Guideline for the Care and Management of a Central Venous Access Device for a Child in the Community

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This guideline should be read in conjunction with local relevant policies / procedures / protocols / guidelines (PPPGs) that include the administration of medications, reporting of adverse incidents in the community, infection control and any other relevant documents that incorporate best practice.

**Regulatory and Professional Documents**


Guideline for the Care and Management of a Central Venous Access Device (CVAD) for a Child in the Community

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**Legislative Documents**
- Health Act 2007 (Revised updated 2016)
- Misuse of Drugs (Amendment) Act 2015.
- Misuse of Drugs (Amendment) Regulations (2014).
- Pharmacy Act (2007).
- Medicinal Products (Control of Advertising) Regulations 2007
- Medicinal Products (Control of Placing on the Market) Regulations 2007 as amended
- Medicinal Products (Prescription and Control of Supply) (Amendment) (No.2) Regulations 2014 (S.I. No. 504/2014).
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1.0. Policy Statement

In this guideline Central Venous Access Device (CVAD) refers to skin tunnelled catheters, implanted ports, and peripherally inserted central venous catheters.

It is the policy of the Health Service Executive (HSE) that healthcare professionals involved in the care and management of a CVAD when used for a child in the community utilise this document as guidance to their practice. This guideline provides direction for the:
- care and flushing of a CVAD when not in use
- changing of a needle free device and connecting line
- priming and connecting a syringe driver to a CVAD for the administration of medication via a syringe driver.

1.1. This guideline focuses on the use and management of a CVAD when utilised for a child being cared for in the community. It does not provide guidance on the psychological care which is integral to the holistic assessment at each community visit/assessment. Appendix I contains an overview of some psychological, pharmacological and non-pharmacological pain relief and distraction techniques for the child (HSE 2010a).

1.2. In order for healthcare professionals in the community to be appropriately prepared and competent, this guideline assumes that an integrated planned transfer of care from the hospital to the community has taken place.

2.0. Background

2.1. Central Venous Access Devices

This guideline was originally developed in 2012 as an outcome of recommendations outlined in the Report on the Use and Management of Central Venous Access Devices for Children in the Community (HSE 2010b).

In this guideline CVAD refers to Skin Tunnelled Catheters (Hickman™/Broviac™), Tunnelled Implanted Ports (Portacath™) and Peripherally Inserted Central Catheters (PICC). For the purpose of this document as the care for both Hickman™/Broviac™ catheters are similar, Hickman™ will be referred to hereafter.

3.0. Purpose

The purpose of this guideline is to:
- provide guidance for all healthcare professionals who care for, manage and maintain CVADs for children in the community in a manner that optimises effective and safe care
encourage best practice and support the standardisation of care by healthcare professionals who are caring for and managing CVADs for children in the community
clarify for healthcare professionals their responsibilities in the care, maintenance and management of CVADs for children in the community
support a needle free experience for the child insofar as is possible
minimise the risk of infection associated with the care and management of long term use of CVADs for children in the community
support standardised documentation practices.

The purpose of this guideline is to provide guidance for the management of CVADs. Patient specific advice will be provided by the discharging facility, e.g. for patients with Home Parenteral Nutrition needs.

3.1. In line with the HSE Code of Practice for Integrated Discharge Planning (HSE 2014), the transition of care from hospital to community must be proactively and collaboratively planned to ensure appropriate services are in place (see Section 8.1) In anticipation of the child’s discharge, if required, education may be accessed by healthcare professionals who will be providing care to the child.

3.2. Assuming that an integrated discharge plan has commenced healthcare professionals, where possible, require a minimum notice of three working days in advance of the discharge of a child with a CVAD to the community. Three working days is normally adequate to ensure that any required equipment is available. However, it is acknowledged that a longer period of notice may be necessary if up-skilling/training is required. It is recognised that healthcare personnel in the community are required on an infrequent basis to provide care for a child with a CVAD and consequently will need to prepare themselves to a level of competence that supports optimum provision of care. However, it is acknowledged that due to the rapidly deteriorating condition of some children with palliative care needs this is not always possible.

