



# Fundamentals of Flushing and Locking

Purpose, product and process

The following is for informational use and not intended to set or be a replacement of your hospital protocols or procedures.

# Purpose

The **Purpose** lesson provides an overview of:

- Flushing and locking
- The ACLs of flushing and locking
  - Assess
  - Clear
  - Lock
- Vascular Access Device (VAD) complications
  - Types and causes
  - Prevention and detection of complications
  - Flushing and locking



# Flushing and locking

## Flushing

The Infusion Nurses Society (*INS*) defines flushing as the act of moving fluids, medications, blood and blood products out of a VAD and into the bloodstream to assess and maintain patency and prevent precipitation due to solution/medication incompatibility.<sup>1</sup>



## Locking

Is the instillation of a solution into a VAD to maintain device patency.<sup>1</sup>

INS advises, "Do not use pre-filled flush syringes for dilution of medications. Differences in gradation markings, an unchangeable label on pre-filled syringes, partial loss of the drug dose, and possible contamination increase the risk of serious medication errors."<sup>1</sup>

# ACLs of flushing and locking<sup>2</sup>

A



**Assess** the status and function of the vascular access device to confirm location and patency

C



**Clear** medications and solutions from the vascular access device to avoid any incompatibilities

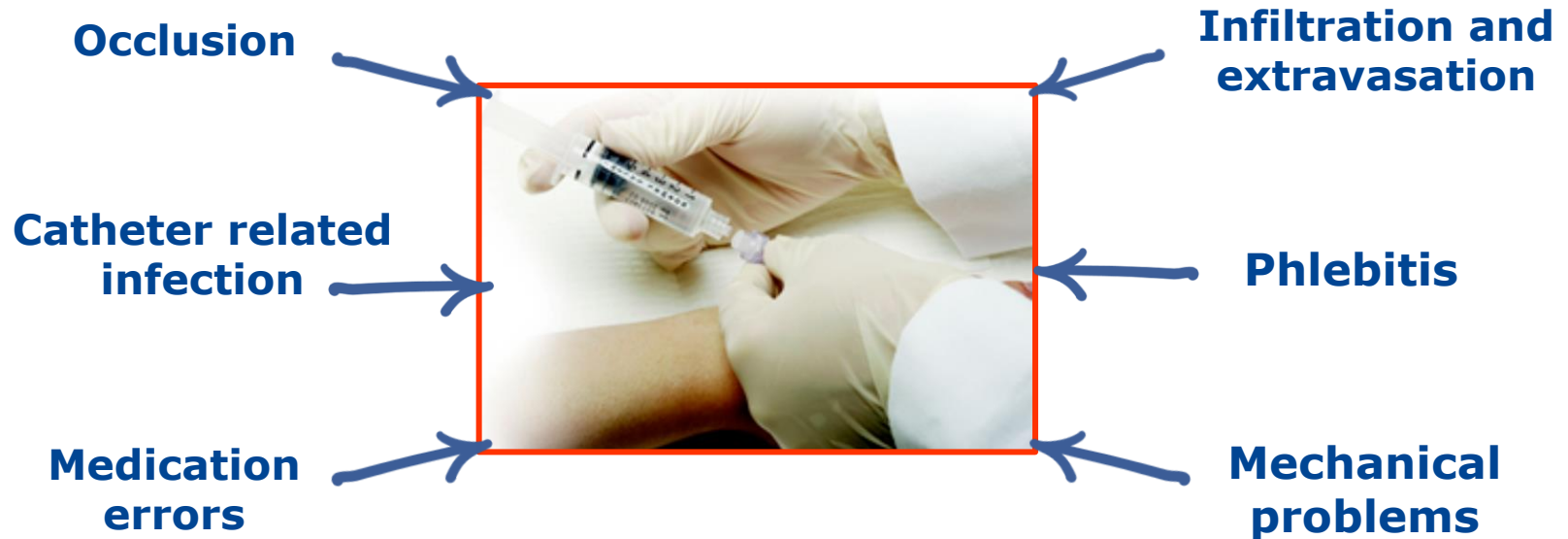
L



**Lock** the vascular access device during periods of nonuse to ensure patency

# VAD complications<sup>3</sup>

The use of VADs is associated with a variety of **complications**. Flushing and locking VADs can help prevent and detect VAD-related complications, including:



Complications related to VADs may lead to increased:

- Risks to the patient
- Patient care hours for nurses and physicians
- Costs to the patient and healthcare facility

# Process

Before flushing and locking a VAD, the following must be carefully **selected**:

- Method of infusion
  - Continuous infusions are administered at a consistent rate over a specific period
  - Intermittent infusions are prescribed when continuous fluids are not required and are administered over a specific period
- Type of VAD
- Infusion line connectors and adapters
- Flushing and locking solutions
  - Solution volumes
  - Solution containers
- Syringe size
- Catheter pressure

Know and follow facility procedures. Each facility may have different policies and procedures for flushing and locking VADS.

