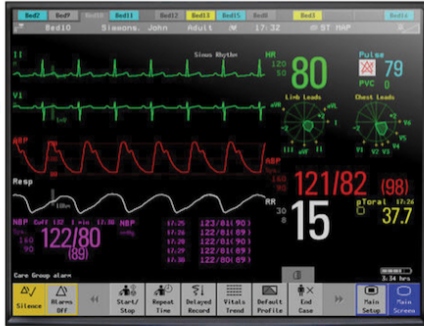


# Laboratory Sample Collection in the Operating Room

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## Background

Anesthesiology residents, CRNAs, and SRNAs at University Medical Center often draw blood for laboratory studies intraoperatively. Which labs are sent in which tubes is not part of the anesthesia training curriculum. While many of these clinicians are familiar with which tubes the more frequently submitted studies require, less experienced clinicians are unable to identify the correct tube. Furthermore, for less common studies, even the most experienced anesthesia practitioners have difficulty consistently selecting the proper tube for submission. This can be problematic as there are times when labs must be drawn without delay, and calling the laboratory to ask may divert the anesthesia practitioners' attention away from the patient.



## Aim

The aim of this project is to enable 100% of residents, CRNAs and SRNAs at University Medical Center to quickly and confidently select the correct tube for laboratory sample submission.

## Measures

The measure of this project is the percentage of correctly identified sample tubes by anesthesia practitioners. Pre-change and post-change surveys with a random assortment of lab studies serve as a way to assess clinicians' knowledge, and serve as a surrogate for actual lab sample submissions.

## Methods

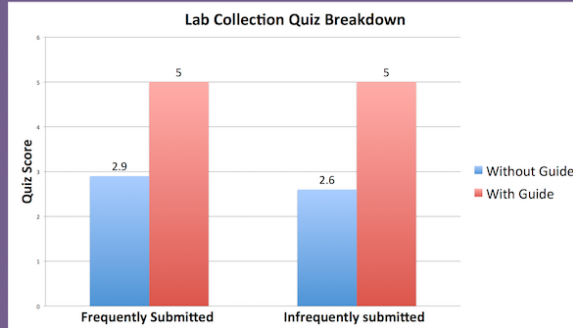
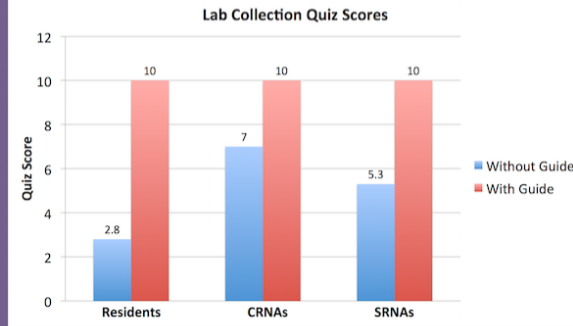
A list of which laboratory studies should be submitted in which tubes was obtained from the University Medical Center laboratory. From the list, an assortment of ten lab studies was selected to create a questionnaire.

### In which color tube are the following labs collected?

1. Type and screen
2. CBC
3. Fibrinogen
4. CMP
5. Troponin I
6. TEG platelet mapping
7. TEG citrated assay
8. CK
9. Lactate
10. PTH

This questionnaire was distributed to anesthesia providers at the UMC operating rooms, and answers were recorded and compiled. A laboratory sample collection guide was created and placed in each operating room. Anesthesia practitioners were given the same questionnaire with the guide as a resource, and answers were again compiled.

