Determining the Minimum Discard Volume for Central Venous Catheter Blood Draws

Sheri Wyant, MSN, RN-BC, OCN®, and Rachael Crickman, MN, RN, AOCNS®, OCN®

This study aimed to determine the minimum discard volume from central venous catheters (CVCs) to avoid dilution or contamination from flush or IV fluids. In 93 adult patients with CVCs, minimum discard volume findings were 9 ml for tunneled and 6 ml for nontunneled catheters. Nurses who obtain samples from CVCs are uniquely positioned to minimize blood loss from sampling.

Sheri Wyant, MSN, RN-BC, OCN®, is a pain management clinical nurse specialist at the University of Washington Medical Center and Rachael Crickman, MN, RN, AOCNS®, OCN®, is an oncology clinical nurse specialist at Virginia Mason Medical Center, both in Seattle, WA. The authors take full responsibility for the content of the article. The authors did not receive honoraria for this work. No financial relationships relevant to the content of this article have been disclosed by the authors or editorial staff. Mention of specific products and opinions related to those products do not indicate or imply endorsement by the *Clinical Journal of Oncology Nursing* or the Oncology Nursing Society. Wyant can be reached at swyant@uw.edu, with copy to editor at CJONEditor@ons.org.

Digital Object Identifier: 10.1188/12.CJON.454-458

At an urban, tertiary teaching hospital in 2005, the laboratory staff observed a high rate of blood sample rejection because of contaminated samples drawn by RNs. In this article, contamination is defined as residual IV fluid or flush within the blood sample. The highest frequency reported in the hospital was from central venous catheters (CVCs). The common contributing factors were variable discard volumes (5–12 ml) and inconsistent nursing practice for blood sampling from CVCs. However, limited research was available on optimal blood sampling methods from CVCs in adults. The hospital at that time had a patient safety goal to reduce the rate of rejected blood samples with redraws to 0.3% or lower—the College of American Pathologists reported top performance among hospital laboratory blood sample rejection rates as 0.3% in 1997 and 0.28% in 2000 (Zarbo et al., 2002).

Literature and Guidelines

Relevant literature includes three methods of blood sampling: discard, push-pull (mixing), and reinfusion (Almandrones, Goldbold, Raaf, & Ennis, 1987; Clemence, Walker, & Farr, 1995; Franson, Ritch, & Quebbeman, 1987; Frey, 2003; Holmes, 1998; MacGeorge, Steeves, & Steeves, 1988; Mayo, Dimond, Kramer, & Horne, 1996; Odum & Drenck, 2002; Wannimolruk & Murphy, 1991). The purpose of the discard method is to remove potential contaminants of blood samples that reside in the catheter. That method includes withdrawing an initial volume of blood to clear the catheter dwell volume and then discarding that blood. Next, a vacutainer system or second syringe is attached to the CVC to collect the blood specimen. Despite nosocomial blood loss, the discard method remains the most widely used method for blood withdrawal from CVCs (Clemence et al., 1995; Frey, 2003).

Push-pull or mixing method is performed by attaching a normal saline flush syringe to the catheter, flushing the line and aspirating 5–10 ml of blood or infusate, and pushing the aspirate in and out multiple times (Frey, 2003; Holmes, 1998). After mixing and reinfusing the aspirate, the syringe is removed and a new syringe or vacutainer is applied and a laboratory sample is drawn for analysis (Frey, 2003; Holmes, 1998). This method helps to minimize blood loss, but the volume and number of times to push-pull varies in the literature, and concerns of sample hemolysis exist (Frey, 2003).

With the reinfusion method, the discard volume is aspirated into a syringe, set aside during blood collection, and then reinfused to the patient after samples have been collected. Although not commonly used, that method can prevent blood loss associated with repeat laboratory draws. Multiple concerns exist with the reinfusion method, including catheter contamination, clot formation, hemolysis, and clinician exposure to blood (Cosca et al., 1998; Frey, 2003; Holmes, 1998; MacGeorge et al., 1988). Therefore, little support exists for this method in clinical practice.

The six studies of discard method in adults reported in the literature had small sample sizes (4–30 patients) and varied in methodology, including use of 0.9% saline flush; volume of flush (2.5–10 ml); and discard volumes of 3–6 ml for complete blood counts and electrolytes, 3–5 ml for drug levels, and 10–25 ml for coagulation tests (Almandrones et al., 1987; Franson et al., 1987; Holmes, 1998; Mayo et al., 1996; Odum & Drenck, 2002; Wannimolruk & Murphy, 1991). Only one study tested discard method in all three types of CVCs (implanted ports, tunneled lines, and nontunneled lines) (Holmes, 1998).

Most guidelines and standards for discard volume from CVC blood draws recommend a flush of CVCs prior to laboratory specimen collection. The discard volume recommendations vary by (a) the dwell volume multiplied by a