Caleb J. Murphy, MD, MBA
Clinical Associate, Section of Hospital Medicine, University of Chicago, Chicago, IL

Andrew W. Schram, MD, MBA
Assistant Professor of Medicine, Section of Hospital Medicine, University of Chicago, Chicago, IL

Should 'daily labs' be a quality priority in hospital medicine?

"Daily labs," the repetitive ordering of complete blood cell counts (CBCs) and serum electrolyte panels (SEPs) in stable hospitalized patients, is a well-known low-value practice in hospital medicine. Daily lab utilization is often cited as a contributor to an array of harms such as iatrogenic anemia, wasteful spending, and an unpleasant experience for patients. However, a closer look at the evidence reveals that unnecessary daily labs are only a minor contributor to anemia and healthcare costs for most inpatients, while their effect on the patient experience has not been definitively established.

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An accurate understanding of the magnitude of harm resulting from inappropriate daily labs is relevant in the context of quality improvement (QI), where the objective is to pursue interventions that support institutional priorities and achieve a favorable balance of expected benefit to resource investment.

RELEVANCE TO QUALITY IMPROVEMENT

Ordering daily CBCs and SEPs, including basic metabolic panels, renal function panels, and comprehensive metabolic panels, is a common practice in the inpatient setting. While these tests are high-yield, low-cost, and play a central role in clinical decision-making, they are also likely to be ordered on a recurring basis without a clear indication. Several studies estimate an inappropriate usage rate of about 25% to 30%.[1] Unnecessary CBC and SEP utilization gained heightened awareness when it was called out by the Society of Hospital Medicine (SHM) in its "Choosing Wisely" list as a common wasteful clinical practice in the hospital setting.[2]

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But there is an important difference between identifying a wasteful clinical practice and assessing its suitability as a QI target. Discussion of even minor problems may be appropriate in educational settings to foster a value-conscious culture among trainees.[3] However, more discernment is needed when an institution considers devoting resources to a clinical QI intervention. The QI community has long recognized the importance of prioritizing change-initiatives based at least partially on their projected impact on institutional priorities.[4]

The concept of QI prioritization is highly relevant to daily labs. While literature on inappropriate daily labs cites a broad range of potential harms to justify intervention, the magnitude of purported harm is often unaddressed or discussed incompletely. In this commentary, we show that the consequences of daily labs may be less pronounced than is commonly suggested. This has implications for what types of daily lab interventions are prioritized by hospitals and the broader hospital medicine community and may guide the evaluation of other QI initiatives.

IATROGENIC ANEMIA: IDENTIFY PATIENTS AT RISK

Excessive phlebotomy leading to iatrogenic anemia was the chief clinical concern underpinning SHM's "Choosing Wisely" recommendation to avoid repetitive CBCs and SEPs in stable hospitalized patients.[2,5] The recommendation was based on several studies that associated phlebotomized blood volume with hemoglobin decline in general medicine and critical care patients.[6–8] However, inappropriate daily labs seem to have, at most, a minor role in provoking clinically significant iatrogenic anemia, particularly in general medicine patients.[8]

The following are 2 key points to consider:

Phlebotomy volume appears to have a modest effect on hemoglobin levels in general medicine patients. Thavendiranathan et al[8] showed in a widely cited paper that every 100 mL of phlebotomy resulted in a hemoglobin decline of 0.7 g/dL. Given that the mean phlebotomy volume per hospital stay was only 75 mL, an average hospitalization (with length of stay of 5.6 days) saw a hemoglobin decline of about 0.5 g/dL attributable to phlebotomy. This is unlikely to be clinically relevant in most patients. Further, daily labs account for only a portion of overall phlebotomy volume, and inappropriate daily labs represent a smaller portion still. The same study found that 5 days of routine lab orders resulted in 50 mL of phlebotomy volume and a hemoglobin decline of about 0.35 g/dL.[8] The expected hemoglobin drop attributable to wasteful CBCs and SEPs, assuming an inappropriate utilization rate of 25% to 30%, would therefore be estimated to be around 0.1 g/dL over a 5-day hospitalization.[1]

The clinical relevance of iatrogenic anemia seems isolated to certain patient populations. In one study, only "severe" hospital-acquired anemia, defined as hematocrit less than 27% with an admission hematocrit higher than 36% to 40%, had a statistically significant association with readmission rates.[9] In this study, the vast majority (85%) of patients with severe hospital-acquired anemia had a major procedure, active hemorrhage, or a hemorrhagic disorder, suggesting an identifiable subset of patients for whom avoidance of unnecessary phlebotomy is most relevant.[9] Adverse effects of iatrogenic anemia have also been established in patients with acute myocardial infarction.[6]

