Prevention of intravascular catheter related infections

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Version	Date	Changes from previous version	Drafted by
2.0	April 2026	Title change to prevention of intravascular catheter related infections. Scope updated to include peripheral vascular catheters, midline catheters and central venous access devices. Alignment to National Clinical Guideline no 30 on infection prevention and control	HSE AMRIC
1.0	September 2021	Procedure for the prevention of peripheral and central catheter related infection	HSE AMRIC

Contents

Introduction

Intravascular catheters, whilst having a significant role in therapeutic care, are a significant contributor to hospital acquired Staphylococcus aureus blood stream infection (SABSI) in the Heath Service Executive (HSE). Other common harms to people that have been directly attributed to the presence of an intravascular catheter include blood stream infection related to other microorganisms, extravasation, tissue damage, local site infection or inflammation. Intravascular catheter related blood stream infections (BSIs) and related infections are mostly preventable if appropriate infection prevention and control (IPC) precautions and practices for safe insertion, maintenance, access, and timely removal are followed accurately (WHO 2024).

Purpose

The purpose of this document is to provide healthcare professionals with evidenced based guidance on fundamental infection prevention and control (IPC) practices to reduce the risk of infection related to intravascular devices, thereby enhancing patient safety and quality of care. Intravascular catheters or devices referred to in this guidance include peripheral venous catheters (PVC), midline catheters (MC) and central venous access devices (CVADs).

This guidance replaces the procedure for prevention of peripheral and central venous catheter related infection published in 2021. This guidance has been reviewed and updated in 2026 to reflect best international practice guidelines and to include best practices in preventing infection for intravascular devices.

This document should be used in association with the “National Clinical Guidance No. 30 Infection Prevention and Control”, which is available at the following link www.gov.ie/IPCclinicalguideline.

All HSE staff are required to complete mandatory hand hygiene training (HSeLanD module) on induction and every 2 years. In addition to this, it is recommended staff complete the eLearning modules on standard precautions, prevention of peripheral and central venous catheter related infections and aseptic technique every 2 years. A detailed list of all the AMRIC modules is available in the AMRIC Hub at www.HSeLanD.ie.

NOTE: The term intravascular catheter or device may be used interchangeably in this document and refers to the types of intravascular devices described in table 1.

Scope

This guidance is intended for use by all HSE staff responsible for the insertion, maintenance, access and removal of intravascular devices where healthcare is provided. Health and Social Care services outside of those directly delivered by the HSE may use this guideline as a reference to support locally developed guidelines.

This guidance applies to all people including adults and children for whom the use of an intravascular device is considered. This national guidance should be used in conjunction with local clinical guidelines and protocols, in particular special patient populations where there are specific management strategies relating to their device for whom local departmental or specialist guidance should be used.

Whilst this document does not specifically address all intravascular devices described in **Table 1** in detail, for example peripheral arterial catheters or implantable ports, the principles detailed in this guidance apply to prevention of infection in the insertion, maintenance, access and removal of all intravascular devices.

The administration of medicinal products is outside the scope of this guidance. Refer to relevant local and national medication protocols and guidance.

The manufacturer's instructions for use should be reviewed and followed for individual catheters, connections, administration sets, dwell times and compatibility with antiseptics, medication, and other fluids.

Minimising the risk of infection from intravascular devices

Intravascular catheters fall broadly into two categories: those that are inserted into peripheral blood vessels (veins and arteries), and those that are inserted into central blood vessels (Table 1).

Table 1 Main types of intravascular devices

Catheter type	Features	Common use	Duration
Peripheral venous catheter (PVC)	Single lumen Most commonly placed in veins of forearm or hand	Administration of intravenous fluid, blood and medication	Short-term
Midline catheter (MC)	Peripheral (does not enter central veins). Commonly placed in proximal basilic or cephalic veins via the antecubital fossa	Administration of intravenous fluid, blood and medication	Short- term 1-4 weeks
Peripherally inserted central venous catheters (PICC)	Inserted into basilic, cephalic or brachial veins and enter the superior vena cava	Administration of fluid and medication including chemotherapy, parenteral nutrition, blood sampling	Medium-term 4 weeks to 6 months
Non-tunnelled central venous catheter (nt CVC)	Single and multiple (up to five) lumens Percutaneously inserted into subclavian (preferred), internal jugular or femoral veins (less preferred)	Administration of intravenous fluid, blood and medication Access/blood sampling Multi-lumen catheters used for administration of parenteral nutrition	Short-term up to 7–10 days
Tunnelled central venous catheters (t CVC)	Image guided or surgical placement Implanted into subclavian (preferred), internal jugular or femoral veins (less preferred).	Frequent long-term access Parenteral nutrition Transfusion Haemodialysis Blood sampling	Long-term months/ years
Implantable device (port/catheter)	Image guided or surgical placement Tunnelled beneath skin and have a subcutaneous port accessed with a needle. Implanted into subclavian or internal jugular vein	Single or double lumen Infrequent access on a long-term basis	Long-term months/ years
Peripheral arterial catheter (PAC)	Single lumen, large calibre Most commonly placed in radial artery as the preferred site; alternatives are femoral, axillary, brachial and posterior tibial arteries	Haemodynamic monitoring and/or access/blood sampling in critically ill patient	Short-term

Adapted from H. P. Loveday *et al* 2014 (EPIC 3 guidelines 2014)

There is a risk of infection when an intravascular catheter is inserted and while it remains in place in a patient. This risk is due primarily to the intravascular catheter and the direct access of microorganisms (via the intravascular catheter) into the blood vessels, bypassing the skin, which is an important barrier. The longer an intravascular catheter is

left in the person, the higher the likelihood that it will become colonised by microorganisms. The microorganisms that colonise catheter hubs and the skin adjacent to the insertion site are the source of most intravascular catheter related BSIs.

The IPC practices detailed in this guidance are aimed at:
1. minimising the risk of infection associated with intravascular catheters by the practice of insertion only where there is a clinical indication
2. prompt removal when no longer required
3. where intravascular catheters are in place ensuring they managed appropriately.

Targeted evidence-based practices to prevent or minimise the number of microorganisms introduced at the catheter site include:

- disinfection of the skin prior to insertion, and disinfection of catheter hubs at every access to remove potentially harmful microorganisms that normally colonise the skin and catheter hubs
- use a catheter dressing to prevent access of microorganisms into the insertion site
- use standard precautions to minimise risk of microorganisms being brought to the insertion site and catheter hub on health and care worker (H&CW) hands and equipment, for example, while preparing or administering intravenous (IV) medications or IV fluids with particular emphasis on hand hygiene and aseptic technique.

Standard Precautions

Standard precautions are the minimum set of practices required when providing care to patients and ensure a fundamental level of IPC. Standard precautions are used by healthcare workers to prevent or reduce the likelihood of transmission of microorganisms from one person or place to another and to render and maintain objects and areas as free as possible from infectious microorganisms.

For intravascular device management (insertion, care, access and removal) particular focus on hand hygiene and aseptic technique is of importance and is detailed in this document.

Further details on the individual elements of standard precautions including aseptic technique and hand hygiene refer to the National Clinical Guideline No. 30 Infection Prevention and Control (NCG no 30 on IPC) Volume 1, available at: www.gov.ie/IPCclinicalguideline

Hand hygiene

Hand hygiene (HH) must be performed with alcohol-based hand rub (ABHR) or soap and water if hands visibly soiled using the correct technique at the point-of-care and must

follow the “My 5 Moments for Hand Hygiene” approach to care delivery as outlined by the World Health Organization, WHO 2009, and the NCG no 30 on IPC.

H&CWs need to consider individual actions to promote good hand hygiene practice, which includes the following:

- cuts and abrasions on the hands of H&CW should be covered with a waterproof dressing
- hand and wrist jewellery should not be worn while on duty, except for one plain band (for example a wedding ring) and this should be moved about on the finger during hand hygiene practices. In high-risk settings such as operating suites or rooms, no jewellery (even a plain band), should be worn
- wrist jewellery should not be worn, this includes wrist watches, fitness bracelets and fitness trackers such as activity trackers
- nails should be kept clean and short. Nail polish/ acrylic/ gel, nail art or false nails should not be worn by H&CWs while on duty
- short-sleeved clothing should be worn when delivering care, as this ensures hands can be decontaminated effectively. This concept is widely referred to as ‘bare below the elbows”. Some H&CWs may wish to cover their forearms. In this case, the minimum requirement is that the forearm is bare for about 5 to 10 centimetres above the wrist when working in service user care areas to ensure that clothing does not interfere with performance of hand hygiene. For this reason, the expression “bare above the wrists” may be preferred
- Regular use of an emollient hand cream product is recommended.

Specific to intravascular device insertion and management strict adherence to hand hygiene (with appropriate product and technique as per level of aseptic technique) must be performed before and after:

- device insertion
- inspection/ palpation of insertion sites
- accessing the intravascular device (including direct and indirect access, such as changing IV fluid bags)
- dressing changes
- device removal.

Hand hygiene is still needed when gloves are worn and should be performed immediately before putting on gloves and immediately after removing gloves.

Aseptic Technique

Aseptic technique protects patients during invasive clinical procedures such as intravascular catheter insertion and during intravascular device maintenance, access, and removal. Aseptic technique aims to prevent microorganisms on hands, surfaces or equipment from being introduced into a susceptible site. Aseptic technique is used to prevent contamination of key parts (for example the part of an intravenous catheter that will be within the vein) and key sites (the location on the body where the catheter will be

introduced into the vein) by microorganisms. Aseptic technique, when performed correctly helps to:

- minimise contamination of key parts and key sites
- protect patients from their own microorganisms that may cause infection
- reduce transmission of microorganisms
- maintain the sterility of equipment and key parts used for aseptic procedures.

