

Clinicians Role in Reducing Lab Order Frequency in ICU Settings

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Background

In many critical care units, there is a huge number of laboratory testing (labs) which happens on regular intervals. A drop in oxygen saturation prompts protocols to have nurses draw an ABG, regardless of the clinical situation. In many situations, lab orders get drawn at inappropriate timing such as a STAT CBC/Coags (Complete Blood Count/Coagulation) even before the blood products were given. Similarly, electrolyte panels are scheduled, when a patient is on diuretic infusion despite minimal urine output. It is known that laboratory values are very expensive and add up very quickly [1]. We also know that drawing labs interrupt patients sleep and possibly cause pain, which leads to dissatisfaction among patients [2].

There is a knowledge gap among critical care clinicians regarding the appropriateness of lab frequency. One example includes CBC every 2 hours to identify a drop in hemoglobin. Another gap in knowledge occurs with the quantity of labs drawn. An example includes every ICU admission getting a protocol that incorporates a CBC, electrolyte panel, ionized calcium, blood cultures, liver function tests, arterial blood gas, magnesium, coagulation values, etc.

This article aims to draw attention towards the magnitude of problem of frequent blood draws and increasing awareness among physicians, nurse practitioners, and physician assistants about clinical assessments prior to labs; chart burden, inappropriate timing, variation in ordering, understanding lab costs, potential errors in labs, increase risks associated with labs, and that frequent labs may not improve the outcomes.

Frequent Lab Draws: Magnitude of Problem

In many intensive care units, data collection comes in large quantities and almost seems endless until the patient is transferred. A lot of this data has artifacts and make us wonder if it is even accurate. One level of data collection that is done is laboratory data from once a day to every hour. Laboratory data is a standard part of the monitoring process but has many disadvantages as well. Do the patients need frequent laboratory testing?

Charting burden

The process of laboratory testing starts with the order being placed in the computer or paper. This can consume a lot of time and effort from clinicians taking them away from the bedside. These orders are frequently rechecked by the same clinicians to make sure all the labs are ordered by on coming clinicians. The laboratory technician and/or nurse review these orders and ensure that the labs are drawn according to the clinicians' request. Occasionally lab orders are entered wrong

and need further time consumption to edit/change the order to the meet clinicians' desired request. Another area of charting burden in medical records is an information overload in all the laboratory data [3].

Variation in ordering

Laboratory order frequency varies upon hospital, provider, and situation. Different clinicians in the same hospital and situation can order labs differently. The level of experience and clinical assessment skills can assist in the decision process. Occasionally the clinicians (MD/NP/PA) will order every 2 hour labs, even if the trend is improving or normal to begin with. Some hospitals have begun teaching their clinicians the unnecessary lab testing and risks to patients from this [4]. When labs are reduced by over 50%, patient outcomes do not worsen and less blood products are given.

Inappropriate timing

There are many situations where frequent lab testing can be timed inappropriately. For example; checking hemoglobin level before a red blood transfusion when it was meant to be drawn after the unit of blood. In many situations, an ICU patient receives a unit of red blood cells when stable and a recheck in hemoglobin could wait until the next complete blood count is obtained. Another event that happens is checking a lactate before treatment is completed (fluid bolus or increase in blood pressure) after an elevated lactate in a septic patient. When labs are being drawn, the laboratory technician or nurse then enters the patient's room causing interruption of the sleep or activities. Labs can be drawn from central lines, arterial lines, or peripherally. Painful needle sticks and disruptive sleep can lead to patient dissatisfaction or even the start or worsening delirium. Many lab draws are interrupting the patient despite hemodynamic stability [2].

Understanding lab costs

Laboratory costs are accounting for 60-70 billion dollars per year in escalating [5]. Laboratory costs vary depending on facility and level of care. The route of lab collection and who collects the blood sample adds a cost. Drawing from an arterial line can be extremely easy but be the highest cost of all with the connection device and training required to access this line. Even venipuncture can add costs for the technician and equipment. An insulin infusion seems to be effective but let's break down the areas of cost. The lab collection every hour accumulates with the glucose cost as well as the site blood is obtained from. Multiply this by 24 hours a day, costs rise very quickly! Many clinicians do not understand that most facilities charge for each part of a lab panel, such as an electrolyte panel, lipid panel, liver function tests, or DIC panel. If a patient is having ectopic heart beat while receiving Lasix, some clinicians order an electrolyte panel with magnesium and phosphorus.

This actually charges the patient separately for sodium, potassium, chloride, bicarbonate, creatinine, BUN, and glucose.

