CARESITE MICRO™ LUER ACCESS DEVICE (LAD):

Blood Clearance Test of the Needleless Connector

September 2023

Abstract

Blood frequently flows through needleless connectors. Aspiration for assessment of catheter patency, obtaining blood samples, and transfusion of blood and other solutions, is often performed through a needleless connector. The laboratory test for the presence of hemoglobin provides measurable data about the ability of clearing the CARESITE Micro Luer Access Device (LAD) of virtually all hemoglobin with two 1 mL flushes of normal saline.[1]

Background

Blood left to reside inside a needleless connector has the potential to increase the risk of bloodstream infection.[2] Therefore, it is important to ensure that all blood is flushed from the needleless connector. The CARESITE Micro LAD was tested by an independent laboratory to determine its ability to be cleared of blood with flushing procedures. This was determined by the measurement of hemoglobin, the oxygen-carrying protein attached to red blood cells.

Methods

The test system consisted of citrated rabbit blood, obtained from New Zealand White rabbit donors. Equal volumes of rabbit blood from at least three donors were drawn into 3.2% sodium citrate collection tubes, stored at 2-8° C, and used within 48 hours of collection. The blood was pooled prior to use, and a total of 10 CARESITE Micro LADs were tested. Each CARESITE Micro LAD (also referred to as a valve) was primed with 0.9% saline prior to blood exposure. A catheter was then attached to the male/distal end of the valve, and a syringe to the proximal/female end. The citrated blood sample was then aspirated through the catheter and valve and into the syringe. The syringe and catheter were then removed from the valve, and the proximal/female end of the valve was swabbed with 70% isopropyl alcohol for approximately 15 seconds and allowed to air dry.

The valve was then flushed by attaching a syringe containing 1 mL of 0.9% saline to the proximal/female end and flushing at a rate of approximately 1 mL/sec. The flush solution was collected in a sterile tube. The flushing step was then repeated four more times with a new syringe each time. Prior to each flush, the proximal/female end of the valve was vigorously swabbed for 15 seconds with 70% isopropyl alcohol and allowed to air dry.

Each flush from the CARESITE Micro valves was then vortexed to mix, and diluted with Cyanmethemoglobin Reagent (CMR), a stable reagent used to determine hemoglobin concentration. Each diluted sample was then allowed to incubate for 15 to 20 minutes at ambient temperature, and the amount of hemoglobin present in the samples was then measured using a spectrophotometer. This process is a standard laboratory process for measurement of hemoglobin.

[1] B. Braun Data on File

[2] Hadaway L. Needleless Connectors: Improving Practice, Reducing Risks. Journal of the Association for Vascular Access. 2011;16(1):20-33. doi:10.2309/java.16-1-4

Results

97% of the hemoglobin was removed from all test valves with a 1 mL saline flush. Nine of the test valves were completely cleared of hemoglobin after the second flush and showed no hemoglobin present in the third, fourth and fifth flush. One test valve was completely cleared of hemoglobin on the third flush and showed no hemoglobin present in the fourth and fifth flush.

Conclusion

The laboratory test for the presence of hemoglobin provides measurable data about the ability of CARESITE Micro™ LAD to clear hemoglobin with two 1 mL flushes of normal saline.

Discussion

Healthcare-associated catheter-related bloodstream infections remain a major cause of morbidity and mortality in the U.S. with tens of thousands of patients acquiring these infections each year.[3] The risks from both a clinical and financial standpoint are significant, including the elimination of enhanced reimbursement for these infections by the Center for Medicare and Medicaid Services and many health insurance carriers.[3]

Catheter maintenance procedures, such as cleaning needleless connectors and catheter flushing procedures, have been implicated as a source of intraluminal contamination resulting in the growth of biofilm causing these infections.[2] Thus, attention to the details of catheter use and maintenance is a critical part of patient care.

[3] Jarvis WR. Choosing the Best Design for Intravenous Needleless Connectors to Prevent Bloodstream Infections. Infection Control Today. July 28, 2010.

B. Braun Medical Inc. | Bethlehem, PA
1-800-227-2862 | bbraunusa.com