CARLO LUTZ, MD
Department of Emergency Medicine, Jacobi Medical Center, Bronx, NY

HYUNG J. CHO, MD
Director, Quality and Patient Safety, Division of Hospital Medicine; Assistant Professor of Medicine, Icahn School of Medicine at Mount Sinai, New York, NY

ONE MINUTE CONSULT

BRIEF ANSWERS TO SPECIFIC CLINICAL QUESTIONS

Are we causing anemia by ordering unnecessary blood tests?

A 68-year-old woman is admitted for community-acquired pneumonia. She receives antibiotics, and her condition begins to improve after 2 days. She has her blood drawn daily throughout her admission.

On hospital day 3, she complains of fatigue, and on day 4, laboratory results show that her hemoglobin and hematocrit values have fallen. To make sure this result is not spurious, her blood is drawn again to repeat the test. On day 5, her hemoglobin level has dropped to 7.0 g/dL, which is 2 g/dL lower than at admission, and she receives a transfusion.

On day 7, her hemoglobin level is stable at 8.5 g/dL, and her physicians decide to discharge her. The morning of her discharge, as a nurse is about to draw her blood, the patient asks, "Are all these blood tests really necessary?"

Iatrogenic anemia from blood draws is common, serious, and unnecessary

DO WE DRAW TOO MUCH BLOOD?

This case portrays a common occurrence. Significant amounts of blood are drawn from patients, especially in critical care. Clinical uncertainty drives most laboratory testing ordered by physicians. Too often, however, these tests lead to more testing and interventions, without a clear benefit to the patient.[1]

When blood testing leads to more testing, a patient's hemoglobin and hematocrit can fall. Symptomatic iatrogenic anemia is associated with significant morbidity for patients with preexisting cardiopulmonary disease.

We draw much larger volumes of blood than most testing guidelines say are necessary. One author[2] has noted that 50 to 60 mL of blood is removed for each set of tests, owing to the size of collection tubes, multiple reagents needed for each test, and the possibility that tests may need to be rerun. Yet about 3 mL of blood is sufficient to perform most laboratory tests even if the test needs to be rerun.[2]

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CAN BLOOD DRAWS CAUSE ANEMIA?

A relationship between the volume of blood drawn and iatrogenic anemia was first described in 2005, when Thavendiranathan et al[3] found that in adult patients on general medicine floors, the volume of blood drawn strongly predicted decreased hemoglobin and hematocrit levels. For every 100 mL of blood drawn, hemoglobin levels fell by an average of 0.7 g/dL, and 13.9% of the patients in the study had iron studies and fecal occult blood tests performed to investigate anemia.

Kurniali et al[4] reported that during an average admission, 65% of patients experienced a drop in hemoglobin of 1.0 g/dL or more, and 49% developed anemia.

Salisbury et al,[5] in 2011, studied 17,676 patients with acute myocardial infarction across 57 centers and found a correlation between the volume of blood taken and the development of anemia. On average, for every 50 mL of blood drawn, the risk of moderate to severe iatrogenic anemia increased by 18%. They also found significant variation in blood loss from testing in patients who developed moderate or severe anemia. The authors believed this indicated that moderate to severe anemia was more frequent at centers with higher than average diagnostic blood loss.[5]

This relationship has also been described in patients in intensive care, where it contributes to anemia of chronic disease. While anemia of critical illness is multifactorial, phlebotomy contributes to anemia in both short- and long-term stays in the intensive care unit.[6]

CHOOSING WISELY GUIDELINES

The Choosing Wisely initiative of the American Board of Internal Medicine Foundation collects recommendations by a number of medical specialty societies to reduce overuse of healthcare resources.[7] The Critical Care Societies Collaborative recommends ordering diagnostic tests only when they answer specific clinical questions rather than routinely. The Society of Hospital Medicine also recommends against repeat complete blood cell count and blood chemistry testing because it may contribute to anemia, which is of particular concern in patients with cardiorespiratory disease.

POSSIBLE HARM

The Critical Care Societies Collaborative, in its Choosing Wisely Guidelines, specifically cites anemia as a potential harm of unnecessary phlebotomy, noting it may result in transfusion, with its associated risks and costs. In addition, aggressive investigation of incidental and nonpathologic results of routine studies is wasteful and exposes the patient to additional risks.

REDUCING PHLEBOTOMY DECREASES IATROGENIC ANEMIA

Since the relationship between excessive phlebotomy and iatrogenic anemia was described, hospitals have attempted to address the problem.

In 2011, Stuebing and Miner[8] described an intervention in which the house staff and attending physicians on non-intensive care surgical services were given weekly reports of the cost of the laboratory services for the previous week. They found that simply making providers aware of the cost of their tests reduced the number of tests ordered and resulted in significant hospital savings.

Another strategy is to use pediatric collection tubes in adult patients. A 2008 study in which all blood samples were drawn using pediatric tubes reduced the blood volume removed per patient by almost 75% in inpatient and critical care patients, without the need for repeat blood draws.[9] However, Kurniali et al found that the use of pediatric collection tubes did not significantly change hemoglobin fluctuations throughout patient hospital stays.[4]

Corson et al[10] in 2015 described an intervention involving detailing, auditing, and giving feedback regarding the frequency of laboratory tests commonly ordered by a group of hospitalists. The intervention resulted in a modest reduction in the number of common laboratory tests ordered per patient day and in hospital costs, without any changes in the length of hospital stay, mortality rate, or readmission rate.[10]

THE CLINICAL BOTTOM LINE

As a general principle, diagnostic testing should be done to answer specific diagnostic questions and to guide management. Ordering of diagnostic tests should be decided on a day-to-day basis rather than scheduled automatically or done reflexively. In the case of blood draws, the volume of blood drawn is significantly increased by unnecessary testing, resulting in higher rates of hospital-acquired anemia.

Order tests only to answer specific clinical questions—not routinely

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***ADDRESS**: Carlo Lutz, MD, Jacobi Medical Center, Department of Emergency Medicine, 1400 Pelham Parkway South, Bronx, NY 10461; carlo.lutz@jacobi.em@gmail.com*