A Comparison of the Quality of Blood Specimens Drawn in the Field by EMS Versus Specimens Obtained in the Emergency Department

Authors: Gina Harrison, BS, RN, CEN, Karen Gabel Speroni, PhD, RN, Lisa Dugan, MSN, RN, CNA, BC, and Marlon G. Daniel, MPH, MHA, Leesburg, VA

CE Earn Up to 8 CE Hours. See page 90.

Introduction: Emergency Department (ED) acceptance of blood specimens drawn by Emergency Medical Services (EMS) staff is not a consistent standard of practice across hospitals. The literature does not address acceptance of pre-hospital phlebotomy specimens drawn by EMS staff. The purpose of this study was to compare specimen redraw rates and ED throughput times for specimens drawn by EMS versus ED staff.

Methods: Data was collected on 400 patients regarding phlebotomist type, intravenous (IV) site, IV angiocatheter size, number of IV attempts producing blood specimens, redraw reason, undue blood exposure to phlebotomist, diagnosis, and length of stay.

Results: In this study of 400 patients (EMS=200; ED=200), the redraw rate was higher for the ED group (11.5%) than the EMS group (9.5%). The primary reason for redraw in the EMS group was insufficient quantity (52.6%; ED=8.7%, p<.05). The primary reason for redraw in the ED group was hemolysis (52.2%; EMS=31.6%). Median ED throughput time was 17 minutes less for the EMS group (163 minutes) than for ED group (180 minutes). There were no incidences of undue blood exposure in either group.

Discussion: Based on no statistically significant differences between the two study groups in redraw rates, a decreased ED patient throughput time, and no undue blood exposure incidences, pre-hospital phlebotomy by EMS in the field and subsequent ED acceptance of samples is a standard of practice that can be implemented.

Key words: Blood specimen collection; Emergency Medical Services; Emergency department; Prehospital emergency care; Length of stay

When a patient arrives at the emergency department, accurate clinical data provided through laboratory test results facilitate timely diagnosis and treatment. The majority of patients who are brought to the emergency department by EMS require an intravenous line to be started en route to the emergency department. Some jurisdictions also allow EMS to obtain blood samples at the time of the intravenous line start.

The practice of accepting blood specimens drawn by EMS in the field has been the subject of a long-standing debate between ED and laboratory staff. The issues center on the quality of blood samples drawn by EMS, the accuracy of blood tube identification, and the possibility of undue blood exposure to EMS staff. The lack of literature and research to support either side of the debate created the need for this study.

According to EMS records, since 1979 in the county where the research described below was conducted, the performance of prehospital phlebotomy by EMS staff with the start of an intravenous line has been routine practice. Approximately 16% of the total patients seen in the hospital's emergency department arrive by ambulance. Of these patients, approximately 64% arrive with symptoms that

Gina M. Harrison, *Member, ENA Chapter 325*, is Management Coordinator, Emergency Department, Inova Loudoun Hospital, Leesburg, VA.

Karen Gabel Speroni is Director, Nursing Research, Inova Loudoun Hospital, Leesburg, VA.

Lisa Dugan is Chief Nurse Executive, Inova Loudoun Hospital, Leesburg, VA.

Marlon G. Daniel is Statistician, Inova Loudoun Hospital, Leesburg, VA.

This study was funded by Patient Care Services of Inova Loudoun Hospital, Leesburg, VA.

For correspondence, write: Gina Harrison, BS, RN, CEN, Emergency Department, Inova Loudoun Hospital, 44045 Riverside Pkwy, Leesburg, VA 20176; E-mail: Gina.Harrison@Inova.org.

J Emerg Nurs 2010;36:16-20.

Available online 13 February 2009.