Principles of aseptic technique are:

- sequencing of actions and procedures, including performing a risk assessment
- environmental controls
- hand hygiene
- the correct use of personal protective equipment (PPE) (sterile and non-sterile)
- maintenance of aseptic fields
- non-touch technique.

Sequencing

Aseptic technique practice is sequenced to ensure an efficient, logical and safe order of procedure events. Risk assessment is required for the type of aseptic technique to be used, standard or surgical.

There are 2 levels of aseptic technique

Standard aseptic technique may be used for a procedure that:

- is technically simple
- is short in duration, i.e. lasting less than approximately 20 minutes
- involves small key sites and equipment with a small number of key parts.

Standard aseptic technique requires a main general aseptic field and typically nonsterile gloves. A risk assessment is required for the use of sterile or non-sterile gloves. If the procedure can be performed without touching the key parts and key sites, then non-sterile gloves can be used. If it is necessary to touch key parts or key sites directly sterile gloves are used to minimise the risk of contamination. The use of critical micro-aseptic fields and aseptic technique is essential to protect key parts and key sites. Standard aseptic technique is used for procedures such as PVC insertion, accessing intravascular devices and dressing changes.

Surgical aseptic technique is used if procedure:

- is technically complex
- may take longer than 20 minutes
- equipment has a large number of key parts
- sterile field needs to be managed critically, for example only sterile equipment can be in contact with it.

Surgical aseptic technique requires a main critical aseptic field, sterile gloves and maximum sterile barrier precautions. Surgical aseptic technique is required for procedures such as midline catheter and CVAD insertion.

Environmental Control

Consider environmental control prior to aseptic procedures.
To minimise airflow disruptions, ensure that there are no avoidable nearby environmental risk factors, such as cleaning around the bed space, bed making or patients using commodes. If possible, the door should be closed, and in case of a central line insertion, a sign to alert possible entrants that a procedure is ongoing in the room.
A CVAD or MC should be inserted in a clinical area where asepsis can be maintained, for example in radiology suites or in intensive care units, or operating theatres, and where the patient, where required, can be appropriately monitored for example with heart monitoring, pulse oximetry, blood pressure.

Hand hygiene and aseptic technique

Effective hand hygiene is an essential component of aseptic technique. For procedures using standard aseptic technique such as PVC insertion or accessing intravascular devices, hand hygiene should be performed as above with ABHR or soap and water if hands visibly soiled) at point of care, immediately before and after the procedure and on removal of PPE. For procedures such as MC and CVAD insertion requiring surgical aseptic technique, a surgical hand rub or surgical hand scrub is required prior to putting on maximum sterile barrier precautions and on removing PPE (Table 2).

Table 2 Recommended aseptic technique and hand hygiene for intravascular device insertion

Procedure	Aseptic technique	Hand Hygiene
PVC	Standard	ABHR or soap and water if hands visibly soiled
MC	Surgical	surgical hand rub with ABHR or surgical hand scrub with antimicrobial soap and water
CVAD	Surgical	surgical hand rub with ABHR or surgical hand scrub with antimicrobial soap and water

Personal Protective Equipment (PPE)

PPE selection as per standard precautions and is based on a point of care risk assessment (PCRA) (Appendix 8).

Maximum sterile barrier precautions

Maximum sterile barrier precautions are used for surgical aseptic technique and are recommended during MC and CVAD insertion procedures (and in exceptional circumstances of need when a catheter needs to be exchanged over a guidewire).
Maximum sterile barrier precautions include:

- a surgical mask, cap, sterile gown and sterile gloves worn by all staff (clinician and assistant) involved in the insertion procedure

- the patient is covered with a large full body sterile drape covering whole bed on at least two sides closest to the operator during catheter insertion.

Staff assisting/ observing in the procedure (having received appropriate training on the procedure being performed, aseptic technique and maximum sterile barrier precautions), should observe for and advise/ bring forward concerns of any breaches in sterility or deviations from checklist, during the procedure to support best practice.

When adherence to aseptic technique cannot be ensured (for example intravascular devices inserted during a medical emergency), replacement should be considered as soon as is possible (within 24 hours) unless there is a compelling clinical reason not to do so.

Non-touch technique

Identifying key parts and key sites and not touching them directly or indirectly is a vital component of achieving asepsis. That is, to protect a key part from contamination, avoid touching it where possible, even when wearing sterile gloves, as sterile gloves can become contaminated.

Maintenance of aseptic fields

Aseptic technique employs two types of aseptic fields, general (used in standard aseptic technique) and critical (used in surgical aseptic technique), and are important to provide a controlled aseptic working space to help promote or ensure the integrity of asepsis during the clinical procedure.

Equipment

Use a pre-assembled PVC insertion pack where one is available. Pre-assembled PVC insertion packs should generally be available in acute hospital settings or other settings in which insertion of a PVC is frequently required.

MC and CVAD placement packs or a procedure trolley containing all the necessary equipment and sterile items for aseptic insertions should be available and easily accessible in all units/ departments where MCs and CVADs are inserted. The use of an insertion checklist may help to ensure adherence to optimal infection prevention and control practices (Appendix 6).

Where no preassembled pack is available, gather all necessary equipment.

Ensure procedure tray/ trolley has been cleaned/ disinfected and is dry before and after every use.

If at any time a piece of equipment may have become contaminated discard it immediately and replace it maintaining sterility.

Where ultrasound guided or vein visualisation technology is utilised, sterile ultrasound probe covers and sterile single use ultrasound gel sachets are recommended and the cleaning and disinfection of ultrasound probes/transducers as per manufacturer's instructions after every use.

Skin preparation

It is critically important that attention is paid to correct skin preparation prior to the insertion of an intravascular device to prevent potential introduction of microorganisms into the body.

The person's skin should be physically clean. If the skin is visibly dirty, it should first be washed with soap and water and allowed to dry fully.

Optimal location for CVAD insertion is an area without significant hair growth. However, if there is hair at the insertion site this should be removed prior to skin disinfection using clippers (not shaving) to improve adherence of the dressing.

The use of 2% chlorhexidine gluconate and 70% isopropyl alcohol is recommended for skin disinfection prior to intravascular device insertion, for site disinfection at dressing changes and prior to accessing the catheter hub ('*scrub the hub'*).

For skin disinfection prior to intravascular device insertion, a single patient use applicator solution of 2% chlorhexidine gluconate and 70% isopropyl alcohol is recommended. Ensure manufacturers' recommendations are followed for application and drying times, and that products are in date. Povidone iodine 10% in alcohol may be used as an alternative for skin disinfection if the patient has a history of allergy to chlorhexidine.

Allow the disinfected skin to fully dry before inserting the intravascular device. Ensure not to re-palpate the chosen vein or touch the skin after application of skin disinfectant, unless aseptic technique is maintained. Where sterile gloves are not used and if the insertion site is re-palpated (for example to confirm anatomy during PVC insertion), skin disinfection must be repeated.

Note: Use of chlorhexidine

No recommendation can be made for the safety or efficacy of chlorhexidine in infants aged less than 2 months. If used in neonates, preterm infants, especially those born before 32 weeks of gestation and within the first 2 weeks of life it should be used with caution. The use of chlorhexidine solutions, both alcohol based and aqueous, has been associated with chemical burns in this age group when used for skin antisepsis prior to invasive procedures.

Healthcare workers should be aware of the risk of chlorhexidine allergy including the rare risk of true anaphylaxis and should question patients on any known allergies prior to use.

Note: Non-sterile wipes should not be used for intravascular device insertion, care and management.

The principles of prevention of infection in the insertion, maintenance, access and removal of intravascular devices are presented under the following sub-headings:

Requirement for an intravascular device
Communication with the patient/ guardian
Competence to insert an intravascular device
Device and site selection
Insertion of an intravascular device
Maintenance and accessing an intravascular device
Removal of an intravascular device removal
Patient education
Documentation, audit and surveillance

Requirement for an intravascular device

Intravascular devices should only be inserted when there is a clear indication for their use. Clinical assessment of the person should be undertaken prior to the insertion of an intravascular device**.**

The following should be considered:

- indication for an intravascular device and type of therapy
- anticipated duration of therapy
- clinical condition (acute/ chronic/ emergency) of the person
- condition of the person's veins
- history of bleeding disorders or anticoagulation therapy
- the safety and practicality of care of the intravascular device in the context of the person's placement in the hospital (for example patients with a CVAD in place should be cared for in clinical areas where staff are expert in their use and care)
- the safety and practicality of insertion and care of the intravascular device in the context of the person's understanding and behaviour.

Note: For patients requiring antimicrobial therapy, oral antimicrobial therapy should be prioritised over intravenous therapy whenever possible. Oral antimicrobial therapy has many advantages, including reduction of the risk of bloodstream and catheter-related infections as a result of not inserting an intravascular device for this purpose only. Even

in a patient with a PVC in place for other reasons the risk of infection is likely to be reduced if the PVC is accessed as little as possible.

In line with HSE AMRIC intravenous to oral switch (IVOS) toolkit :

Most infections can be managed safely and effectively using the oral route.

For antimicrobials with excellent oral bioavailability (for example ciprofloxacin, clindamycin, co-trimoxazole, fluconazole, fusidic acid, metronidazole) the oral route should be used from the outset, once the oral route is considered reliable.

IVOS should be considered within the first 24 - 48 hours of the first dose of IV antimicrobial being administered, or before if patient is responding to treatment and clinically improving. If IVOS does not occur within the first 48 hours, a daily review thereafter should be undertaken with documentation of the treatment plan.

When reviewing a patient's antimicrobial for an IVOS, it should be considered if antimicrobial therapy is still indicated. If it is no longer indicated, for example if an infection has been ruled out, antimicrobial therapy should be stopped.

If, after review of above and potential for oral therapies, venous access is still needed for long term therapy (7-14 days or longer) consider if insertion of a midline catheter or peripherally inserted central catheter may be more appropriate, or if difficult IV insertion, consider intravenous (IV) care team involvement where available.

