

# BLOOD DRAWING PRACTICES AND BLOOD LOSS FROM LABORATORY TESTS

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## KEY WORDS

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## ABSTRACT

In the Intensive care unit (ICU), arterial access lines can make phlebotomy easier and less painful for patients. With this ease of phlebotomy has come a perceived tendency toward ordering frequent blood tests by physicians, sending frequent blood specimens by nurses, and asking for resubmitted samples by the laboratory. This might lead to significant increases in the cost of a stay in the ICU. Laboratory tests can be an important source of blood loss in hospitals, especially for new borns and patients in intensive care. Anemia caused by repeated blood withdrawals is a common problem in hospitalized patients particularly those who are critically ill or rare receiving various medications. Laboratory persons also should look at the volumes and to make sure only the amounts that are necessary for the tests. Actual laboratory instruments use small amounts of sample, often in the range of 3 to 100  $\mu$ L, but it is common practice to draw full large-volume tubes, regardless of tests requested and amount of sample required. To conclude, blood loss from diagnostic tests could be reduced by newly developed selective analyzers, smaller sample volumes, blood saving collection techniques and to collect only the necessary amount of blood needed for tests.

## INTRODUCTION

Increased blood loss for laboratory testing seems to be primarily attributable to the increased number of analytes measured, an increased frequency of testing and easier collection with arterial and venous indwelling catheters (Silver *et al.*, 1993, Low *et al.*, 1995). Blood loss from diagnostic tests could be reduced by newly developed selective analyzers, smaller sample volumes and saving collection techniques, but recent reports claim that laboratory-related blood loss must not be underestimated, especially during long-term intensive care. (Dech and Szaflarski, 1996; Hicks, 1999, Mather, 2000). To inform the attending physicians properly, our daily laboratory report always indicated the current cumulative blood loss of each individual patient. A tendency may exist to increase blood tests, phlebotomy procedures, and blood loss when arterial lines are in place. In the Intensive care unit (ICU), arterial access lines can make phlebotomy easier and less painful for patients. With this ease of phlebotomy has come a perceived tendency toward ordering frequent blood tests by physicians, sending frequent blood specimens by nurses, and asking for resubmitted samples by the laboratory. This might lead to significant increases in the cost of a stay in the ICU. Laboratory tests can be an important source of blood loss in hospitals, especially for new borns and patients in intensive care. Anemia caused by repeated blood withdrawals is a common problem in hospitalized patients particularly those who are critically ill or rare receiving various medications. There are very few studies in teaching Medical College hospitals conducting a large number of patients to quantify blood loss for laboratory diagnostic tests. So our aim is to study large number of patients to obtain current data to

determine which department (ICU) and patient group (new born) are involving blood loss from laboratory tests.

## MATERIALS AND METHODS

The study was performed in a 700 bed teaching hospital of the Sir Lakshmi Narayana Institute of Medical Sciences (SLIMS), Bharath University, Puducherry. We estimated blood loss associated with laboratory testing data for 1000 patients.

## RESULTS

The difference between median and mean clearly verify an asymmetrical distribution of measured values. It should be noted that the estimation of blood loss by adding the volumes of the tubes used for blood collection does not account for the fact that not all containers were filled to normal capacity. No point of care testing was performed on the ward on the ICU, or in the operating rooms except for approximately 5000 capillary blood glucose tests/month. This equates to 500mL of whole  
**Table 1: Shows the blood loss data for all 1000 patients blood loss by laboratory tests**

Table 1	Mean	Median
Totals blood loss mL	52	21
Blood loss/day mL	6	5
Departmental (laboraty) wise blood loss		
Hematology, %	26	27
Biochemistry, %	45	46
Arterial Blood gas analysis, %(ABG)	3	0
Microbiology, %	19	18
Other lab analysis, %	12	0
No. of analysis's	16	6
No. of tests	25	14

blood and to a mean blood loss of 0.20 mL/patients. The amount of blood loss attributable to points of care testing can be neglected, but only under the conditions of our hospital. Sample transport from the intensive care units (ICU) and operating rooms is via a Pneumatic tube sample transport system. Blood loss was assessed in both treatment on the ward and intensive care, including intraoperative analysis.

## DISCUSSION

For our study reports are suggested that loss of 210 mL of blood ( $p < 0.001$ ) is not clinically critical for adults. 210 milliliters of whole blood is equivalent to the loss of 85mL of erythrocytes (Hematocrit, 40%). In the literature, no limit for not clinically critical blood loss can be found because such a not critical volume depends on many factors, *i.e.* Age, underlying disease.

Primary blood collection tubes are used for analysis, that analyzer dead volume is 100  $\mu$ L, and that the mean testing volume is 10-15  $\mu$ L, the calculated sample volume for three determinations amounts to 130 and / 250  $\mu$ L of run (Basel, 2002). According to the results of Dale and Pruett (1993), 46 times (2 to 108 fold) more than the necessary amount of blood is taken. Our data compared with published results (Eyster and Bemene, 1973; Silver *et al.*, 1993; Low *et al.*, 1995; Smoller and Kruskall, 1986) reveal a much lower diagnostic blood loss in our study (20 mL/day against 39-65mL/day). For samples, each of these 4.5mL of blood was drawn. A major reduction in the diagnostic related blood loss could be achieved by use of 2mL sample containers for repetitive clinical tests and reducing the sample volume for arterial blood gas analysis to 1mL.

Low birth new borns or patients with already existing anemia. Hicks (Hicks, 1999) study shows, the increase in elderly patients could be another reason to reduce laboratory related blood loss. The use of special collection containers in pediatric units led to a 50% reduction in the mean daily blood loss, but

according to the results of Smoller *et al.*, (Smoller *et al.*, 1989). Use of smaller containers did not affect the laboratory tests that are not medically indicated.

Blood loss seen in intensive care units, and to inform the physicians, our laboratory report always indicates loss of individual patient. It can't be good for the patient and it means biohazardous waste for the laboratory to dispose (Sainato, 1999).

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