Increase risks associated with labs

Depending on the frequency for laboratory testing and amount of blood collected (1-10 mLs per vial), we cause iatrogenic anemia [6]. This puts the ICU patient at risk of need blood transfusions which is an all new set of risks such as Transfusion Related Acute Lung Injury, Transfusion Associated Circulatory Overload, or Transfusion Related Immunomodulation [7]. Costs for the hospital and patient accumulate quickly [1]. Hospital resources are spent obtaining these laboratory tests and that's if the data appear to be reliable. It isn't uncommon for abnormal testing to come back which could lead to a "redraw" starting the process over at the beginning [8].

Frequent labs and patient outcome

It is very difficult to find any evidence that shows high frequency laboratory data improves outcomes [9]. There are other areas such as radiologic testing that has similar findings to laboratory testing data.

When chest x-rays are obtained in a restrictive strategy, there wasn't any harm detected [4]. A recent study conducted in a 24 bed SICU saved about \$60,000 and 4 liters of blood per month without affecting outcomes [10].

Academic Societies' View

Even major organizations have gotten behind drawing laboratory testing more efficiently. Society of Critical Care Medicine, American Association of Critical-Care Nurses, American College of Chest Physicians, and American Thoracic Society have joined together in the Choosing Wisely campaign [11]. The first thing (out of five) Physicians and patients should know is "Don't order diagnostic tests at regular intervals (such as everyday), but rather in response to specific clinical questions."

Recommendations

Recommendation for Reducing Critical Care Lab Orders Frequency are mentioned in Table 1.

1. Physicians, Nurse Practitioners and Physician Assistants should question laboratory testing orders. "Are these labs really needed?"
2. Don't order diagnostic tests at regular intervals but rather for specific clinical questions.
3. Post transfusion or post electrolyte replacement laboratory orders should be held for stable clinical conditions.
4. Some Critical Care Units have AM Lab Protocols that need to be reevaluated to remove the unnecessary labs. (example: daily aPTT, Lactate, BNP, and/or Liver Function Tests)
5. Education on laboratory testing needs to occur with all clinicians in the ICU including nursing. Consider daily checklist technique.

Table 1: Recommendation for Reducing Critical Care Lab Orders Frequency.

Conclusion

Laboratory testing in high frequency may provide an intensive care clinician a sense of comfort that they have covered all the bases. Unfortunately this can cause information overload along with many other errors and costs. Laboratory testing in high frequency has not been proven to improve outcomes. Research and experience is trending to laboratory testing when clinically appropriate. With strengthening efforts, we can help reduce costs, reduce patient risks, and improve satisfaction [12].

References

1. Oliveira AM, Oliveira MV, Souza CL (2014) Prevalence of unnecessary laboratory tests and related avoidable costs in intensive care unit. *Jornal Brasileiro de Patologia e Medicina Laboratorial* 50: 410-416.
2. Ramarajan V, Chima HS, Young L (2016) Implementation of Later Morning Specimen Draws to Improve Patient Health and Satisfaction. *Lab Med* 47(1): e1-e4.
3. Lee J, Maslove DM (2015) Using information theory to identify redundancy in common laboratory tests in the intensive care unit. *BMC Medical Informatics and Decision Making* 15(1): 1-8.
4. Ganapathy A, Adhikari NK, Spiegelman J, Scales DC (2012) Routine chest x-rays in intensive care units: a systematic review and meta-analysis. *Crit Care* 16(2): R68.

5. Hanson CA (2013) Laboratory Test Utilization Strategies. Mayo Clinic Mayo Medical Laboratories.
6. Ezzie ME, Aberegg SK, O'Brien JM (2007) Jr. Laboratory testing in the intensive care unit. *Crit Care Clin* 23(3): 435-65.
7. Benson AB (2012) Pulmonary Complications of Transfused Blood Components. *Crit Care Nurs Clin North Am* 24(3): 403-418.
8. Flabouris A, Bishop G, Williams L, Cunningham M (2000) Routine blood test ordering for patients in intensive care. *Anaesth Intensive Care* 28(5): 562-565.
9. Hallworth MJ (2015) Improving clinical outcomes - towards patient-centred laboratory medicine. *Ann Clin Biochem* 52(Pt 6): 715-716.
10. Ko A, Murry JS, Hoang DM, Harada MY, Aquino L, et al. High-value care in the surgical intensive care unit: effect on ancillary resources. *Journal of Surgical Research*.
11. Halpern SD, Becker D, Curtis JR, Fowler R, Hyzy R, et al. (2014) An official American Thoracic Society/American Association of Critical-Care Nurses/American College of Chest Physicians/Society of Critical Care Medicine policy statement: the Choosing Wisely(R) Top 5 list in Critical Care Medicine. *Am J Respir Crit Care Med* 190(7): 818-826.
12. May TA, Clancy M, Critchfield J, Ebeling E, Enriquez A, et al. (2006) Reducing unnecessary inpatient laboratory testing in a teaching hospital. *Am J Clin Pathol* 126(2): 200-206.