Multiple PVC insertion attempts increase risk of infection; to avoid this each healthcare facility should have a documented escalation pathway, and a process for selecting the appropriate device for the right patient (for example those described in vessel health and preservation frameworks (Infection Prevention Society (2020)), and to identify people with difficult vascular access early so that they are referred to the appropriately skilled inserters or IV care teams (where available).

The use of vein visualisation technology or ultrasound for PVC insertion may be helpful in specific patient subgroups where intravascular cannulation may be difficult (for example, a person who injects drugs, a person with burns, persons who may be oedematous, persons receiving chemotherapy). This may avoid need for central line which has a higher infection risk compared with peripheral lines.

The indication for insertion of the intravascular device should be documented in the patients' healthcare record/ clinical notes.

Clinical indications for PVC insertion include:

- an **immediate plan** to administer IV fluids or IV medication which cannot be delivered orally and are suitable for infusion via the peripheral route
- an **immediate risk** of rapid deterioration of the person's condition that may require vascular access.

A PVC should **not** be inserted:

- as a routine practice in all people accessing a service; for example, a PVC **should not be routinely inserted** for all patients attending the emergency department, but only where it is clinically indicated described as above
- for the purpose of blood sampling alone (blood cultures should not be taken through a PVC unless required at time of insertion)
- in anticipation that there may be a requirement for IV fluids, IV medication or intravenous contrast arising from subsequent assessment.

A midline catheter may be considered appropriate for:

- patients undergoing intravenous (IV) therapy for more than seven days and up to 28 days, and where the required IV therapy is suitable for peripheral administration.

If central administration is required for medication or infusion administration, for example total parenteral nutrition (TPN), then a peripherally inserted central catheter (PICC) or central venous catheter (CVC) should be considered.

Requirement for a CVAD include but are not limited to the following:

- infusion of cardiovascular support medication
- haemodynamic monitoring
- high volume fluid resuscitation
- administration of TPN
- haemodialysis
- poor peripheral venous access
- IV administration of hyperosmolar and irritating solutions and solutions of alkaline pH, which may cause endothelial damage and subsequent phlebitis and thrombus formation (for example, chemotherapy, vesicants).

The H&CW inserting the device should choose an appropriate CVAD considering the catheter type and size/ number of lumens required, duration of access, type of therapy, site for insertion, risk of complications including infection and patient factors. Vein to catheter ratio may also be considered.

Communication with the patient/ parent or guardian

Discuss the procedure with the patient and other relevant persons (for example parent or guardian) as appropriate to the clinical context and obtain consent. For paediatric intravascular device insertions, explain the procedure to the child as appropriate to the child's age and understanding. When obtaining consent, all HSE staff must follow the HSE Consent Policy as applicable.

Establish the person's venous history and any relevant status (for example pre-existing intravascular devices, anatomical abnormality, factors that influence choice of site such as arterio-venous (AV) fistula or disturbance of lymphatic drainage).

Check if the patient has any known allergies to skin preparations and adhesive materials and document any allergies reported in their healthcare record/ clinical notes.

Provide information on symptoms of harm related to the intravascular device and encourage the person to alert healthcare staff to any changes or concerns they may have regarding their intravascular device.

Allow opportunities to voice any concerns, express any preferences or ask any questions if possible. Answer any questions the patient may have about the intravascular device. This may enhance the patient's acceptance of the need for the device and ability to support care of the device, thus reducing risk of complications.

An information leaflet, for example learn about your IV line (Appendix 9), should be offered to the person, or relevant other persons as appropriate. Speaking to the points contained within this leaflet may serve as an opportunity to educate and empower the patient in reminding healthcare workers to clean hands before handling or manipulating an intravascular device for access or removal, the insertion site and other device related procedures (for example access and or removal) and disinfection of hubs, injection ports and needleless bungs prior to accessing.

Refer to local interpreter services if required.

Competence to insert an intravascular device

All H&CWs involved in the management (insertion, maintenance, access and removal) of an intravascular device should complete all training and competency assessments as required for their role. Only competent, trained staff (or staff in training who are supervised by competent staff) should insert, maintain, access and remove intravascular devices. This means that insertion and maintenance of intravascular devices is within their scope of clinical practice, determined by the individual's credentials, education, training (including practical training workshops and simulation training where available), and competence. Competency assessment must be conducted to establish proficiency in performing these skills, including competence in aseptic technique.

The H&CW inserting the intravascular catheter needs to consider their own competence to successfully complete the procedure in each individual person following assessment of the person's general condition and venous status. If the practitioner considers that they are unlikely to successfully insert the intravascular device, they should seek assistance from a more experienced practitioner, or where IV care teams or experienced inserters are available, rather than proceed with the attempt, unless the urgency of the situation demands that an attempt must be made without delay.

Where peripheral intravenous access is poor and cannulation is likely to be difficult, alternative methods of access should be considered and discussed with the patient and appropriate colleagues.

Where ultrasound guided or vein visualisation technology assisted intravascular device insertion is utilised, only competent, trained staff (or staff in training who are supervised by competent staff) in its use should use this technology, adhering to infection prevention and control practices including aseptic technique and use of sterile ultrasound probe cover and sterile single use ultrasound gel sachets, and cleaning and disinfection requirements after every use.

Device and site selection

Device type, insertion location and insertion technique influence the risk of infection. Select the most appropriate intravascular device at the commencement of therapy to optimise patient outcomes and reduce complications.

Peripheral Vascular Catheter (PVC)

Considerations for device selection

- the size and condition of the person's vein
- the purpose of the PVC
- the type of infusion and required flow rate for the therapy to be administered
- choose the shortest and smallest gauge PVC suitable for the prescribed therapy and patient category, as this can reduce the risk of phlebitis
- PVCs selected for use should have a safety device with engineered sharps injury protection to minimise possible serious consequence of sharps injury.

Considerations for site selection:

Image 1- Anatomy of the forearm

Anatomy of upper extremity veins:

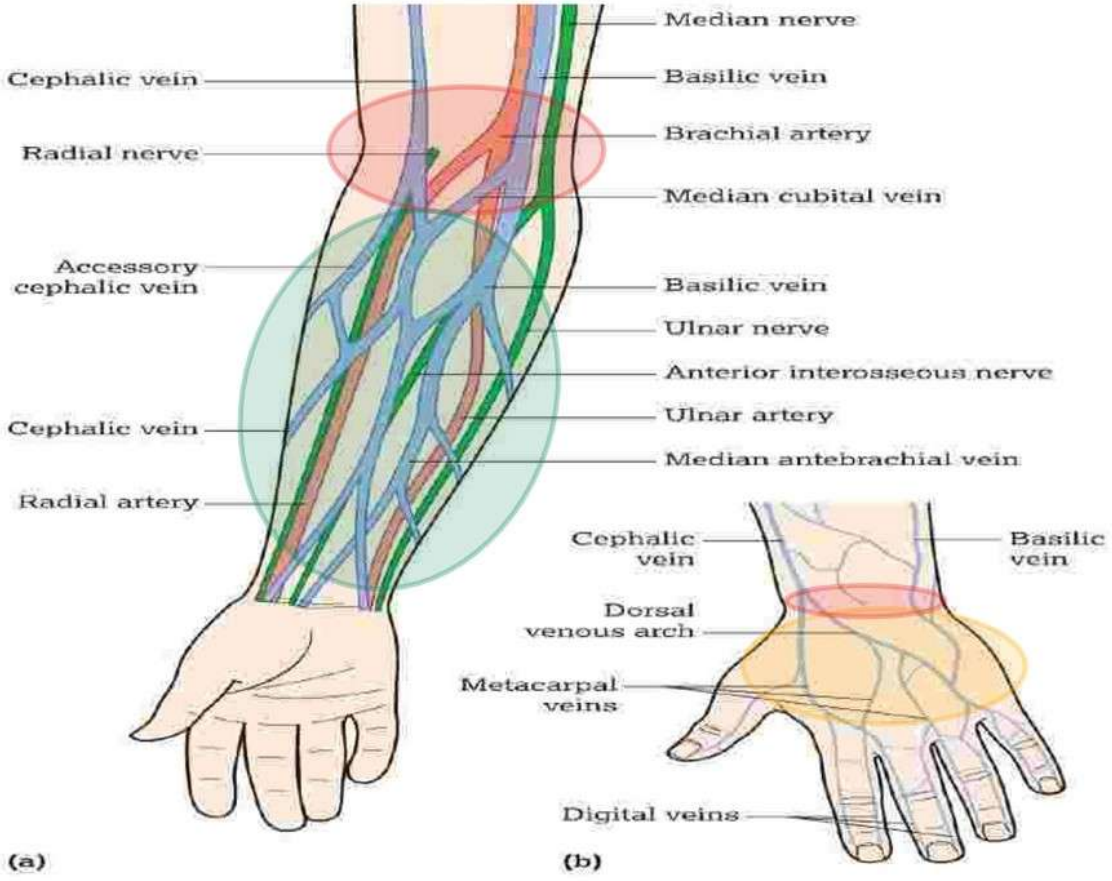

Figure i (a) Superficial veins of the forearm. (b) Superficial veins of dorsal aspect of the hand.

Adapted from Guiding Framework for the Education, Training and Competence Validation in Venepuncture and Peripheral Intravenous Cannulation for Nurses and Midwives (2017)

Select where possible:

- the person's non-dominant forearm (except in renal patients where the creation of an arteriovenous fistula may be required)
- the basilic or brachial veins on the posterior (dorsal) surface of the forearm (green area Image 1)
- in paediatric patients the scalp, upper or lower limbs
- the metacarpal veins on the dorsum of the hand are easiest to visualise but more liable to thrombosis and are prone to vessel damage (orange area Image 1).

