Interpreting Complete Blood Counts Soon After Birth in Newborns at Risk for Sepsis

Thomas B. Newman, Karen M. Puopolo, Soora Wi, David Draper and Gabriel J. Escobar

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WHAT’S KNOWN ON THIS SUBJECT: Components of the complete blood count (CBC) provide information about the likelihood of sepsis in newborns, but previous studies have used varying definitions of abnormal and yielded inconsistent results.

WHAT THIS STUDY ADDS: White blood cell counts and absolute neutrophil counts increase the probability of sepsis only when they are low. The informativeness of the CBC increases with age and when interval likelihood ratios are used rather than a “normal” range.

BACKGROUND: A complete blood count (CBC) with white blood cell differential is commonly ordered to evaluate newborns at risk for sepsis.

OBJECTIVES: To quantify how well components of the CBC predict sepsis in the first 72 hours after birth.

METHODS: For this retrospective cross-sectional study we identified 67623 term and late-preterm (≥34 weeks gestation) newborns from 12 northern California Kaiser hospitals and 1 Boston, Massachusetts hospital who had a CBC and blood culture within 1 hour of each other at 72 hours of age. We compared CBC results among newborns whose blood cultures were and were not positive and quantified discrimination by using receiver operating characteristic curves and likelihood ratios.

RESULTS: Blood cultures of 245 infants (3.6 of 1000 tested newborns) were positive. Mean white blood cell (WBC) counts and mean absolute neutrophil counts (ANCs) were lower, and mean proportions of immature neutrophils were higher in newborns with infection; platelet counts did not differ. Discrimination improved with age in the first few hours, especially for WBC counts and ANC (eg, the likelihood ratio for ANC < 1000 was 115 at ≥4 hours). Both WBC counts and ANC were most informative when very low (eg, the likelihood ratio for ANC < 1000 was 115 at ≥4 hours). No test was very sensitive; the lowest likelihood ratio (for WBC count ≥ 20 000 at ≥4 hours) was 0.16.


AUTHORS: Thomas B. Newman, MD, MPH, Karen M. Puopolo, MD, PhD, Soora Wi, MPH, David Draper, PhD, and Gabriel J. Escobar, MD

AFFILIATIONS: Departments of Epidemiology and Biostatistics and Pediatrics, School of Medicine, University of California, San Francisco, California; Division of Research, Kaiser Permanente Medical Care Program, Oakland, California; Department of Newborn Medicine and Channing Laboratory, Brigham and Women’s Hospital, Boston, Massachusetts; Division of Newborn Medicine, Children’s Hospital Boston, Boston, Massachusetts; Harvard Medical School, Boston, Massachusetts; Department of Applied Mathematics and Statistics, University of California, Santa Cruz, California; and Department of Pediatrics, Kaiser Permanente Medical Center, Walnut Creek, California

KEY WORDS: complete blood count, sepsis, bacteremia, neutrophils, leukocytes, sensitivity, likelihood ratios, newborn

ABBREVIATIONS: CBC—complete blood count; GBS—group B Streptococcus; WBC—white blood cell; ANC—absolute neutrophil count; I/T—proportion of neutrophils that are immature; KPMCP—Northern California Kaiser Permanente Medical Care Program; BWH—Brigham and Women’s Hospital; LR—likelihood ratio; ROC—receiver operating characteristic

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