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Use of a smartphone app to assess neonatal jaundice

Neonates are screened for hyperbilirubinemia before hospital discharge using a transcutaneous or total serum bilirubin measurement. However, levels peak at approximately 96 hours of life, which is after most healthy infants have left the hospital. Outpatient follow-up is often performed by visual inspection, but this can be highly variable and have poor interobserver agreement. The authors conducted a study to assess a technology for detecting total serum bilirubin (TSB) based on analyzing digital images of newborns obtained using their BiliCam smartphone app. The prospective study involved newborns who were younger than seven days old and born at 35 weeks or more gestation. Participants were recruited from seven pediatric hospital sites in the United States and enrolled in the study between October 2014 and July 2016. Neonates who had received phototherapy were excluded. The authors developed BiliCam to convert images of newborns to estimated TSB levels as a potential point-of-care screening device for resource-poor areas. For this study, the authors installed the app on an iPhone 5s smartphone, which was used to capture images of skin overlying the newborn sternum, on which was placed a 6- x 6-cm color calibration card to account for lighting variability. The user obtained flash and nonflash images at three distances from the newborn. Red, blue, and green pixilation characteristics were entered into a computer algorithm to estimate a bilirubin value on the server. Attempts were made to secure images within two hours of a blood draw for TSB determination. The images were compared to TSB assays run on the instruments used by the participating hospitals. A complete set of BiliCam images was evaluated for 530 newborns and compared to TSB values with 0.91 correlation (95 percent confidence interval [CI], 0.89-0.92), with the highest correlation among white neonates and lowest among Asian-American newborns. The sensitivity of the BiliCam was 84.6 percent and the specificity was 75.1 percent for identifying neonates in the high-risk zone of the Bhutani TSB nomogram. This is compared to transcutaneous bilirubin (TcB) sensitivity of 81.3 percent and specificity of 82.6 percent. The authors concluded that BiliCam is not sufficient as a standalone diagnostic tool but, similar to TcB meters, can serve as a screening device to help determine which neonates require a blood draw for a TSB level.

Taylor JA, Stout JW, de Greef L, et al. Use of a smartphone app to assess neonatal jaundice. *Pediatrics*. 2017;140. doi:10.1542/peds.2017-0312.

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A novel approach to improving lab test utilization

Clinical practice guidelines, which are derived from evidence-based practice, are developed to improve utilization of laboratory testing. Successful implementation of clinical practice guidelines (CPGs) depends on many factors, including their user-friendliness and applicability to particular patients. The use of computerized order entry provides health care institutions with an opportunity to apply CPGs. The authors conducted a study in which they compared international practice guidelines with ordering practices in their institution to improve detection and reduce unnecessary testing for *HFE*-related hereditary hemochromatosis (*HFE*-HH), a disorder of low genetic penetrance and a well-known cause of inherited iron overload syndrome. They reviewed international practice guidelines and the 918 genotyping assays performed at their institution in 2015 and found that transferrin

saturation levels were significantly higher for patients with newly diagnosed *HFE*-HH than for those with nonrisk genotypes. Based on this information, the authors constructed a “one-button” order that restricts *HFE* genetic testing to patients with transferrin saturation greater than 45 percent, which is consistent with published CPGs. This approach detected 100 percent of new patients with *HFE*-related hereditary hemochromatosis. However, the authors noted that testing thresholds and detection rates varied by institution, supporting the need to design institution-specific interventions. The authors concluded that transferrin saturation was superior to ferritin levels as the initial test when *HFE*-HH was suspected at their institution and that their algorithmic one-button electronic order improved patient care. Furthermore, they noted the unique ability of pathologists, who have access to laboratory data, to lead efforts in test utilization and customized interventions.

Zhou Y, Procop GW, Riley JD, et al. A novel approach to improving utilization of laboratory testing. *Arch Pathol Lab Med*. 2018;142:243-247.

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