Avoid the following sites where possible:

- areas of flexion (red areas Image 1) such as wrists and antecubital fossa as this may predispose to phlebitis
- areas below previous cannulation sites, bruised or phlebitis areas, or areas of previous infiltration/ extravasation
- a limb with evidence of infection or a limb with a peripherally inserted central venous catheter or other access device
- an arm on the side of the body where lymph node clearance was performed, lymphatic drainage is poor or there is an arteriovenous fistula
- lower limbs
- the anterior (ventral) forearm veins, especially the cephalic vein in patients with chronic renal failure.

PVC insertion should be carried out as close as possible to the time of use to reduce the risk of accidental dislodgement and related complications.

A PVC should not be inserted in close proximity to another cannula. If it is essential that two cannulas are inserted within proximity, they should be secured with separate dressings.

A practitioner should not normally puncture the skin more than twice whilst attempting to site a PVC unless the urgency of the situation demands that further attempts must be made without delay. In most circumstances if unsuccessful after two attempts it is recommended that another suitably trained H&CW attempts to site the PVC.

Midline Catheter (MC)

Considerations for device selection:
It is recommended that the smallest gauge of device and least number of lumens to accommodate therapy is utilised to reduce the risk of phlebitis, thrombosis and infection.

Considerations for site selection:

- midline catheters are inserted in a peripheral vein in the upper arm via the basilic, cephalic or brachial veins. Tip termination is distal to or at the level of the axilla vein for children and adults
- vein selection should include catheter to vessel ratio with the smallest gauge and least number of lumens to reduce complications.

Central Venous Access Device (CVAD)

Considerations for device selection

- the minimum necessary number of lumens, connectors and ports should be used. Multi-lumen catheter insertion sites may be particularly prone to infection because of increased trauma at the insertion site or because multiple ports increase the frequency of CVAD manipulation

- if TPN is being administered, clinicians should dedicate one lumen of the CVAD exclusively for that use. Always consider PICC for TPN if possible
- anticipate duration of access – for short-term access a non-tunnelled CVC maybe be appropriate, for people expected to require regular or continuous access over a longer timeframe a tunnelled CVC may be appropriate, or an implantable device (catheter/ port) may be preferred for long- term duration. A PICC may be considered for people in whom medium-term intermittent access is required. The need for the CVAD should be considered at every clinical interaction and removed as soon as clinically possible
- in units or patient populations that have high catheter related blood stream infection, for example central line related blood stream infection (CLABSI) rate despite compliance with basic CLABSI prevention practices, antiseptic or antimicrobial impregnated CVCs should be considered in those whose catheter is expected to remain in place for greater than 5 days
- heparin coated catheters are not recommended.

Considerations for site selection:
The site at which a CVAD is placed can influence the subsequent risk of catheter-related blood stream infections because of variation in both the density of local skin flora and the risk of thrombophlebitis.

- **skin creases, and insertion sites near beard or pubic hair should be avoided.**
- the H&CW inserting the CVAD should assess specific factors such as pre-existing intravascular devices, anatomic deformity, site restrictions, the relative risk of mechanical complications and the risk of infection
- for CVC insertion the subclavian vein site has been associated with lower rates of infective complications than the internal jugular site, but with a higher incidence of pneumothorax. The femoral vein site has been associated with higher rates of infective complications than either subclavian vein or jugular vein sites, but the femoral vein site, while not optimal, may need to be used in exceptional circumstances
- for all of these venous sites the right side of the patient is usually favoured because usual vessel anatomy allows direct access to the superior vena cava and the inferior vena cava and provides the shorter easier route for the practitioner inserting the device.
- consider potential need for acute dialysis catheter insertion. If possible, leave right internal jugular vein (IJV) for dialysis catheter insertion
- subclavian vein catheterisation should be avoided to the greatest degree possible for temporary access in all patients with chronic renal failure due to the risk of central vein stenosis
- clinicians should use ultrasound guided central venous access for catheter insertion to reduce the number of cannulation attempts and mechanical complications. When using ultrasound guidance, the clinician should be appropriately trained in this technique and the principles of asepsis applied throughout the procedure.

Insertion of an intravascular device

Prior to PVC/MC/CVAD insertion procedure

Preparation in clean utility or preparation room is required

- consider environmental controls
- confirm the indication for procedure
- perform hand hygiene as above
- clean/ disinfect a procedure tray/ trolley and allow to dry and gather all necessary equipment.

PVC insertion

- ensure skin at insertion site is visibly clean (see skin preparation)
- perform hand hygiene (as above)
- put on PPE as per PCRA
- open equipment aseptically and ensure that all key-parts (for example iv cannula, tip of the syringe) remain sterile and covered until use
- perform hand hygiene and apply gloves as per risk assessment
- prepare catheter insertion site, follow skin preparation of insertion site (Do not re-palpate the chosen vein or touch the skin after disinfection)
- insert the PVC (following the appropriate procedure for type of device chosen) maintaining aseptic technique throughout the procedure
- remove the needle introducer and dispose of immediately into a sharp's container
- hold the sterile gauze by one corner and place under the cannula hub to absorb blood spillage (ensure only section of gauze that is sterile is in touch with hub)
- attach hub or blood collection device or short extension set with a clamp primed with sterile sodium chloride for injection (NaCl 0.9%) or infusion as prescribed
- stabilise the PVC in position with a sterile, transparent, semipermeable polyurethane dressing
- flush cannula with sterile NaCl 0.9% for injection, using appropriate technique as per device to confirm patency. Refer to local guidance for minimum flush volumes for specialist patient cohorts for example paediatrics and neonates
- All used sharps must be disposed of carefully into an approved sharps container at the point of use
- Dispose of any healthcare risk waste in the appropriate waste stream
- Remove gloves and perform hand hygiene
- Remove any additional PPE that may have been required and perform hand hygiene
- Complete PVC insertion care bundle identifying date, time, site and include signature of healthcare worker inserting the PVC (Appendix 4).

MC and CVAD insertion

A MC or CVAD requires surgical aseptic technique and should be inserted in a clinical area where asepsis can be maintained for example in radiology suites or in intensive care units, or operating theatres, and where the patient, where required, can be appropriately monitored for example with heart monitoring, pulse oximetry, blood pressure.

Pre-procedure

- use a sterile pre prepared CVAD or MC insertion set (where available) containing necessary sterile equipment and intravascular device with the correct number of lumens
- using a large, cleaned, disinfected and dry procedure trolley open equipment carefully, maintaining sterility, and open any additional sterile equipment into the sterile field created.

Procedure

- ensure skin at insertion site is visibly clean (see skin preparation)
- perform hand hygiene
- apply maximum sterile barriers precautions
- prepare catheter insertion site, follow skin preparation of insertion site. Palpation of the insertion site should not be performed after application of antiseptic unless aseptic technique is maintained
- allow the disinfected skin to fully dry before inserting the intravascular device. Sterile body drape can be applied after application of skin preparation
- insert the MC/ CVAD following the appropriate procedure for type of device chosen, maintaining aseptic technique throughout the procedure
- flush and lock catheter lumens (as required) with sterile 0.9% NaCl for injection (or other compatible sterile solution as per local policy)
- a sterile, transparent, semipermeable polyurethane dressing and chlorhexidine-impregnated dressing if appropriate (see use of chlorhexidine) is recommended to cover the insertion site
- a suture-less securement device is recommended to reduce infection risk. A CVAD may be secured with sutures to minimise movement of the catheter if a suture-less securement device not available
- all used sharps must be disposed of carefully into an approved sharps container at the point of use
- dispose of any healthcare risk waste in the appropriate waste stream
- remove gloves and perform hand hygiene
- remove additional PPE and perform hand hygiene.

For CVADs the catheter tip position must be confirmed prior to use by any of the following techniques

- chest x-ray (most commonly used approach)

- continuous electrocardiograph (ECG) monitoring (during insertion of the line, typically in an intensive care situation)
- transthoracic echocardiography
- transoesophageal echocardiography
- ultrasound
- fluoroscopy imaging.

Once tip confirmation has been established, the clinician or assistant must document the final position and the catheter marking (for example internal, external, and total catheter lengths).

Complete associated documentation for example insertion checklist/ insertion care bundle identifying date, time, site. procedure and include signature of H&CW inserting the intravascular device (Appendix 4,5 & 6).

Maintenance and accessing an intravascular device

The safe management of an intravascular device and care of the insertion site are essential components of a comprehensive strategy for preventing intravascular device related infections. The ongoing need for the intravascular device should be clinically reviewed at least daily by the multidisciplinary team and devices that are no longer clinically indicated should be removed.

Standard precautions are required for management, access and removal of intravascular devices. Hand hygiene is required before and after contact with an intravascular device and aseptic technique during all intravascular device care such as medication administration, dressing changes and removal.

Dressings

Dressing requirements may vary depending on type of intravascular device inserted. In general, the following principles apply:

- a sterile, transparent, semipermeable polyurethane dressing is recommended to cover the insertion site
- the insertion site should be kept clean and dry
- ensure the intravascular device is in the correct position, insertion site is visible through the dressing and that the dressing is dry and intact
- aseptic technique is required for all dressing changes
- the insertion site should be disinfected with single-use application of 2% chlorhexidine gluconate in 70% isopropyl alcohol (or povidone iodine in alcohol for patients with

sensitivity to chlorhexidine). Local wound care and dressing policy and manufacturer recommendations should be followed (see note on use of chlorhexidine).

For PVCs:

- the dressing should only be changed if it becomes loose, wet or soiled. Routine dressing change is not recommended.

For MC/ CVADs:

- dressings should be changed every 7 days or sooner if the dressing is no longer intact or becomes damp, no longer occlusive or adherent, soiled or if there is evidence of inflammation or excessive accumulation of fluid
- if the patient is diaphoretic or if the site is bleeding or oozing, a sterile gauze dressing can be used, until this is resolved. The dressing should be changed at least every 24 hours and, where the exit site is not visualised, palpation of the site should form part of the daily assessment. If serosanguinous fluid drainage is present, a haemostatic agent may be considered
- Evidence supports the use of a chlorhexidine dressings to reduce catheter related infections. Chlorhexidine-containing/ impregnated dressings are recommended in patients over 2 months of age (see note on use of chlorhexidine)
  Refer to manufacturer's instructions for recommendations on dressings for implanted devices (ports/ catheters).