## Results



| Responder | Type and Screen | CBC | Fibrinogen | CMP | Troponin I | TEG Platelet mapping | TEG citrated assay | CK | Lactate | PTH | Total | Total with Guide |
|-----------|-----------------|-----|------------|-----|------------|----------------------|--------------------|----|---------|-----|-------|------------------|
| CRNA      | 1               | 1   | 1          | 1   | 1          | 1                    | 0                  | 1  | 1       | 0   | 8     | 10               |
| CRNA      | 1               | 1   | 1          | 1   | 1          | 0                    | 1                  | 1  | 1       | 0   | 8     | 10               |
| CRNA      | 1               | 1   | 1          | 0   | 1          | 0                    | 0                  | 1  | 0       | 0   | 5     | 10               |
| CRNA      | 1               | 0   | 1          | 1   | 0          | 0                    | 1                  | 0  | 1       | 1   | 6     | 10               |
| CRNA      | 0               | 1   | 1          | 1   | 1          | 1                    | 1                  | 1  | 1       | 0   | 8     | 10               |
| Resident  | 1               | 1   | 0          | 0   | 0          | 0                    | 0                  | 1  | 0       | 0   | 3     | 10               |
| CRNA      | 1               | 1   | 1          | 1   | 1          | 1                    | 0                  | 0  | 1       | 0   | 7     | 10               |
| SRNA      | 1               | 1   | 1          | 1   | 1          | 0                    | 0                  | 0  | 0       | 0   | 5     | 10               |
| Resident  | 0               | 1   | 0          | 1   | 0          | 0                    | 0                  | 0  | 0       | 0   | 2     | 10               |
| CRNA      | 1               | 1   | 1          | 1   | 1          | 0                    | 1                  | 1  | 1       | 0   | 8     | 10               |
| SRNA      | 1               | 1   | 0          | 1   | 1          | 0                    | 0                  | 1  | 0       | 0   | 5     | 10               |
| Resident  | 0               | 0   | 0          | 0   | 0          | 0                    | 0                  | 0  | 0       | 0   | 0     | 10               |
| CRNA      | 1               | 1   | 0          | 1   | 1          | 1                    | 0                  | 1  | 1       | 0   | 7     | 10               |
| CRNA      | 1               | 0   | 1          | 1   | 0          | 1                    | 0                  | 0  | 1       | 0   | 5     | 10               |
| CRNA      | 1               | 1   | 1          | 1   | 1          | 1                    | 0                  | 1  | 1       | 0   | 8     | 10               |
| SRNA      | 1               | 1   | 0          | 1   | 1          | 0                    | 0                  | 1  | 1       | 0   | 6     | 10               |
| Resident  | 0               | 0   | 0          | 0   | 0          | 0                    | 0                  | 0  | 0       | 0   | 0     | 10               |
| Resident  | 1               | 1   | 1          | 1   | 1          | 0                    | 1                  | 1  | 1       | 1   | 9     | 10               |

## Laboratory Sample Collection Guide

**Light Green Top:**  
Acetaminophen Level  
Amylase  
AST/ALT  
BMP/CMP  
Calcium  
CK (Total)  
CKMB  
Electrolyte Panel  
Gentamicin Level  
Haptoglobin  
Hepatic Function Panel  
LDH  
Lipase  
Magnesium  
Phenobarbital  
Phenytoin  
Phosphorus  
Potassium  
Renal Function Panel  
Salicylate  
Sodium  
Triglyceride  
Troponin I  
Uric Acid  
Vancomycin

**Dark Green Top:**  
TEG Platelet Mapping (ADP assay)  
Ammonia (must be on ice)  
Ionized calcium

**Pink Top:**  
ABO/RH  
Antibody Screen  
BNP  
Type and Crossmatch  
Type and Screen  
DAT  
Transfusion Reaction

**Lavender Top:**  
CBC  
ESR  
Hematocrit  
Hemoglobin  
Hemoglobin Electrophoresis  
Platelet Count

**Blue Top:**  
aPTT  
Factor VIII Assay  
Factor IX Assay  
Fibrinogen  
Heparin Anti-Xa  
Platelet Function Analysis (2 tubes)  
Protime – INR  
TEG Citrated Assay  
Thrombin time  
vonWillebrand Factor activity/antigen

**Red Top:**  
Drug Screen Mass Spec  
Lithium  
Osmolality – Serum  
PTH – Intraop  
T3/Free T4  
TSH

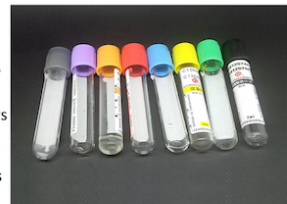
**Gray Top:**  
Lactic Acid (must be on ice)  
Volatile Compounds (methanol, ethanol, isopropanol, acetone)

**Bact/ALERT:**  
Blood Cultures - draw one aerobic and one anaerobic bottle

**Commonly Drawn Labs:**  
CMP / BMP / electrolytes – Light Green  
Type and Screen – Pink  
Type and Crossmatch – Pink  
CBC / H&H – Lavender  
TEG Citrated Assay – Blue  
TEG Platelet Mapping – Dark Green

## Conclusions

University Medical Center aims at providing excellent patient care, including vigilance in ensuring patient safety. One area of improvement in patient safety is with the quick and correct collection of laboratory samples intra-operatively by members of the Department of Anesthesiology. Initial education for members of the department as well as a readily available reference guide for laboratory samples can help facilitate safe, but efficient, patient care.



A laboratory reference guide has been placed in each operating room at University Medical Center. Discussion with staff and assessment of the frequency of incorrectly submitted samples will give further insight into the utility of the guide.