4.0. Scope

4.1. This guideline applies to all healthcare professionals defined as any medical practitioner or registered nurse employed by the HSE or who provides care on behalf of the HSE for a child with a CVAD in the community. Healthcare professionals in hospital and community settings will work within the requirements of their professional regulatory body when involved in the care and management of a CVAD when used for a child in the community.
## 5.0. Glossary of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>Accountability</td>
<td>‘Accountability is understood as being able to give an account on one’s nursing and midwifery judgements, actions and omissions. Accountability is about maintaining competency and safeguarding quality patient care outcomes and standards of the profession, while being answerable to those who are affected by one’s nursing or midwifery practice. Accountability means being answerable for the decisions made in the course of one’s professional practice.’ (NMBI 2015, p.17).</td>
</tr>
<tr>
<td>Aseptic Non Touch Technique</td>
<td>Aseptic non-touch technique is the term used to describe a technique that maintains asepsis and is non-touch in nature (Rowley and Clare 2011, p.E90).</td>
</tr>
<tr>
<td>Authority</td>
<td>Authority is associated with role and linked to the responsibilities an employee is given. Authority is the power given to the employee to carry out his/her responsibilities (HSE 2010c, p.6).</td>
</tr>
<tr>
<td>Adverse Drug Reaction</td>
<td>A response to a medicinal product which is noxious and unintended (Directive 2001/83/EU; SI 272/2012)</td>
</tr>
<tr>
<td>Central Venous Access Device (CVAD)</td>
<td>A central venous access device (CVAD) is a catheter which is inserted into the central venous system with the tip sitting within the Superior Vena Cava. (RCN 2010, Dougherty &amp; Lister 2015).</td>
</tr>
<tr>
<td>Child</td>
<td>In this guideline “child” refers to individuals aged 18 years and under.</td>
</tr>
<tr>
<td>Competence</td>
<td>The attainment of knowledge, intellectual capacities, practice skills, integrity and professional and ethical values required for safe, accountable and effective practice as a registered nurse or registered midwife (NMBI 2015, p.15).</td>
</tr>
<tr>
<td>Continuous Infusion</td>
<td>May be defined as the intravenous delivery of a medication or fluid at a constant rate over a prescribed period of time. The length of time over which a continuous infusion is administered will range from several hours to several days (Whittington 2008, p.125.).</td>
</tr>
<tr>
<td>Direct Intermittent Injection (Intravenous Bolus)</td>
<td>Constitutes the administration of a medicine in a small volume of diluents directly into a venous access device or in the injection port of the administration set (Whittington 2008, p. 127).</td>
</tr>
<tr>
<td>Flush Volume</td>
<td>Routine flushing of a CVAD is performed at established intervals to promote and maintain patency and to prevent mixing of incompatible medication and solutions. (RCN 2010)</td>
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<tr>
<td>Guideline</td>
<td>Definition</td>
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<tr>
<td>Healthcare Professional</td>
<td>In this guideline any medical practitioner or registered nurse employed by the HSE or who provides care on behalf of the HSE.</td>
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<tr>
<td>Intermittent Infusion</td>
<td>Is the administration of a small-volume infusion i.e. 50-240 mls, over a period of between 20 minutes and 2 hours. This may be given as a specific dose at one time or at repeated intervals during a 24 hour period (Whittington 2008, p. 126).</td>
</tr>
<tr>
<td>Medication Management</td>
<td>The facilitation of safe and effective use of prescription and over the counter medicinal products (Bulechek and McCloskey 1999, p. 706).</td>
</tr>
<tr>
<td>Medicinal Product</td>
<td>Any substance or combination of substances presented for treating or preventing disease in human beings (Directive 2001/83/EC).</td>
</tr>
<tr>
<td>Peripherally Inserted Central Catheter (PICC)</td>
<td>A Peripherally Inserted Central Catheter (PICC) is a thin flexible single or double lumen catheter that is inserted via a peripheral vein into a central vein, the tip of which terminates centrally in the Superior Vena Cava (SVC) (Dougherty and Lister 2015).</td>
</tr>
<tr>
<td>Priming Volume</td>
<td>The amount of fluid required to fill the entire length of the CVAD. The discharging facility will inform community service of the child’s individual priming volume. (Dougherty and Lister 2015).</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Responsibility is explained as the obligation to perform duties, tasks or roles using sound professional judgement and being answerable for the decisions made in doing this. (NMBI 2015, p.17).</td>
</tr>
<tr>
<td>Subcutaneous Infusion (Hypodermoclysis)</td>
<td>Injection of fluids into the subcutaneous tissues to supply the body with liquids quickly (RCN 2010).</td>
</tr>
<tr>
<td>Syringe Driver</td>
<td>The syringe driver is a small, portable, battery-driven infusion pump, which allows medication to be infused via subcutaneous or central venous access route over a 24 hour period (Dickman et al 2011).</td>
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### Abbreviations used in the Document*