Document date of dressing change in care bundles (Appendix 4 & 5) or patients healthcare record as appropriate.

Accessing intravascular devices

- hand hygiene should be performed immediately before and after accessing hubs and sampling ports and PPE as per PCRA (Appendix 8)
- disinfect and scrub the access port or catheter hub ('*scrub the hub*') prior to access using a single antiseptic containing 2% chlorhexidine in 70% isopropyl alcohol solution. The hub should be cleaned or scrubbed for a minimum of 15 seconds and allowed to dry before accessing the port.
- flush and lock catheter lumens with sterile 0.9% NaCl for injection (or other compatible sterile solution as per local policy) at every episode of access. Follow local guidance on flushing/ locking techniques and volumes of flush to be used
- for IV fluid replacement intervals and administration sets changes see Appendix 7 or follow local protocols as appropriate
- intermittent disconnection of giving sets increases the risk of infection and is not recommended. If a giving set is disconnected for any reason or for any length of time, the entire giving set and infusion/ fluid therapy should be changed

- when an intravascular device is replaced or re-sited, the infusion and administration set should also be replaced
- local protocols aligned to manufacturer's instructions should be in place to determine how devices and accessories are changed/replaced. If needleless devices are used, manufacturer's recommendations for changing the needleless components should be followed (typically every 7 days unless blood products given through this component). Follow local policy for changing of administration sets and accessories where blood products have been administered
- all components of the system should be compatible and secured, to minimise leaks and breaks in the system. Adhesive tape should never be used as a means of junction securement between the hub and connector or infusion line
- for lumens no longer in use, lock with compatible sterile solution as per local policy
- the use of disinfectant caps on needleless access ports may be considered for intermittently used devices
- the manufacturer's recommendations for only using disinfectants that are compatible with specific intravascular device materials must be followed.

Management of intravascular devices

- inspect the intravascular device insertion site at am and pm shifts, and complete care bundles (examples in Appendix 4 & 5)
- for patients in intensive care with a CVAD, the use of daily chlorhexidine bathing treatment (see use of chlorhexidine) is recommended to reduce catheter related bloodstream infection
- patients should be encouraged where possible to report any changes in their intravascular device site or any new discomfort.

For PVCs

- use the Visual Infusion Phlebitis (VIP) score to record signs of tenderness, redness, swelling, inflammation, discharge or thrombosis and for guidance as to the appropriate actions to implement (Appendix 3)
- any member of the multidisciplinary team (MDT) who observes local adverse effects related to a PVC should inform the clinical team and consider removal of the PVC promptly. Indications for removal include VIP score of 2, increasing pain at the PVC insertion site, erythema, swelling, induration, discharge/ ooze and resistance to injection (thrombosis).

MC/ CVAD

- the insertion site should be examined for discharge, tenderness, pain, redness and swelling, the position and length should be checked, and all findings documented.

In the event of tenderness at the site, fever without obvious source, symptoms of local or systemic infection or the presence of exudates, the dressing should be removed and site inspected directly.

If infection is suspected inform clinical team and consider taking blood cultures. Positive central line blood cultures may represent colonisation of the line and may not represent true blood stream infection; peripheral blood cultures are generally optimal as more likely to reflect true blood stream infection.

If sepsis is suspected follow guidance as per National Clinical guideline no 26 Sepsis Management for Adults(including Maternity), and National Implementation Plan (NIP) for the International Guidelines for the Management of Septic Shock & Sepsis-Associated Organ Dysfunction in Children (SSCGC).

Replacement and/ or removal of an intravascular device

The need for the intravascular device should be assessed at a minimum daily. It is recommended that intravascular devices are immediately removed when no longer required or where there is no longer a clear indication for their use.

Intravascular devices should not be left in place in anticipation that there may be a requirement for their use, for example intravenous fluids or intravenous medication arising from subsequent assessment.

When it is apparent that aseptic technique was difficult to assure during intravascular insertion (for example when it is inserted during a medical emergency) the intravascular device should be removed as soon as possible and if necessary, replaced by a new device (as appropriate in discussion with the clinical team).

PVC

- every patient with a PVC should have twice daily review
- a PVC should be removed promptly where there is evidence of device failure (as outlined above using the VIP score)
- patients transferred from another healthcare facility with a PVC should be assessed to determine if the PVC is required. If it is not required, it should be removed and its removal documented
- all persons on discharge home should have their PVC removed and documented in their healthcare record unless there is a specific documented clinical requirement for retention of the PVC.

MC/ CVAD

When and how MC/ CVAD are replaced can influence the risk of infection.

- different MCs and CVADs have different recommended durations of use. Refer to device specific manufacturer's instructions for recommended dwell times
- do not routinely replace MCs or CVADs, to prevent catheter-related infections

- do not remove MC or CVAD based on fever alone. Use clinical judgment regarding the appropriateness of removing the catheter if infection is evidenced elsewhere or if a non-infectious cause of fever is suspected
- when adherence to aseptic technique and maximum sterile barrier precautions cannot be assured (for example where a CVAD is inserted during a medical emergency), replace CVAD as soon as possible using standard precautions
- use guide wire assisted CVAD exchange to replace a malfunctioning catheter, or to exchange an existing catheter only if there is no evidence of infection at the catheter site or proven catheter related blood stream infection
- do not use guide wire assisted catheter exchange for people with catheter related infection. If continued vascular access is required, remove the implicated CVAD, and replace it with another CVAD at a different insertion site
- if a guidewire exchange is to be used, maximum sterile barrier precautions are required and new sterile gloves, drapes and skin preparation solution are to be used after handling the old catheter
- administration tubing and connectors should also be replaced when an intravascular device is changed
- for patients transferring out of critical care areas for example intensive care unit (ICU), critical care unit (CCU) or high dependency unit (HDU), an assessment for the ongoing need for CVAD is required. CVADs, for example CVCs, should normally be removed before leaving a critical care area unless there is a clear continuing need and the receiving area staff have the skills and capacity to care for the CVAD appropriately, with appropriate communication between healthcare areas on transfer.

Removal of an intravascular device

Removal of an intravascular device should only be performed by a H&CW who is competent in this procedure. An intravascular device should be removed when no longer required for patient care, or if removal is indicated due to infection/ device failure. Standard precautions including hand hygiene and aseptic technique, with the correct procedural steps for the type of device being removed should be followed for all intravascular device removals.

Always inform the person of the intention to remove the intravascular device and ensure that they are prepared.

- standard precautions, with a specific focus on hand hygiene, PPE as per PCRA, aseptic technique and waste management are required for the removal of intravascular devices
- follow device specific procedure for removal using aseptic technique
- apply sterile occlusive dressing to the insertion site following removal of device
- where required, assess line integrity*

- following removal of the intravascular device, remove gloves, perform hand hygiene. Segregate and dispose of waste according to local policy and perform hand hygiene
- document date and reason for removal of the intravascular device in the patients' healthcare record or care bundles as appropriate (Appendix 4 &5)
- intravascular sites should be monitored for a further 48 hours for post infusion phlebitis or infection. Patients should be provided with education on signs and symptoms of infection and if discharged, how to monitor at home and who to contact should there be any issues with the site after discharge.

*Note: Culturing of line tips is not routinely indicated. If a CVAD is the suspected source of infection and the tip is required for culture, collection of the CVAD line tip should be performed aseptically.

Complete appropriate documentation with indication for removal and date and time of removal. This may be in the patient's health care record or device care bundle in line with local policy.

Patient Education

Written information about the care of their intravascular device should be provided to all patients and include information on prevention of infection.

On discharge

Where a patient is managed as an outpatient while an intravascular device is in place, additional care information and patient and carer education will be required. The patient and/ or their carers should be taught any techniques they may need to use to prevent infection and manage their device safely. There should be appropriate communication and documentation with healthcare professionals with responsibility for caring for the patient and the device post discharge and appropriate contact information for advice or in the case of emergency.

A patient's understanding of this information should be checked prior to discharge.

Documentation, audit and surveillance

Documentation

For delivery of a high standard of care and accountability it is essential that accurate records of all intravascular device insertion, access and management are maintained for each patient.

Documentation required includes:

- date of device insertion
- type of device inserted, number of lumens, gauge/French size
- insertion site
- dressing and securement type
- catheter length and measurement at skin, and the actual tip location (CVAD)
- the serial number /batch number of the device placed (CVAD)
- name of H&CW inserting the device
- suggested date of device removal
- actual date of device removal
- name of the H&CW removing the device
- reason for removal
- culture results (if applicable)

The use of a CVAD checklist is also recommended to ensure adherence to optimal infection prevention practices at CVAD insertion (Appendix 6)

Care Bundles

Care bundles are groupings of evidence based best practices (usually 3-5 practices) with respect to a disease process or procedure that individually improve care, and when applied together result in substantially greater improvement. All elements of the care bundle must be adhered to for every person every time the procedure is performed. Intravascular device evidence informed care bundles should be developed and implemented and may be tailored to local risk profiles.

It is recommended that services develop local care bundles to promote evidence-based care and audit. When developing bundles the key components of intravascular device care should be considered essential elements to be included (Appendix 2). Examples of a PVC and MC/ CVAD care bundle are available in Appendix 4 & 5.

Audit

All intravascular devices should have an insertion bundle/ checklist, and maintenance bundle completed during the am (day) and the pm (night) shifts.
An ongoing programme of audit of care bundles is recommended.
Quality improvement plans should be developed to address any areas of non-compliance found on audit.

