Clinical Pathology Selected Abstracts, 12/14

Clinical pathology abstracts editor: Deborah Sesok-Pizzini, MD, MBA, associate professor, Department of Pathology and Laboratory Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, and medical director, Blood Bank and Transfusion Medicine, Children's Hospital of Philadelphia.

Prevalence of antimicrobial use in U.S. acute care hospitals

Inappropriate antimicrobial drug use is associated with adverse events in hospitalized patients as well as the emergence of resistant pathogens. Targeting effective interventions to improve antimicrobial use in the acute care setting may help guide safe and effective therapy while reducing the risks and complications of resistant and difficult-to-treat pathogens. Inappropriate antimicrobial use may be due to incorrect drug selection, dosing levels, or treatment duration. The authors performed a one-day antimicrobial drug use prevalence survey in acute care hospitals in 10 states between May and September 2011 to determine the most common antimicrobial drug types and their prevalence, as well as the reasons for their use. On the survey date, patients were randomly selected from each hospital's morning census. The data collectors reviewed the medical records retrospectively to learn more about the antimicrobial drugs, as well as the reasons for treatment, infection sites, and if the infections began in community or health care settings. Results showed that the use of broad-spectrum antimicrobial drugs, such as piperacillin-tazobactam and vancomycin, for resistant pathogens was common. This was true for community-onset infections and among patients outside critical care units. Approximately 50 percent of patients were receiving two or more antimicrobial drugs for treatment of infection at the time of the survey. The authors concluded that although the data suggest the potential misuse of antimicrobial drugs for active infections in hospitalized patients, the use of drugs for surgical prophylaxis is largely consistent with current guidelines. Additional work is needed to understand the settings and indications for which reducing antimicrobial use is safe and efficacious.

Magill SS, Edwards JR, Beldavs ZG, et al. Prevalence of antimicrobial use in US acute care hospitals, May–September 2011. *JAMA.* 2014;312(14):1438–1446.

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Link between early administration of high-dose erythropoietin in preterm infants and brain MRI abnormality

Premature infant survival has improved, but a number of these infants suffer from long-term developmental disabilities. These neurocognitive disabilities are a result of encephalopathy of prematurity, which is characterized by white matter lesions, white matter loss, and abnormalities in cortical development. Since erythropoietin (EPO) and its receptors are expressed in the central nervous system and animal studies have shown a neuroprotective effect, EPO may have beneficial effects on long-term neurodevelopmental outcome. The authors conducted a study in Switzerland between 2005 and 2012 to determine if an association exists between early high-dose recombinant human EPO in preterm infants and biomarkers of encephalopathy of prematurity on MRI at term-equivalent age. The randomized, double-blind, placebo-controlled study included 495 infants. A nonrandomized subset of 165 infants was evaluated on MRI acquired at term-equivalent age. The preterm infants were randomized to receive either EPO or placebo intravenously before three hours of age, at 12 to 18 hours, and at 36 to 42 hours after birth. The primary outcome of the study, neurodevelopment at 24 months, has not been assessed. However, investigators showed on MRI that high-dose EPO treatment within 42 hours after birth was associated with a reduced risk of brain injury. The authors noted that this secondary outcome analysis requires assessment via a randomized trial designed primarily to assess white matter and gray matter injury at term-equivalent age using MRI.

Ha-Vinh Leuchter R, Gui L, Poncet A, et al. Association between early administration of high-dose erythropoietin in preterm infants and brain MRI abnormality at term-equivalent age. *JAMA.* 2014;312:817–824.

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Lower versus higher hemoglobin threshold for transfusion in septic shock

The benefit versus harm of giving blood transfusions to patients experiencing septic shock is unknown. Transfusions are given to both bleeding and nonbleeding septic shock patients. Recommendations from the Surviving Sepsis Campaign include maintaining a hematocrit of more than 30 percent in the presence of hypoperfusion in the first six hours. Afterwards, it is recommended to keep hemoglobin levels between 7 g/dL and 9 g/dL in patients with myocardial ischemia, severe hypoxemia, acute hemorrhage, or ischemic coronary artery disease. However, limited data support these recommendations. The authors conducted a multicenter, randomized parallel-group trial of septic shock patients to determine if a higher or lower hemoglobin threshold for transfusion showed differences in death rates by 90 days. They analyzed data from 998 patients with similar baseline characteristics. Patients in the higher threshold arm (less than 9 g/dL) received a median of four red blood cell units, while patients in the lower threshold arm (less than 7 g/dL) received a median of one red blood cell unit. At the end of 90 days, the rates of ischemic events and use of life support were similar among those assigned to blood transfusions at a higher or lower threshold. The authors concluded that this study shows that using a hemoglobin threshold of 7 g/dL instead of 9 g/dL results in the same mortality rates at 90 days. However, the number of transfusions clearly differed between the two groups.

Holst LB, Haase N, Wetterslev J, et al. Lower versus higher hemoglobin threshold for transfusion in septic shock. *N Engl J Med.* 2014;371:1381–1391.

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