation may prevent readmission for phototherapy (Wickremasinghe et al, *JAMA Pediatrics* 2018)



Questions?

[contact information]