Criteria for intravascular device care bundle audits may include the following:

- all PVCs/ MCs or CVADs inserted must have a checklist/ insertion and maintenance care bundle in place
- all elements in the care bundle must be adhered to for every person every time the procedure is performed.

Surveillance

- an ongoing programme of education and training on infection prevention control practices related to the insertion, care and maintenance of all intravascular devices and the use of care bundles and audit is recommended
- ongoing audit quality assurance/ improvement, risk management and surveillance programmes should be in place to monitor the incidence of infection and other adverse events associated with intravascular devices and review and reporting at appropriate senior management and risk management forums
- intravascular device related SABSI and other complications with significant patient impact (for example requiring systemic antimicrobial treatment or delay in discharge) should be reported as incidents on the National Incident Management System (NIMS) and require an incident review. HSE guidelines and resources on infection incident review tools is available here
- a national key performance indicator is set out in the HSE National Service Plan on the rate of new cases of hospital-acquired *Staphylococcus aureus* bloodstream infection, with the benchmark target rate for 2026 being less than 0.7 for every 10,000 bed days used. Hospitals are required to submit data on new cases of hospital-acquired *Staphylococcus aureus* bloodstream infection to the business intelligence unit (BIU) monthly, along with commentary on new cases of hospital-acquired *Staphylococcus aureus* bloodstream infection related to intravascular devices. These data is used by the HSE to monitor safety and quality of care activity in hospitals in relation to SABSI and to monitor progress in reducing this rate. This data also updates the Department of Health on safety and quality of care activity related to hospital-acquired *Staphylococcus aureus* bloodstream infection.

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Glossary of terms

ABHR	alcohol-based hand rub
AMRIC	antimicrobial resistance and infection control team
AV	arteriovenous
BSI	blood stream infections
CCU	critical care unit
CLABSI	central line associated blood stream infection
CRBSI	catheter related blood stream infection
CVAD	central venous access device
CVC	central venous catheter
HCAI	healthcare associated infection
H&CW	health and care worker
HDU	high dependency unit
HH	hand hygiene
HSE	Health Service Executive
ICU	intensive care unit
IJV	internal jugular vein
IPC	infection prevention and control
IV	intravenous
IVOS	intravenous to oral switch
MC	midline catheter
MDT	multidisciplinary team
NaCl	sodium chloride
NIMS	National Incident Management System
PCRA	point of care risk assessment
PICC	peripherally inserted central catheter
PPE	personal protective equipment
PVC	peripheral venous catheter
SABSI	*Staphylococcus aureus* bloodstream infection
TPN	total parenteral nutrition

List of Appendices

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Appendix 1: Vein Selection

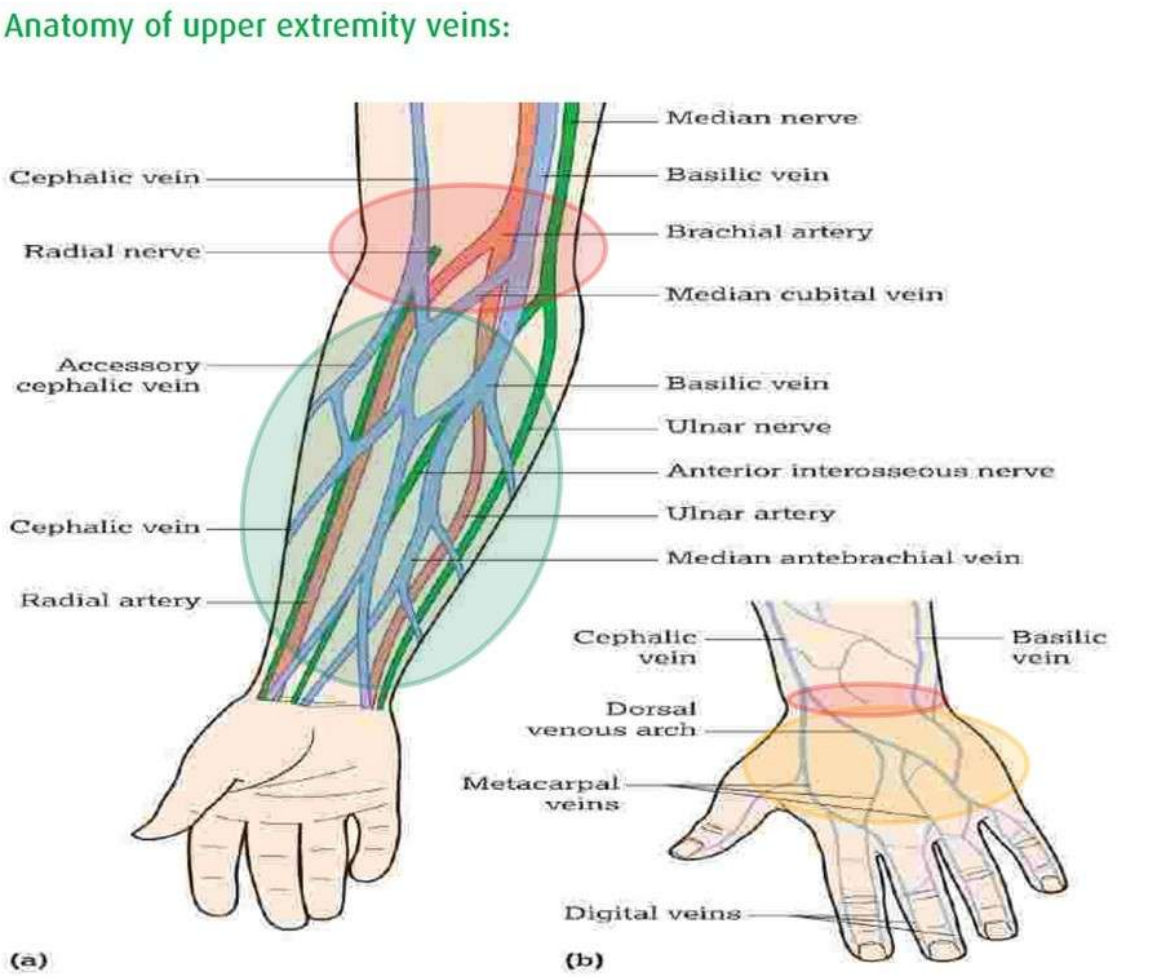

Figure i (a) Superficial veins of the forearm. (b) Superficial veins of dorsal aspect of the hand.

Adapted from Guiding Framework for the Education, Training and Competence Validation in Venepuncture and Peripheral Intravenous Cannulation for Nurses and Midwives (2017)

- The superficial veins of the upper extremities of the body are used for PVC cannulation because they are located just beneath the skin in the superficial fascia.

- The cephalic vein is a large vein, which is easily stabilised and accessible. Its size and position make it an excellent choice for cannulation. Its position at a joint however may increase complications such as mechanical phlebitis.

- The basilic vein is often overlooked for the purpose of cannulation. It is a large, easily palpable vein but it is more difficult to access and stabilise due to its location, and the presence of valves may inhibit cannula advancement.

- The median cubital and basilic veins in the antecubital fossa are usually used for venepuncture. Their size and superficial location make them easy to palpate and visualise and they are well supported by muscular and connective tissue. The median cubital vein crosses in front of the brachial artery, therefore care must be taken to avoid puncturing the artery.

- The digital veins flow along the lateral portion of the fingers. These are only used as a last resort and can only accommodate a very small gauge needle.

- The metacarpal veins are formed by the union of digital veins, making them accessible and easily visualised and palpated. They also allow subsequent sites for cannulation above previous puncture sites. The use of these veins and should be avoided, if possible, in older people, however, where skin is turgor and subcutaneous tissue is diminished (Dougherty 1996). Note: The most distal vein of the extremity should be selected, depending on the condition of the vein

Appendix 2 Care bundle key components

PVC care bundle should include the following components

PVC Insertion bundle
Clinical indication - confirm the clinical indication and necessity for PVC insertion
Hand hygiene-perform hand hygiene using ABHR or soap and water if hands are visibly soiled, with the appropriate technique before insertion
Skin antisepsis- prepare the insertion site with a 2% chlorhexidine gluconate in 70% isopropyl alcohol solution, allowing it to dry completely before insertion (see note on chlorhexidine)
Aseptic technique -use standard aseptic technique for PVC insertion practices
Dressing-use sterile, transparent semipermeable dressing

PVC Maintenance bundle
Hand hygiene -perform hand hygiene using ABHR or soap and water if hands are visibly soiled, with the appropriate technique before and after any contact with the device or insertion site
Aseptic technique for all access and care procedures (for example when accessing the device, changing dressings, or administering medication)
Site and dressing care- maintain a clean, dry, and intact dressing. Use sterile, transparent semipermeable dressings and only change if not intact/ wet/ loose
Catheter hub and needleless connector disinfection-Scrub the hub/ connector with an appropriate antiseptic (for example chlorhexidine in alcohol (see note on chlorhexidine) for the recommended duration and allow to dry before each access.
Patency- ensure device patency through regular flushing with appropriate volume, solution and recommended clamping sequence
Regular assessment and documentation review of device, necessity, complications, site condition and function and ensure timely removal when no longer required

MC/ CVAD care bundle should include the following components

Insertion bundle
Hand hygiene- perform hand hygiene with ABHR or antimicrobial soap and water before insertion using appropriate technique and product (for example surgical hand rub or hand scrub)
Maximum sterile barrier precautions-use maximum sterile barrier precautions for the person inserting the device and their assistant during intravascular device placement, including sterile gloves & gown, hat & mask, and a large sterile drape to cover patient
Aseptic technique- use surgical aseptic technique for MC/CVAD insertion procedures
Skin antisepsis 2% chlorhexidine gluconate in 70% isopropyl alcohol solution, allow it to dry completely before insertion (or solution of povidone iodine in alcohol for patients with sensitivity to chlorhexidine (see note on chlorhexidine)**)**
Site selection -choose the insertion site that minimises infection and mechanical complications, guided by patient specific factors and vessel preservation strategies
Device selection- select the most appropriate device type, size, and number of lumens based on anticipated therapy duration, and patient anatomy
Dressing and securement -apply a sterile, transparent semipermeable dressing immediately post-insertion and where applicable chlorhexidine impregnated dressings. Use a suture-less securement device where appropriate.