If our goal is to prevent or limit consequential iatrogenic anemia, it may be prudent to identify patients at risk for negative effects of iatrogenic anemia and focus interventions on those patients. This could include patients with active bleeding, bone marrow suppression, or acute myocardial infarction. Unfortunately, these patients may require regular CBCs and SEPs due to clinical instability. Reducing daily lab orders would be most sensible in the context of multifaceted interventions that also target collection tube volume (either by using pediatric tubes or by underfilling standard tubes), bleeding prevention and mitigation, and improved utilization of other laboratory tests.[6,10] Even so, as others have suggested, it is unclear to what extent iatrogenic anemia is preventable.[9]

WASTEFUL SPENDING: CLARIFY WHO BENEFITS

Purported financial benefits of reducing inappropriate daily labs also feature prominently in the literature on high-value care. These benefits are unintentionally exaggerated in several ways:

Discussions of daily labs are commonly framed with dramatic statistics on total healthcare spending without clarifying that laboratory spending—not to mention daily labs specifically—is a minor component of overall healthcare expenditures.[11,12]

Some studies calculate cost savings based on hospital charges.[13,14] Charge figures for laboratory tests are readily available, but they are notoriously inflated, are rarely paid in full,[15] and are therefore a poor marker for how many healthcare dollars actually change hands.

Determining who benefits financially from reduced laboratory utilization is muddled due to the complexity of US healthcare financing. Not infrequently, it is implied that hospitals or patients are the chief beneficiaries of cost savings resulting from reduced laboratory utilization,[2] but often it is payers who benefit the most.

Consider fixed costs

Hospitals may in fact be disincentivized to perform less testing because they will be left to cover fixed laboratory costs without payer reimbursement. Even in situations where hospitals bear the full financial responsibility of laboratory testing, such as charity care or reimbursement with fixed payments based on diagnosis-related groups, cost savings are attenuated. This is because most laboratory expenses are fixed costs such as laboratory equipment and staff and not variable costs such as phlebotomy tubes, testing strips, and other consumable materials.[16,17]

"Capacity dynamics" are also unfavorable: an institution may have difficulty realizing savings in laboratory or phlebotomist staffing unless it can shed at least one "full-time equivalent" of testing or phlebotomy. The same rule holds true for laboratory equipment. In fairness, a published intervention noted that the host institution was able to capture new phlebotomist capacity by redirecting some phlebotomist time to the outpatient setting.[18] Also, interventions with potential to reduce phlebotomist or laboratory staff workload may be more highly valued by institutions suffering from staffing shortages.

Unclear association between daily labs and care 'cascades'

Healthcare testing "cascades of care" warrant a brief discussion. Cascades of care refer to downstream

healthcare utilization triggered by low-value services. Inpatient daily labs have been cited as a cause of care cascades,[19] but on closer inspection, daily labs are not an ideal example of a cascade-inciting event.

Care cascades characteristically occur when isolated diagnostic tests are ordered in inappropriate situations—for example, when the pretest probability of disease is very low, such as preoperative electrocardiography for low-risk procedures.[20] However, inpatient CBCs and SEPs are not ordered only as diagnostic tests but also to monitor patients' health status. Since the alternative to daily labs in the inpatient setting is usually ordering these tests every other day or several times weekly, any unexpected abnormalities would likely reveal themselves at some point during the hospitalization and would still need to be addressed prior to discharge. Therefore, inpatient daily labs seem to be a low-yield target if the goal is to prevent care cascades.

PATIENT EXPERIENCE: REDUCE VENIPUNCTURES

Reducing unnecessary daily labs may very well improve the patient hospital experience by decreasing discomfort and improving sleep quality, but there is a gap in the literature as to whether this is truly the case. It is important to note that patient experience related to daily labs is specifically affected by venipuncture.[21] Reducing daily lab orders has the potential to decrease patient discomfort and improve sleep only if the total number of venipunctures is reduced. For example, ordering weekly CBCs but daily SEPs would presumably not result in a meaningful difference in patient discomfort or sleep quality because the total number of venipunctures would remain the same.

REASONABLE RESOURCES FOR A MODEST PROBLEM

As SHM recommended in their 2013 "Choosing Wisely" list, ordering routine inpatient CBCs and SEPs should be avoided in the presence of "clinical and lab stability."[2] This recommendation is a helpful principle for clinicians motivated to practice high-value care in the hospital setting. However, demonstrable harms due to unnecessary daily labs are less pronounced than is commonly suggested. This position does not discount efforts to reduce inappropriate utilization of inpatient CBCs and SEPs, but it does have implications for how many resources should be committed to combatting the problem. It is reasonable to conclude that the required resource investment for proposed interventions—as well as the intensity of focus of the hospital medicine community on the problem—should match the modest impact of inappropriate daily labs on outcomes, costs, and the patient experience.

DISCLOSURES

The authors report no relevant financial relationships which, in the context of their contributions, could be perceived as a potential conflict of interest.

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Address: *Caleb J. Murphy, MD, MBA, Section of Hospital Medicine, University of Chicago, 5841 S. Maryland Avenue, MC 5000, Chicago, IL 60637; cmurphy3@medicine.bsd.uchicago.edu*