Venous Access Devices: Obtaining Coagulation Tests in Adult Inpatients With Cancer

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Most patients with cancer require the insertion of a venous access device (VAD) during the course of cancer treatment. As a routine, heparin is instilled regularly into VADs to prevent clotting and maintain patency. Blood samples needed from patients with VADs usually are obtained from the devices by RNs according to established protocols. This practice limits unnecessary venipunctures, which can be uncomfortable for patients and, in some cases, very difficult because of the size and integrity of patients' veins. But when specific types of blood samples are required, such as those related to coagulation, the heparinized solution might affect results. To ensure accurate laboratory results, patients may have to undergo venipunctures.

Table 1. Spearman's Rank Correlation Coefficient Between VAD and Peripheral PT, INR, and aPTT

PERIPHERAL AND VAD	SPEARMAN CORRELATION	p*
PT 1	0.985	< 0.001
PT 2	0.986	< 0.001
PT 3	0.988	< 0.001
INR 1	0.985	< 0.001
INR 2	0.986	< 0.001
INR 3	0.988	< 0.001
PTT 1	0.974	< 0.001
PTT 2	0.975	< 0.001
PTT 3	0.967	< 0.001

INR N = 39; aPTT N = 37

*Obtained from testing the null hypothesis that no relationship exists between VAD and peripheral samples; $p < 0.05$ indicates a significant relationship.

aPTT—activated partial thromboplastin time; INR—international normalized ratio; PT—prothrombin time; VAD—venous access device

Palermo, Andrews, and Ellison (1980) concluded that after a 1.5 ml discard volume, accurate coagulation studies could be obtained from a heparinized VAD. Their sample size included only 12 subjects. Ellis (1993) discarded 5 ml prior to blood sampling in 25 subjects and found that accurate activated partial thromboplastin time (aPTT) results could be obtained from VADs if protamine was added to samples; this did not apply, however, to prothrombin time (PT) specimens.

A study by Mayo, Dimond, Kramer, and Horne (1996) (N = 20) concluded that PT, aPTT, and fibrinogen can be drawn from VADs after a 25 ml discard when the objective is to confirm normal coagulation, and that peripheral blood should be drawn for coagulation testing when a critical clinical decision is needed because heparin-free samples are difficult to obtain through heparinized double-lumen VADs. McLaren, Hanna, Mills, Bourdeau, and Cowin (2001) compared three methods of blood sampling for international normalized ratio (INR) values in hemodialysis patients. INR samples were obtained from a peripheral venipuncture site, the central venous catheter (CVC), and the arterial bloodline; variable amounts were discarded depending on the site and type of catheter. Results revealed no significant differences among the three results and concluded that the CVC line and the arterial bloodline are suitable for INR samples. In contrast, four other studies concluded that venipuncture was the only appropriate route for obtaining PT, aPTT, fibrinogen, and fibrinogen degradation products (Almadrones, Godbold, Raaf, & Ennis, 1987 [N = 30, discard 10 ml]; Barton & Poon, 1986 [N = 12, discard 0 ml, 10 ml]; Pinto, 1994 [N = 12, discard 6 x dead space volume]; van Genderen, Gomes, & Stibbe, 1994 [N = 14, discard 10 ml]). Hinds et al. (2002), in a study of 53 pediatric patients with cancer, found that PT, aPTT, and fibrinogen levels obtained from heparinized VADs after 3 ml, 6 ml, and 9 ml discards differed significantly from peripheral samples.

Because existing studies have been inconclusive with small sample sizes and have produced conflicting results, the Oncology Nursing Society (2004) recommended the use of peripheral blood for coagulation studies. Additional evidence-based studies are needed before VAD samples can be used for coagulation studies. Previous researchers have suggested that future studies be designed to include a larger discard volume and that the influence of continuous infusion be

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