Maintenance bundles
Hand hygiene -perform hand hygiene before and after any contact with the device or insertion site, using ABHR or soap and water if hands are visibly soiled, and the appropriate technique
Aseptic technique- for all access and care procedures (for example when accessing the device, changing dressings, or administering medication)
Site and dressing care- assess for signs of infection. Maintain a clean, dry, and intact dressing. Use sterile, transparent semipermeable dressings and where applicable chlorhexidine dressings and change every 7 days or sooner if no longer intact or has become damp, no longer occlusive or adherent, soiled or if there is evidence of inflammation or excessive accumulation of fluid
Skin antisepsis with appropriate skin disinfectant - for all dressing changes the site should be disinfected with single-use applicator solution of 2% chlorhexidine gluconate in 70% isopropyl alcohol (or solution of povidone iodine in alcohol for patients with sensitivity to chlorhexidine (see note on chlorhexidine**))**
Catheter hub and needleless connector disinfection- scrub the hub/ connector with an appropriate disinfectant (for example chlorhexidine in alcohol (see note on chlorhexidine**)) for the recommended duration and allow to dry before each access**
Patency- ensure device patency through regular flushing with appropriate volume and solution
Regular assessment and documentation- review of device necessity, signs of infection or complication, documentation of site condition and function and ensure timely removal when no longer required.

Appendix 3 Modified Visual Infusion Phlebitis (VIP) score

Modified V.I.P (Visual Infusion Phlebitis) Score		
IV site appears healthy	0	No phlebitis: Observe cannula
One of the following is evident: slight pain or redness near site	1	Possible first signs: Observe cannula
Two or more of the following are evident: pain, redness, swelling	2	Early stage of phlebitis: Remove & re-site cannula
All the following are evident: pain, redness, hardening of surrounding tissue	3	Phlebitis/Thrombophlebitis: Remove & resite cannula at another location if still needed. Seek further advice
As above including palpable venous cord	4	
As above including pyrexia	5	

Appendix 4 Example of a PVC care bundle

AFFIX PATIENT LABEL HERE

PERIPHERAL VASCULAR CATHETER (PVC) CARE BUNDLE

INSERTION & MAINTENANCE BUNDLE
If patient has multiple PVCs a separate form should be used for each site

Insertion Bundle – complete on PVC insertion			
Clinical indication:		Hand hygiene immediately before insertion	Yes/No
Diagnostics	☐	*Chlorhexidine skin prep used	Yes/No
Resuscitation	☐	Aseptic technique throughout procedure	Yes/No
IV medication	☐	Transparent semi-permeable dressing	Yes/No
IV fluids	☐	Location of insertion: Pre-hospital	E.D.
Transfusion	☐	Ward Theatre	Other
		Date: / / Time:	
PVC inserted by: Name			Dr/Nurse/Midwife
Insertion site: R / L		Size of cannula:	

Maintenance bundle: complete fully at AM and PM shifts
All intravenous medications should be reviewed daily and stopped or changed to suitable oral preparation as soon as possible - IV to PO switch

PVC Date/Day	Date: Day: AM	PM	24 hours - review**	Date: Day: AM	PM	48 hours - review**	Date: Day: AM	PM	72 hours - review**	Date: Day: AM	PM	96 hours - review**
Assess the need for PVC on each shift? *(consider IV to PO switch)*	Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐	
Record Visual Infusion Score (VIP) score	VIP 0 1 2 3 4 5	VIP 0 1 2 3 4 5		VIP 0 1 2 3 4 5	VIP 0 1 2 3 4 5		VIP 0 1 2 3 4 5	VIP 0 1 2 3 4 5		VIP 0 1 2 3 4 5	VIP 0 1 2 3 4 5	
PVC dressing is dry and intact	Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐	
Hand hygiene is performed (before and after contact with device or insertion site).	Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐	
Aseptic technique for all access and care	Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐	
Scrub the hub and connector with an appropriate disinfectant (for example chlorhexidine in alcohol*) for the recommended duration and allow to dry before each access	Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐	
PVC flushed and patent	Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐	Yes ☐ No ☐	
Initial												

**Review clinical reason and/or justify rationale for PVC to remain in place; remove PVC if not required.
If venous access is for long-term therapy (7-14 days or longer), consider if insertion of a midline catheter (MC) or peripherally inserted central catheter (PICC) may be appropriate

Actions taken and additional comments	Date & Time	Signature

Modified V.I.P. (Visual Infusion Phlebitis) Score		
IV site appears healthy	0	No phlebitis: **Observe cannula**
One of the following is evident: slight pain or redness near site	1	Possible first signs: **Observe cannula**
Two or more of the following are evident: pain, redness, swelling	2	Early stage of phlebitis: **Remove & resite cannula**
All of the following are evident: pain, redness, hardening of surrounding tissue	3	Phlebitis/Thrombophlebitis: **Remove and resite cannula at another location if still needed. Seek further advice**
As above including: palpable venous cord	4	
As above including: pyrexia	5	

Date Removed:	Time Removed:
Reason for PVC Removal:	

* No recommendation can be made for the safety or efficacy of chlorhexidine in infants aged less than 2 months. Healthcare workers should be aware of the risk of chlorhexidine allergy and question patients on any known allergies prior to use.

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Appendix 5 Example of a MC/ CVAD care bundle

AFFIX PATIENT LABEL HERE

MIDLINE CATHETER (MC)/ CENTRAL VENOUS ACCESS DEVICE (CVAD) care bundle

Maintenance bundle to be completed am and pm shifts

Type of device (Please tick ✓ the relevant MC/ CVAD option)	**Non -Tunnelled Lines**	Peripherally Inserted Central Catheter (PICC) ☐		Central Venous Catheter (CVC) ☐	Midline Catheter ☐
	Tunnelled Lines ☐ Type:			Implanted Port ☐	Hemodialysis Catheter ☐
Clinical indication (Please tick ✓ the relevant indication)	Diagnostics ☐	Resuscitation ☐	Intravenous (IV) Medication ☐	IV Fluids ☐	Chemotherapy ☐	Other
Device insertion date:	**Location of insertion:**	**Inserted by:**	**Insertion site:**	**Insertion checklist completed:**	

All intravenous medications should be reviewed daily and stopped or changed to suitable oral preparation as soon as possible - IV to PO switch.
Observe for signs and symptoms of local or systemic infection. Record any variances and actions taken in comment section below

Signs and symptoms of infection	**REMEMBER:**
Local infection	
Erythema / inflammation /exudate Hot to touch Pain tenderness	Scrub the hub for 30 seconds before access Replace needleless bungs per local policy Replace dressing every 7 days or as appropriate
Systemic infection	
Hypotension Tachycardia Pyrexia Rigors	
If lumen blocked: seek medical advice as soon as possible as this could potentiate complications.	

DATE														
Shift AM/PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Time														
Line Day														
Dressing changed														
Needless bungs changed														
Non-coring needle changed														

1	**Assess the need for MC/CVAD on each shift?** (assess medications for IV to PO switch)													
2	**Hand Hygiene is performed** (before and after contact with the device or insertion site).													
3	**Aseptic technique** - for all access and care procedures													
4	**Site inspection and dressing care-** assess for signs of infection. Is dressing clean, dry, and intact. (Use sterile, transparent semipermeable dressings and where applicable chlorhexidine dressings and change every 7 days or sooner, **as required**)													
5	**Skin antisepsis with appropriate disinfectant** (single-use application of 2% chlorhexidine gluconate in 70% isopropyl alcohol or povidone iodine in alcohol for patients with sensitivity/or contraindication to chlorhexidine*).													
6	**Catheter hub and needleless connector disinfection** - scrub the hub/ connector with an appropriate disinfectant (for example chlorhexidine in alcohol*) for the recommended duration and allow to dry before each access													
7	**Patency** - ensure device patency (regular flushing with appropriate volume and solution as per local protocol)													
	Staff Signature (initials)													

Date	Time	Comments	Signature

Catheter manufacturer		**Size (French)**		**Position confirmed**	Yes ☐ No ☐	**Reason for line removal**
Securement device	Device ☐ Sutures ☐	**Final line length (cm)**		**Repositioning required?**	Yes ☐ No ☐	End of treatment ☐ Exit site infection ☐ Blood stream infection ☐
Number of lumens		**Device removed by*** (specify name):				Poor flow/dysfunction ☐ Leak/bleed ☐
Recommended line dwell time: *(refer to clinical advise or device information)*						Other:

* No recommendation can be made for the safety or efficacy of chlorhexidine in infants aged less than 2 months. Healthcare workers should be aware of the risk of chlorhexidine allergy and question patients on any known allergies prior to use.

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Appendix 6 Example of a CVAD insertion check list

CRITICAL STEPS	Yes ✓	No *(If No-add a comment)*
1. Informed consent		
2. Surgical hand rub/hand scrub		
3. Maximum sterile barrier precautions: Wear cap, mask, sterile gown/gloves, (and eye protection if required) if in contact with or crossing the sterile field at any time during the procedure. (All others entering the room during the procedure must wear cap and mask)		
4. Prepare skin site with appropriate skin disinfectant*~and allow to dry		
5. Drape patient from head to toe using sterile technique		
6. Prepare sterile field (patient full body drape, sterile procedure tray, ultrasound probe and all equipment for the procedure), and all sterile equipment including device & lumens (pre-flushing and clamping all lumens not in use during procedure as required)		
7. Consider appropriate patient position for insertion		
8. Maintain sterile field throughout procedure		
9. If guidewire present, ensure grasp on guide wire is maintained throughout procedure and removed post procedure		
10. Aspirate blood from all lumens, flush, and apply correct needleless bungs/ connectors using sterile technique		
11. Confirm venous placement		
12. Clean site with chlorhexidine*~ and apply sterile dressing (chlorhexidine impregnated if appropriate)		

CVAD inserted by_____ Assistant _____

Deviations: If there is a deviation in any of the critical steps, the assistant must immediately notify the person inserting the CVC and stop the procedure until corrected.