<table>
<thead>
<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>ABA</td>
<td>An Bord Altranais</td>
</tr>
<tr>
<td>ANTT</td>
<td>Aseptic Non Touch Technique</td>
</tr>
<tr>
<td>CNSp</td>
<td>Clinical Nurse Specialist</td>
</tr>
<tr>
<td>CON</td>
<td>Children’s Outreach Nurse</td>
</tr>
<tr>
<td>CVAD</td>
<td>Central Venous Access Device</td>
</tr>
<tr>
<td>DoH</td>
<td>Department of Health</td>
</tr>
<tr>
<td>DPHN</td>
<td>Director of Public Health Nursing</td>
</tr>
<tr>
<td>FBC</td>
<td>Full Blood Count</td>
</tr>
<tr>
<td>Fr</td>
<td>French (Catheter Measurement)</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>HSE</td>
<td>Health Service Executive</td>
</tr>
<tr>
<td>IV</td>
<td>Intravenous</td>
</tr>
<tr>
<td>MDT</td>
<td>Multidisciplinary Team</td>
</tr>
<tr>
<td>mls</td>
<td>Millilitres</td>
</tr>
<tr>
<td>NHS</td>
<td>National Health Service</td>
</tr>
<tr>
<td>NMBI</td>
<td>Nursing and Midwifery Board of Ireland</td>
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<tr>
<td>NMPDU</td>
<td>Nursing and Midwifery Planning and Development Unit</td>
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<tr>
<td>OLCHC</td>
<td>Our Lady’s Children’s Hospital Crumlin</td>
</tr>
<tr>
<td>PCT</td>
<td>Primary Care Team</td>
</tr>
<tr>
<td>PHN</td>
<td>Public Health Nurse</td>
</tr>
<tr>
<td>PICC</td>
<td>Peripherally Inserted Central Catheter</td>
</tr>
<tr>
<td>psi</td>
<td>Pounds per Square Inch</td>
</tr>
<tr>
<td>RCN</td>
<td>Royal College of Nursing</td>
</tr>
<tr>
<td>SVC</td>
<td>Superior Vena Cava</td>
</tr>
<tr>
<td>TPN</td>
<td>Total Parenteral Nutrition</td>
</tr>
<tr>
<td>U &amp; E</td>
<td>Urea and Electrolytes</td>
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*Please note some of these abbreviations are currently not in the HSE Standards and Recommended Practices for Health Care Records Management 2011.*
6.0. Roles and Responsibilities

It is the responsibility of each healthcare professional using or managing a CVAD for a child cared for in the community to have read and to comply with this guideline. An integrated discharge planning process is essential to enable healthcare professionals in the community to provide optimum care (see Section 8.1). This section therefore also includes relevant aspects of the roles and responsibilities of healthcare professionals in the discharging facility and is structured sequentially, in order of transition of care from hospital to the community.

Children’s Palliative Care Clinical Nurse Specialist (Our Lady’s Children’s Hospital Crumlin) (OLCHC) – As a member of a hospital based palliative care team, the Clinical Nurse Specialist (CNSp) is responsible for co-ordinating care between the hospital and the community, for children with specialist palliative care needs. As a hospital based team this is done in collaboration with the child’s primary medical team. The Children’s Palliative Care CNSp has a responsibility to educate, in collaboration with existing education facilities and to support the primary healthcare team assisting in symptom management.

Consultant Paediatrician - is responsible for the decision to discharge the child. This needs to be a well-planned integrated discharge to allow adequate time for healthcare professionals in the community to be up-skilled, if required, in order to provide optimum care. The Consultant Paediatrician will communicate, as required with members of the Multidisciplinary Team (MDT) within the hospital, the child’s GP, Paediatric Consultant in local hospital and Consultant in Palliative Medicine if relevant.

CNSp / Designated nurse co-ordinating discharge - is responsible for contacting the Director of Public Health Nursing (DPHN) or Public Health Nurse (PHN) as appropriate. She/he will provide a discharge summary relating to all aspects of the child’s care. The CNSp/designated nurse co-ordinating discharge if required will meet with healthcare professional(s) who will provide care for the child with a CVAD in the community and will supply a list of any required equipment to the PHN/Community RGN. The CNSp/designated nurse co-ordinating discharge may be required to collaboratively provide education either at hospital or community level. This will be decided on a case by case basis.

Children’s Haematology/Oncology Clinical Nurse Specialist (CNSp) – is responsible for co-ordination of care between the hospital and community for children with a haematology/oncology condition in collaboration with local healthcare professionals, at hospital and community level. The CNSp has a responsibility to educate, in collaboration with existing education facilities and to provide support to the primary healthcare team, assisting in symptom management.
**General Practitioner (GP)** - The child’s GP receives notification regarding discharge which contains details regarding the child’s condition, medical history and requirements for care from the hospital. The GP is responsible for prescribing medication for the child in the community as required and in consultation, where necessary, with the child’s Paediatrician and/or hospital team.

