

# Safety of Extending Implanted Vascular Access Device Maintenance Flush Frequency

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**BACKGROUND:** Standards of care and guidelines acknowledge insufficient evidence that defines frequency of flushing for implanted vascular access devices (IVADs). Manufacturers recommend 4 weeks, but guidelines suggest that extending to 12 weeks is safe based on functionality.

**OBJECTIVES:** The study reviewed current standards of care for IVAD flush maintenance frequency, examined the characteristics of blood from IVADs by aspirating and observing contents prior to flushing when maintenance care is delayed beyond four weeks, and identified whether more research is required to determine optimal IVAD maintenance flush frequency.

**METHODS:** An outpatient oncology clinic gathered data related to IVAD flush frequency during the COVID-19 pandemic. The concern was potentially harmful substances being flushed into the patient. A new method was developed to allow for observation of physiologic characteristics within the IVAD. Abnormal-appearing substances aspirated from the devices were discarded prior to use.

**FINDINGS:** Visible clots and alterations in color and appearance were observed in 25% of the 59 patients observed between 8 and 17+ weeks when the IVAD reservoir was aspirated prior to flushing.

## KEYWORDS

port maintenance; guideline variations; flushing; oncology; standards of care; biofilm

## DIGITAL OBJECT IDENTIFIER

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**MORE THAN TWO BILLION INTRAVASCULAR DEVICES**, which are widely used in critical patients and patients with cancer, are inserted globally each year (He et al., 2019). Defining optimal maintenance protocols is difficult based on lack of consensus in the literature and standards of care through the Oncology Nursing Society and Infusion Nurses Society (INS). The Oncology Nursing Society cites that evidence is lacking to support a definitive practice related to implanted vascular access device (IVAD) maintenance flushing frequency. Current recommendations are labeled as controversial (Cope & Matey, 2017). Based on device trials, most manufacturer product brochures reference a four-week flush frequency to maintain functionality (Bard Access Systems, 2012). INS guidelines state that flushing as long as every 12 weeks is safe and effective to maintain patency (Gorski et al., 2021). The body of evidence related to flushing frequency is level IV evidence on a rating scale from I to V, with I being the highest level of evidence and V being the lowest (Gorski et al., 2021). Level IV evidence is based on consensus, case reports, quality improvement, theory, and descriptive studies (Gorski et al., 2021).

Studies showing multiple changes that may occur within the IVAD reservoir over time prompted this research. Physiologic changes cited in the literature include biofilm, bacteria, discoloration of stagnated heparin, and thrombosis formation (Dalton et al., 2014; Goossens, 2015). Biofilms are estimated to be the cause of 65% of diagnosed hospital infections in developed countries (Ielapi et al., 2020). Studies have confirmed that biofilm formation begins on implantation (He et al., 2019; Ielapi et al., 2020). Biofilm creates a potential for infections because of the ability of microorganisms encapsulated within to evade the immune system and develop antimicrobial resistance (Gabriel, 2020; Ielapi et al., 2020; Malek & Raad, 2020). As biofilm develops, a “sludge” may form, defined as a “slushy mass, deposits, or sediment . . . it appears to be the buildup of clotted blood, blood components, drug and mineral precipitates or residues, and lipids that adhere to or reside in the internal path of the reservoir” (Dalton et al., 2014, p. 23). Flushing intervals were not analyzed in the mentioned studies.

A study by Skelton et al. (2019) cites that the incidence of complications related to IVADs ranges from 7.2% to 32.1%. Late complications (greater than 30 days) include infection, venous thromboembolism (VTE), extravasation, and mechanical failure, with reported incidence rates of 1.9% to 17%. Infection and VTE have the highest rates, ranging from 2.3% to 22% and from 0.1% to 18%, respectively (Skelton et al., 2019). Despite estimated ranges of