Comments:

* It is recommended a single patient use applicator with 2% chlorhexidine gluconate and 70% isopropyl alcohol **or** a solution of 10% povidone iodine in alcohol for patients with sensitivity to chlorhexidine.

~No recommendation can be made for the safety or efficacy of chlorhexidine in infants aged less than 2 months. Healthcare workers should be aware of the risk of chlorhexidine allergy and question patients on any known allergies prior to use.

Appendix 7 Replacement of IV infusions and administration sets

Table 1: Recommended IV fluid replacement interval

Fluid	Replacement Interval
Standard (crystalloid) and non-lipid parenteral solutions	Every 24 hours
Lipid-containing solutions	Within 24 hours
Lipid emulsions	Within 12 hours
All blood components (excluding factor VIII or IX for continuous infusion)	Within 4 hours
Drug infusions (e.g. heparin, insulin)	Every 24 hours

When a PVC/CVC is replaced or re-sited, the infusion and administration set should also be replaced. Fluid containers should only be spiked once, and the spike should be advanced all the way into the container.

Intravenous administration set changes

Intermittent disconnection of giving sets increases the risk of infection and is not recommended for any reason. If a giving set is disconnected for any reason or for any length of time, the entire giving set and infusion/fluid therapy must be changed.

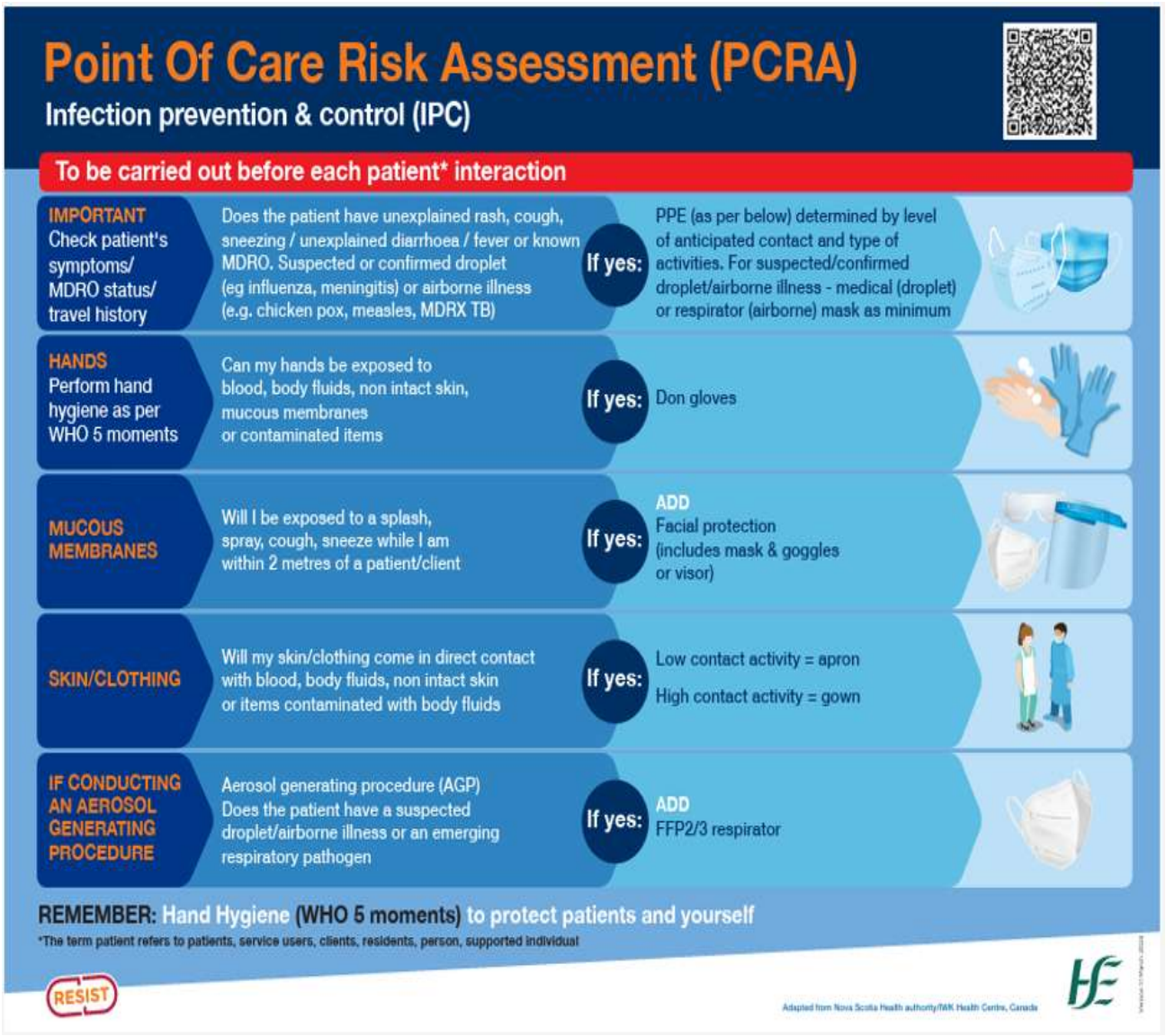
The span of time that an administration set should be used for depends on its use. Please see Table 2 or refer to local protocols or manufacturers' guidelines for specific maximum use times.

Table 2: Recommended administration set replacement interval

Administration	Replacement
Not containing lipids, blood or blood products	After 96 hours but at least every 7 days*
Lipid/lipid-containing parenteral nutrition	Within 24 hours
Chemotherapeutic agents	Remove immediately after use*
Propofol	Every 6 to 12 hours, when the vial is changed or as per manufacturer*
Heparin	Every 24 hours
Other infusions (not including those listed above)	After 96 hours but at least every 7 days*
***All administration sets should be replaced when disconnected or if the catheter is changed. When an administration set is changed, the IV fluid bag should also be changed Refer to local guidance for blood administration and replacement intervals**	

Healthcare Infection Control Practices Advisory Committee (HICPAC). (2011 (2017 Update)). Guidelines for the Prevention of Intravascular Catheter-Related Infections. The Healthcare Infection Control Practices Advisory Committee, Centre for Disease Control (CDC).

Appendix 8 Point of Care Risk Assessment



Appendix 9 Patient information leaflet IV line

Learn about your IV Line (Drip)

What is an IV cannula (tube)?

An IV cannula is a small plastic tube that passes through your skin into a vein. We will refer to it as a tube in this leaflet. It is often called an IV line or a drip. A needle is used to put the tube in through the skin. After the tube is in place the nurse or doctor takes away the needle and leaves the tube in place. There is a cap or lid on the end of the tube outside the body.

The tube can be used to give you fluids or blood or medicines and some can be used to take blood samples. The tube means that you do not need to have a needle jab every time you get a medicine that is given into the vein. Usually, the tube goes through the skin into one of the arm veins.

Sometimes the tube goes through the skin on the chest wall or the neck and into one of the big veins inside the chest. A tube that goes into one of the big veins in the neck is called a central venous catheter or central line. It can be uncomfortable when one of these tubes is being put in place but after that is done most have no trouble from it.

What can go wrong with an IV cannula (tube)?

The tube leaves a small hole in your skin and it sits in that hole with one end outside on the skin and the other end inside your vein. As long as there is a tube in place and a little hole in the skin there is a risk that bacteria (bugs) can track along the tube to get under your skin or into your vein. If this happens you can get an infection.

Infection from an IV cannula (tube)

Infection is sometimes just at the place where the tube is placed. This local infection can cause soreness or pain near the tube and the skin may get red and hot. Sometimes there is crusting or small scabs at the place where the tube goes through the skin. If you notice any of these things tell your nurse or doctor right away.

Infection from an IV cannula (tube) can sometimes be very serious with spread of bacteria into the blood (septicaemia). When this happens the person usually feels very sick and may have shivering, temperature and feel very weak. If this happens to you tell your nurse or doctor right away

What can be done to protect you from IV cannula (tube) infection?

Even with the best care that is possible there is always a risk of infection with an IV cannula (tube). The risk is higher in people with very complicated illness, people who are very vulnerable to infection and in people where is very hard to put in the tube because their veins are hard to find.

The most important thing to reduce the risk of infection is that people should only get a tube put in if they need one. The tube should be taken out as soon as it is no longer needed. If you have an IV tube it is OK to ask every day if you still need it.

The risk of infection from the tube is less when the skin is cleaned carefully before the needle is put through the skin. Risk of infection is less if the doctor or nurse putting in the cannula is careful about cleaning their hands before they put it in. It is OK to remind people to clean their hands.

The risk of getting and infection from an IV cannula (tube) is less if everyone carries out hand hygiene before they touch the tube or give you medicines through it. It is OK to remind people to clean their hands.

Watch out for and tell nurses and doctors if you get

- soreness or pain near the tube
- the skin near the tube gets red and hot
- there is crusting or small scabs at the place where the tube is placed
- there is pus at the place where the tube is placed
- the tube is still in but no one has used it for a day
- you get shivering or a high temperature or feel suddenly very unwell

Further information

Please do not hesitate to ask the healthcare staff caring for you if you have any questions, or if you require more information about IV cannula (tube). Information on hand hygiene, infection control and managing superbugs at home is available on www.hse.ie or www.hpsc.ie

This information is approved for use by the HSE's Antimicrobial Resistance and Infection Control national programme. Text awarded Plain English mark from the National Adult Literacy Agency

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