

Annex 1. Questionnaire administered to nursing staff to evaluate clarity, applicability, and perceived usefulness of the PICC–Midline maintenance bundle.

**Questionnaire to be completed after reviewing the care bundle for the management of
PICC and Midline catheters (anonymous)**

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| 1) Are there patients with central venous access in your unit? | Yes | No |
| 2) Do you have a cart dedicated to dressing central venous catheters? | Yes | No |
| 3) Were you already familiar with the bundle? | Yes | No |
| 4) Were you already familiar with all the supplies described in the bundle and recommended for dressing CVCs and PICC/Midline catheters? | Yes | No |
| 5) Were you already familiar with all the steps/procedures described in the bundle and recommended for dressing CVCs and PICC/Midline catheters? | Yes | No |
| 6) Are all the necessary supplies available in your unit? | Yes | No |
| 7) Do you think it would be useful in your work to have a descriptive bundle with all the steps to simplify the entire procedure and avoid doubts and uncertainties? | Yes | No |
| 8) Do you think the bundle could be a valuable tool for managing central venous catheters, avoiding unnecessary or incorrect procedures? | Yes | No |

How prepared/updated do you consider yourself in the management of central venous and midline catheters?

Annex 2. PICC–Midline care bundle summarizing recommended materials and procedural steps for catheter dressing and access management and checklist (12 – 16).

1 – Wash your hands  Clean hands with a 4% chlorhexidine and alcohol-based gel for at least 30 seconds, or wash with antiseptic soap and water for at least 60 seconds before and after any catheter-related procedure.	6 – Apply the new Sutureless Skin Adhesive Device (SAC)  Apply the sutureless skin adhesive device to stabilize the catheter on the skin.
2 – Wear non-sterile gloves  At this stage, sterile gloves are not required—clean, non-sterile gloves are sufficient.	SecurAcath® Subcutaneous Anchor (SAS). Applied at the time of catheter insertion, this type of securement device remains in place throughout dressing changes and should only be removed when the catheter itself is removed. 
3 – Remove dirty dressing  Use a sterile technique. Take care when removing adhesive devices such as Biopatch or sutureless securement systems, but do not remove the SecurAcath® subcutaneous anchor (SAS).	7 – Apply the new semi-permeable dressing  Cover the site with a transparent, semipermeable dressing to protect the area and allow continuous inspection. Recommended options include a Biopatch® (slow-release chlorhexidine disk) or a transparent dressing with CHG gel. For pediatric patients, Exit Green® may be used to enhance bacterial capture at the exit site.
4 – Wash your hands again  After removing the old dressing, clean your hands again and wear sterile or clean gloves. Use a no-touch technique during the procedure.	8 – Protect the catheter access port(s) (HUB) - Washing and closing  Use needle-free connectors (NFC) with neutral pressure. Actively disinfect each connector with gauze soaked in 70% isopropyl alcohol for at least 15 seconds, and allow to dry for 30 seconds. Disinfection must be performed before and after every use. Port protectors containing 70% isopropyl alcohol can be applied to reduce line contamination; if not in use, replace them every 7 days.
5 – Inspect the catheter exit site  Use the visual exit-site score. Check for any signs of inflammation or infection (e.g., redness, swelling, discharge).  Perform antisepsis of the area. Use disposable disinfectant applicators: Chloraprep® (2% chlorhexidine and 70% isopropyl alcohol) or 2% chlorhexidine gluconate soap solution. Apply with circular movements using the no-touch technique for at least 30 seconds, and allow to air dry for another 30 seconds. Alternatively, 10% povidone-iodine may be used, allowing 120 seconds of drying time.	 

1- **WASH YOUR HANDS**

Proper hand and forearm hygiene using 4% chlorhexidine and/or alcohol-based gel for at least 30 seconds, or antiseptic soap and water for at least 60 seconds, before and after each procedure involving the central venous catheter. [Infection prevention and control](#)

2- **WEAR NON-STERILE GLOVES**

At this stage, it is not necessary to wear sterile gloves, but clean, non-sterile ones. Use a dedicated dressing kit and trolley containing barrier precautions for the operator (non-sterile gloves, gown, mask, and cap) and for the patient (sterile drape).

