

# Clinical examination could not accurately predict neonatal jaundice

Moyer VA, Ahn C, Sneed S. Accuracy of clinical judgment in neonatal jaundice. Arch Pediatr Adolesc Med. 2000 Apr;154:391-4.

## QUESTION

How accurate are clinicians in assessing neonatal jaundice?

## DESIGN

Blinded comparison of clinicians' visual observations with serum bilirubin test results.

## SETTING

Well-newborn nursery of a hospital in Houston, Texas, United States.

## PATIENTS

122 healthy full-term infants (mean age 2 d, 54% boys).

## DESCRIPTION OF TESTS AND DIAGNOSTIC STANDARD

The infants were observed by 2 clinicians independently (pediatric resident, nurse practitioner, or attending physician) under fluorescent lighting near a window. The clinicians assessed jaundice as being absent, slight, or obvious for prespecified body zones starting at the head and progressing

down the body. The record of each clinical assessment was placed in a sealed envelope before the serum bilirubin test was done.

## MAIN OUTCOME MEASURES

Agreement between the 2 observers and correlation with serum bilirubin levels. The cut point for clinically significant jaundice was a bilirubin level of  $\geq 205$   $\mu\text{mol/L}$ .

## MAIN RESULTS

Agreement between observers for jaundice for each part of the body was poor;  $\kappa$  values ranged from  $-0.06$  for soles of the feet to  $0.23$  for the area of nipple line to umbilicus (0% to 23% agreement beyond chance alone). The absence of visible jaundice below the nipple line predicted

that an infant would have a bilirubin level  $< 205$   $\mu\text{mol/L}$ , but the presence of jaundice below the nipple line did not reliably predict higher bilirubin levels. The sensitivity, specificity, and likelihood ratios are shown in the Table.

## CONCLUSION

Clinical assessment of jaundice by experienced observers was not reliable and could not accurately predict elevated serum bilirubin levels.

Source of funding: No external funding.

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### Test characteristics for visual observation of jaundice in full-term infants\*

Sensitivity (95% CI)	Specificity (CI)	+LR	–LR
97% (90 to 100)	19% (13 to 26)	1.9	0.15

\*Abbreviations defined in Glossary; data provided by author.

## COMMENTARY

The study by Moyer and colleagues strongly reinforces existing evidence that visual assessment of neonatal jaundice is unreliable and inaccurate, even when estimates are made of the cephalocaudal progression of jaundice to different body zones. The sensitivity of clinical observation of high bilirubin levels (jaundice extending below the nipple line) was greater than the specificity, implying that high serum bilirubin levels are less predictable than low levels. 1 of the 2 infants with false-negative predictions (serum bilirubin levels  $> 205$   $\mu\text{mol/L}$  whose jaundice stopped above the nipple line) had a serum bilirubin level of 279  $\mu\text{mol/L}$ .

The inclusion criteria and definition of variables of the study may bias the results. The range of gestational ages from 37 to 41 weeks, variation in skin color of the patients, and range of postnatal ages are clinically relevant. The risks for underestimating jaundice and kernicterus are probably greater for infants of 37 to 38 weeks of gestational age than for those of higher gestational ages, for infants with dark skin tone, and for infants on day 2 rather than on day 7. Day 2 is often the day of discharge from the hospital of mother and infant. Most of the infants we have seen with kernicterus since its resurgence in the 1990s (apparently associated with earlier discharges) had G-6-PD deficiency, had dark skin tone,

and were discharged early. A serum bilirubin level  $> 205$   $\mu\text{mol/L}$  is far above the 90th percentile for normal full-term infants on day 2, especially early in the day (1).

Of interest was the failure of the clinicians to show a learning curve, consistent with the finding that naive parents made better judgments of the presence or absence of jaundice than did health care workers (2). The possibility that variation in predictive accuracy may depend on observer perception, cited by the authors, suggests that clinicians should audit their own predictive performance in order to detect any consistent tendency to under- or overestimate jaundice. The present study will add fuel to the search for noninvasive technology to accurately assess jaundice.

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## References

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