# Selection: Flush and lock solutions

VADs are indwelling catheters or cannulas used to obtain **venous access**. There are several types of VADs. The types of flushing solution and volumes used depend on the type of VAD being used.<sup>2</sup>

## Solutions used for flushing include:

- 0.9% sodium chloride
  - Preservative free
- Diluted heparin solutions
  - Heparinized saline

## Volume of saline used for flushing depends upon:

- The purpose of the flush
- The type of VAD
- Patient-specific considerations
  - Fluid restriction, etc.



The type of VAD used should be carefully matched to the infusion method/requirements for each individual patient.<sup>1</sup>



# Selection: Syringe

## Syringe **size** and **catheter pressure**<sup>4</sup>

- Intraluminal pressure rises when the force applied to the syringe plunger meets resistance inside the catheter lumen or vessel.<sup>4</sup>
  - This pressure can reach a level that causes catheter rupture.
- Infusion Nurses Society, *2016 Infusion Therapy Standards of Practice*, recommends to assess VAD functionality by using a 10 mL syringe or a syringe specifically designed to generate lower injection pressure (i.e., 10 mL diameter syringe barrel), taking note of any resistance.<sup>1</sup>
- BD PosiFlush™ Pre-Filled Syringes have a consistent 10 mL syringe barrel diameter which may help lower the risk of catheter damage caused by injection pressure.

Large-diameter syringe barrels generate smaller amounts of pressure compared to small-diameter syringe barrels assuming the same force is applied to the plunger.<sup>4</sup>

# Selection: Flush volume

Use a minimum **volume** equal to twice the internal volume of the catheter system, (e.g. catheter plus add-on devices) to **flush** the catheter system.<sup>1</sup>

3mL BD PosiFlush™ Saline Syringe

Add on Devices + Catheter

= Prime Volume

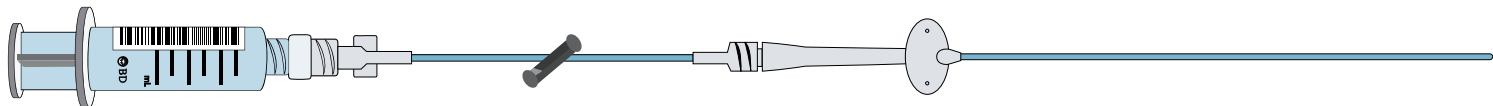
**x2** Prime Volume



Extension Set  
1.00 mL + 20 G Peripheral Catheter  
.10 mL

= 1.10 mL

**x2** 2.20 mL



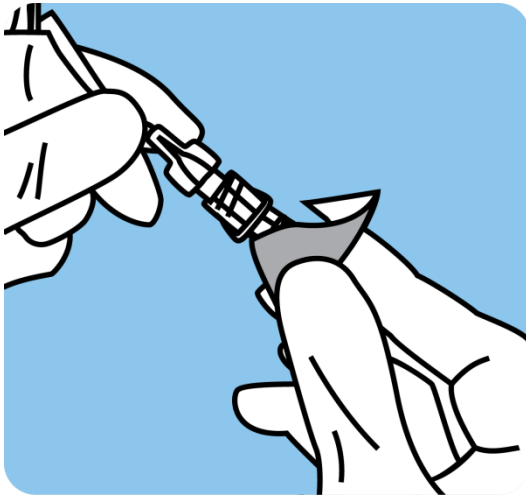
1.00 mL  
Extension Set + .33 mL Fr PICC

= 1.33 mL

**x2** 2.66 mL

# Disinfection

**Disinfecting** the surface of the connector before the connection of each syringe or IV set is a critical step in reducing the entrance of organisms into the VAD lumen.<sup>1</sup>



Infusion Nurses Society recommends the following best practice protocols for the disinfection of needleless devices:

- Perform disinfection of connection surfaces (i.e., needleless connectors, injection ports) before flushing and locking procedures.
- Use vigorous mechanical scrubbing methods even when disinfecting needleless connectors with antimicrobial properties.
- After disinfectant cap removal, multiple accesses of the VAD may be required to administer a medication and require additional disinfection before each entry.
- Consider using a vigorous 5 to 15 second scrub time with each subsequent entry into the VAD, depending upon the needleless connector design.
- Acceptable disinfecting agents include 70% isopropyl alcohol, iodophors, or >0.5% chlorhexidine in alcohol solution.
- Ensure that disinfecting supplies are readily available at the bedside to facilitate staff compliance with needleless connector disinfection.<sup>1</sup>

The BD PosiFlush™ SureScrub™ Pre-Filled Syringe enables clinicians to follow best practices and guidelines for disinfection of needleless connectors.



# Product

The **Product** lesson provides an overview of pre-filled flush syringes used to flush VADs, with a focus on the:

- BD PosiFlush™ Pre-Filled Syringe
  - Benefits of product portfolio
  - Features
  - Instructions for use



# BD PosiFlush™ Pre-Filled Syringe product portfolio

**BD PosiFlush™** Pre-Filled Syringes are available in several options:



## **BD PosiFlush™ Pre-Filled Saline Syringe**

3 mL, 5 mL and 10 mL have a consistent 10 mL syringe barrel diameter.