3- **REMOVE DIRTY DRESSING**

Perform the stretching technique starting from the edges, allowing air to enter beneath the dressing to facilitate removal and reduce the risk of catheter dislodgement. Take care when removing attached devices such as Biopatch® or sutureless securement devices, but do not remove subcutaneous anchors (SAS) such as the SecurAcath®, which is placed at the time of catheter insertion and should only be removed when the catheter itself is withdrawn.

4- **WASH YOUR HAND AGAIN**

Wear sterile or clean gloves and perform the procedure using a no-touch technique.

5- **INSPECT THE CATHETER EXIT SITE**

Use the Visual Exit-Site Score system to assess any signs of inflammation or infection (discharge, redness, or swelling). Perform **antisepsis of the area** with disposable disinfectants such as Chloraprep® or sterile gauze soaked in 2% chlorhexidine, applying it to the exit site with vigorous rubbing using the no-touch technique for 30 seconds, then allow to air dry for another 30 seconds. Alternatively, use 10% povidone-iodine and allow to dry for 120 seconds. The advantage of chlorhexidine gluconate is its residual antimicrobial activity on the skin for up to 48 hours, which is not deactivated by the presence of organic material.

6- **APPLY THE NEW SUTURLESS SKIN ADHESIVE DEVICE (SAC)**

Use devices such as StatLock®, Grip-Lok®, or WingGuard® to stabilize the catheter by securing it to the skin without sutures. The SecurAcath® subcutaneous anchor (SAS) is applied at the time of catheter insertion; it does not require routine replacement.

7- **APPLY THE NEW SEMI-PERMEABLE DRESSING**

The recommended dressings are transparent, semipermeable polyurethane adhesive films that are hypoallergenic and latex-free. They are impermeable to liquids, bacteria, and viruses, allowing continuous inspection of the exit site. Dressings with a bordered edge are preferred, as they offer greater stability. Their high breathability promotes optimal oxygenation and evaporation beneath the dressing. They should be replaced every 7 days or earlier if visibly soiled, loose, or wet. Gauze or premedicated dressings are indicated when increased absorbency is needed—such as in cases of heavy sweating, secretions, skin lesions, or local bleeding—especially within the first 24 hours after catheter insertion. They should be changed every 48 hours or as clinically indicated. If indicated, a Biopatch® absorbent hydrophilic polyurethane disk with continuous chlorhexidine release may be used as a barrier against extraluminal microorganism migration. It should be changed together with the dressing. Biopatch® disks are not recommended in children under 2 months; if needed, Exit Green® bacterial-capturing gauze—made of green acetate that traps bacteria—may be used as an alternative.

8- **PROTECT THE CATHETER ACCESS PORT(S) (HUB) - WASHING AND CLOSING**

Use needle-free connectors (NFC) with neutral pressure. Active disinfection must be performed before each access to the infusion line by vigorously scrubbing the connector for at least 15 seconds with gauze or wipes soaked in a disinfectant solution (2% chlorhexidine in 70% isopropyl alcohol) (Goraki et al., 2021). Passive and continuous disinfection of NFCs can be achieved by applying Port Protectors® containing a sponge saturated with 70% isopropyl alcohol. These should be replaced whenever the infusion line is disconnected and, if not in use, every 7 days (SHEA Guidelines, 2014). At the end of each infusion and after the administration of therapy, perform a pulsatile flush with 10 ml of sterile saline using 10 ml syringes to avoid excessive pressure. Whenever possible, use sterile prefilled 10 ml saline syringes. After the infusion of parenteral nutrition (PN) or contrast media (CM), flushing should be performed at least every 7 days if the line is not in continuous use. In pediatric patients, perform flushing with a saline volume equal to twice the internal volume (dead space) of the catheter under normal conditions, and four times the dead space after blood sampling, blood transfusions, parenteral nutrition with lipids, or contrast medium injection—always using 10 ml syringes.