0099-1767/$36.00

doi: 10.1016/j.jen.2008.11.001

meet EMS protocols for intravenous line therapy and laboratory testing. These specimens typically are drawn through the intravenous angiocatheter while the intravenous line is being started. Current hospital practice allows for prehospital blood specimens obtained by authorized EMS staff during intravenous line access to be processed by the laboratory. This practice is in part based on the assumption that acceptance of prehospital phlebotomy blood specimens allows for timelier laboratory results, thereby decreasing time to diagnosis and decreasing length of stay in the emergency department. From an evidence-based practice perspective, however, these outcomes had not been measured formally to support this practice.

At the time of the study design, a Medline and CINAHL literature review did not identify citations addressing quality of blood specimens collected by EMS versus ED staff. Some research has been done on factors associated with the quality of blood specimens in the emergency department.[1] However, no studies were identified that compared differences between EMS and ED staff regarding outcomes such as hemolysis rate, specimen re-draw rate, ED throughput time, and blood exposure incidences.

An informal survey of 20 emergency departments local to the hospital demonstrated that 50% currently are accepting blood specimens drawn by EMS. Those not accepting EMS blood specimens cited concerns such as undue risk of blood exposure to EMS staff and potential misidentification of blood samples.

While phlebotomy generally is considered a minimally invasive procedure, it is not without risk. Subjecting patients to unnecessary additional venipunctures upon arrival at the emergency department exposes the patient to increased risk of procedural complications such as inadvertent arterial puncture, nerve injury, thrombosis, and infection.[2]

The purpose of this study was to compare specimen re-draw rates and ED throughput times between 2 groups (EMS vs. ED). The hypothesis of this study is that there would be no significant differences in specimen re-draw rates and a shorter ED throughput time for the EMS group for which prehospital phlebotomy specimens were drawn in the field.

Methods

This prospective study was conducted over a 10-month period in 2007 in a 155-bed hospital with a 29-bed emergency department. The study was approved by an institutional review board. All patients were 18 years of age or older and were brought to the emergency department by county EMS. Blood specimens from emergency patients who had died were not included in this study. Study procedures were reviewed with emergency staff at study initiation meetings held prior to the start of the study.

A total of 400 patients meeting the eligibility criteria were classified into 1 of 2 groups (200 per group). Group 1 patients arrived in the emergency department via ambulance with blood specimens drawn in the field by EMS. Group 1 patients met standing intravenous line protocols. Group 2 patients arrived via EMS without blood specimens having been drawn but required blood specimens to be obtained upon arrival at the emergency department. Group 2 patients had a physician order for intravenous line placement and blood specimens.

All procedures conducted in this study were part of hospital standard operating procedure (SOP), and no changes were made in the laboratory procedures for processing blood samples. The hospital SOP for obtaining blood specimens from the intravenous line start site requires the specimen to be drawn through a minimum of a 22-gauge angiocatheter when possible and blood to be drawn through extension tubing into a syringe and transferred to blood tubes using a transfer device. Supplies used by EMS and ED staff for intravenous line start and blood specimen collection were the same with one exception, as Microtainer tubes were available for ED staff but not for EMS staff.

Hospital SOP was followed for patient verification, which requires using 2 patient identifiers. Patient labels were affixed immediately to blood specimen tubes drawn by EMS upon arrival at the emergency department. Specimens were sent to the laboratory via a pneumatic tube system. Blood specimens for blood typing, blood cultures, and specimens requiring icing were not drawn by EMS per hospital SOP.

Study data were collected on phlebotomist procedure factors, patient factors, and blood specimen–related factors. Phlebotomist procedure factor data collected included the following: phlebotomist type (registered nurse, licensed practical nurse, or patient care technician); collection site; intravenous catheter size; number of attempts producing blood specimens; reason specimens were not drawn by EMS; reason EMS specimens were discarded; reason for re-draw after specimen was sent to the laboratory (eg, specimen hemolyzed, insufficient quantity, specimen clotted, or repeat for critical values); and incidence of undue blood exposure to the phlebotomist. Patient factor data collected was admission and discharge complaint by body system, patient's dominant arm, and length of stay in the emergency department. ED throughput time was defined in this study as the time the patient was seen by ED physician to the time the physician determined disposition. Blood specimen factor