## **BD PosiFlush™ SF Normal Saline Syringe**

May be used on sterile fields and are provided in sterile packages.



## **BD PosiFlush™ Heparin Lock Flush Syringe**

Intended for maintenance of patency of vascular access devices.



## **BD PosiFlush™ SureScrub™ Pre-Filled Syringe**

Enables clinicians to follow best practices and guidelines for disinfection of needleless connectors.



# BD PosiFlush™ Pre-Filled Syringe features

BD PosiFlush™ Pre-Filled Saline Syringes are designed for flushing and locking of indwelling vascular access devices.

**Features** include:

- **Selection**

- Barcode on each syringe
- Bold print for clarity
- Proper medication labeling requirements
- 3 mL, 5 mL and 10 mL syringe availability to accommodate flushing volume needs

- **Preparation**

- BD PosiFlush™ Pre-Filled Syringes improve clinician efficiency and workflow by eliminating steps and time involved in the manual preparation of saline syringes
- Terminally sterilized SAL  $10^{-6}$
- Designed to prevent solution from entering a non-sterile area of the syringe



The BD PosiFlush™ Pre-Filled Syringe supports efforts to reduce the risk of medication errors by meeting Joint Commission and ISMP medication labeling guidelines.



# BD PosiFlush™ Pre-Filled Syringe features

- **Administration**

- BD PosiFlush™ Pre-Filled Syringes have a consistent 10 mL syringe barrel diameter which may help lower the risk of catheter damage caused by injection pressure.
- Latex and preservative free.

- **Disposal**

- Utilizing smaller sized (3 mL and 5 mL) BD PosiFlush™ Pre-Filled Syringes helps to reduce disposal waste.
- BD PosiFlush™ Pre-Filled Syringes are packaged in 100% recyclable shelf and case cartons.

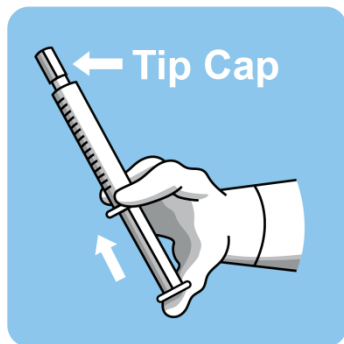


The use of BD PosiFlush™ Pre-Filled Syringes complies with major PICC manufacturer recommendations for flushing with a 10 mL syringe.

# BD PosiFlush™ Pre-Filled Saline Syringes

## Instructions for Use\*

- Tear open package at either end and remove syringe.
- Depress plunger with **tip cap on** to relieve the resistance between the stopper and the barrel. This step is known as “breaking the seal”.
- Disinfect the connector, per facility policy.
- Using an aseptic technique, remove the syringe tip cap from the FLUSH syringe by twisting it off.
- Hold the syringe upright and expel the air and any excess solution in the syringe by positioning the front rib of the gray plunger tip at desired solution volume.
- Attach the syringe to the injection site and flush, per facility policy.
- Discard used syringe, including any unused solution, per facility policy.
- DO NOT REUSE.



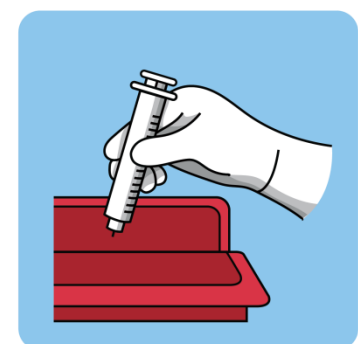
1.



2.



3.



4.

\*Not intended as a supplement to or a replacement for the Instructions for Use. Please consult BD product labels and package inserts for any indications, contraindications, hazards, warnings, cautions and instructions for use.





# BD PosiFlush™ Pre-Filled Saline Syringe Quiz

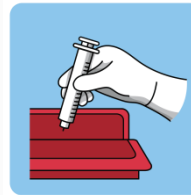
Order the instructions in the correct sequence from start to finish

1.



Depress plunger with **tip cap on** to relieve the resistance between the stopper and the barrel.

2.



Discard used syringe, including any unused solution, per facility policy.

3.



Hold the syringe upright and expel the air and any excess solution in the syringe by positioning the front rib of the gray plunger tip at desired solution volume.

4.



Using an aseptic technique, remove the syringe tip cap from the FLUSH syringe by twisting it off.

# References

1. Infusion Nurses Society. Infusion Nursing Standards of Practice. *Journal of Infusion Nursing*. 2016; S51,S68-69,S77-S79,S149-S151.
2. Hadaway, L. Principles of flushing vascular access devices. Franklin Lakes, NJ: Becton Dickinson, 2006: 6-8.
3. Helm R, Klausner J, Klemperer J, Flint L, Huang E. Accepted but unacceptable: peripheral IV catheter failure. *J Infus Nurs*. 2015 May-Jun;38(3):189-203
4. Macklin D. What's physics go to do with it? *Journal of Vascular Access Devices*. 1999;4(2):7-13.