LEADERSHIP & PROFESSIONAL DEVELOPMENT

Judy A. Schreiber, RN, PhD • Associate Editor

Evidence-Based Practice for Obtaining Blood Specimens From a Central Venous Access Device

Sarah J. Mendez, MA, RN, AOCNS®

As part of a scheduled policy and procedure review, the department of nursing education at a large urban academic medical center conducted a literature review to determine the most up-to-date evidence for central venous access device (CVAD) blood draws. The literature review revealed that the dead space blood draw was the best practice methodology because the dead space methodology, defined as the point at which blood is in the attached syringe when aspirating without flushing, reduced the potential for infection with minimal blood loss from blood discard.

To ensure that all nurses were using evidence-based knowledge when drawing blood, the nursing education department at NYU Langone Medical Center developed a nursing competency based on the dead space blood draw methodology. While observing oncology nursing competencies for the new dead space method, the nursing staff's perception was that many laboratory values were unexpectedly skewed (i.e., electrolyte levels were either very high or very low). Hospital policy requires repeated testing for any abnormal values, which results in the drawing and wasting of more blood in direct contradiction to the rationale for practice modification.

A quality and performance improvement (QPI) project was initiated to determine the percentage of error with the dead space method. A secondary aim was to determine the appropriate hold time for IV fluid before obtaining the blood specimen, which addresses a gap in the literature regarding the appropriate time that IV infusions need to be held to ensure accuracy of laboratory results. The QPI project demonstrated that the dead space methodology had an error rate of less than 2% (see Table 1).

This article details a review of the literature that examined the level of evidence regarding four blood draw methodologies and describes the rationale for selection of dead space methodology, a description of a dead space procedure, and a QPI project conducted to determine error rate using the dead space methodology.

Background

Laboratory tests such as complete blood count (CBC) and basic metabolic panel (BMP) are an essential part of monitoring eligibility for, and response to, the treatment of patients with cancer. Pharmacologic interventions often impact these tests, causing a wide variation in results. According to Holmes (1998) and Adlard (2008), an adult patient can lose up to 96 ml of blood per week from 6 ml of blood being discarded prior to the obtainment of each blood specimen needed for analysis. Blood loss from multiple blood draws is a problem, particularly as it may induce or worsen anemia, resulting in blood transfusions. Hemoglobin level often is a deciding factor in the continuation of treatment and is frequently decreased because of chemotherapy regimens. Daily testing requires that the amount of blood wasted or discarded be kept at a minimum. For patients with cancer, transfusions may increase the risk of alloimmunization and febrile reactions. In addition, pediatric, frail, older, or heavily treated patients are at higher risk for complications associated with blood loss resulting from CVAD blood draws.

The best methods for blood collection reduce the risk of infections, occlusions, thrombus formation, and blood loss that require therapeutic interventions (Adlard, 2008; Cole et al., 2007; Cosca et al., 1998; Farjo, 2003; Frey, 2003; Holmes, 1998; Keller, 1994; Moureau, 2004). The focus of this article is to examine error rates using the dead space methodology among patients with cancer.

Blood Draw Methods

Blood draw methods identified in the literature include the discard method, the push/pull method, the reinfusion method, and the dead space method (Adlard, 2008; Farjo, 2003; Frey, 2003; Holmes, 1998; Moureau, 2004; Weigand & Carlson, 2005) (see Figure 1).

Literature Review

The literature was reviewed to determine the best method for blood draws among patients with cancer. The competency and standard of care are based on the evidence. This literature review included CINAHL®, MEDLINE®, Ovid, and PubMed databases with key terms including *central venous catheter, blood sample, blood specimens, central venous access devices,* and all combinations of those terms. The current QPI aims to address the gap in the literature about efficacies of blood draw methods among oncology-specific populations.

Adlard's (2008) review cited studies that reported discard volumes accounting for 24%–30% of blood loss among pediatric patients with cancer, resulting in the need for transfusions. Adlard found that 75% of the pediatric bone marrow transplantation (BMT) units reported using the discard method, 14% used the reinfusion method, and 11% used the push/pull method. Adlard pointed out that the selected blood sampling method varied among the units, and the studies were not designed with the rigor needed to be able to make inferences.