**Director of Public Health Nursing (DPHN)** - is responsible for the governance and provision of the public health nursing service and is therefore responsible for implementation of this guideline within the community nursing service. (S)he must ensure that nursing staff within their remit have access to this guideline and to ensure that staff are released for education to support the implementation of the guideline.

**Public Health Nurse (PHN)** - is responsible, given notification of planned discharge to have any required equipment/appliances in place as indicated by the discharging facility. She/he will provide direct care and management of the CVAD as required when the child has been referred to his/her caseload and will work within their scope of practice.

**The Community Specialist Palliative Care Team** - is responsible for the provision of specialist palliative care for adults/children who have been referred and accepted for care by the Specialist Palliative Care Service. The Specialist Palliative Care Team is an interdisciplinary team made up of a Consultant in Palliative Medicine, Clinical Nurse Specialists, and may also include Health and Social Care Professionals. Following the referral and acceptance for care of a child with specialist palliative care needs the team works in collaboration with the GP, PHN and other members of the primary care team and the Paediatric Units involved in the child’s care.

**Children’s Outreach Nurse (CON) for Life Limiting Conditions** - is responsible for the co-ordination of care between the hospital and the community for children with life limiting conditions (see Section 8.1). In collaboration with local healthcare professionals this includes the provision of care for children with specific palliative care needs at hospital and community level. The CON acts as a paediatric resource and has a supportive role in education in collaboration with existing education facilities.
7.0. The Care and Management of CVADs (Hickman™/Broviac™ Catheter, Portacath™ and PICC Lines) for a Child in the Community

In this guideline CVAD refers to Skin Tunnelled Catheters (Hickman™/Broviac™), Tunnelled Implanted Ports (Portacath™) and Peripherally Inserted Central Catheters (PICC). For the purpose of this document as the care for both Hickman™/Broviac™ catheters are similar, Hickman™ will be referred to hereafter.

In this section the care and management of CVADs will be outlined. Each subsection will detail the specific care needs of the following commonly used devices – Hickman™ /Broviac™ Catheter, PortaCath™ and PICC.

7.1. Introduction to Hickman™ Catheter

The Hickman™ Catheter is a central venous access device inserted under general anaesthetic in theatre. It is made of silicone and is approximately 90cms long and it is cut to the appropriate size for each individual child at the time of its insertion. It is tunnelled under the skin of the chest wall and inserted via the internal or external jugular vein with the tip sitting within the Superior Vena Cava (RCN 2010, Dougherty and Lister 2015). The external end exits from the chest wall usually lateral to the right breast (see Figure 1). The catheter has a short Dacron cuff on its outer surface, situated under the skin, above the point of exit from the chest. This is designed to act as a barrier to infection and to anchor the line in the subcutaneous tissue. These catheters may have single, double or triple lumens, which allows multiple, and concurrent venous access. These catheters are commonly used in children.

Figure 1: Position of Hickman™ Catheter
7.1.1. Guidelines for the Care of a Hickman™ Catheter

1. Strict hand hygiene is essential prior to handling the catheter at all times.
2. All procedures are carried out using an aseptic non-touch technique (Rowley and Clare, 2011) (see Appendix VI (a), for information on aseptic non-touch technique). Sterile gloves must be worn when accessing the catheter for taking blood cultures, changing the needle free device and connecting or disconnecting Total Parenteral Nutrition (TPN) infusion lines.
3. The use of sterile gloves is unnecessary when administering bolus medication, attaching and detaching intravenous infusions (Rowley and Clare 2011).
4. The Hickman™ Catheter must remain clamped when not in use.

7.1.2. Care and Maintenance

7.1.2.1. Flushing and Maintaining Patency

It is essential to follow certain general principles prior to flushing and maintaining the patency of a Hickman™ Catheter:

Syringe Size: It is recommended that a 10 ml syringe (or larger) be used for withdrawing blood samples or injecting into any Hickman™ Catheter as infusion pressure must not exceed 25 psi (a catheter will rupture at pressures in excess of 25 psi). Small syringes generate very high internal pressures with very little force (Bard 2010).

Flush Volumes: Sodium Chloride (NaCl) 0.9% is used before and after drug administration. It is used after blood sampling and after disconnecting lines. Heparin Sodium (10 units per ml IV flush solution) is then instilled to maintain patency (Dougherty and Lister 2015). The volume varies depending on the age and weight of the child. Please refer to instructions from the discharging facility Appendix VIII).

Push-Pause Method: It is important to use a push-pause method when flushing the Hickman™ Catheter as this creates turbulence within the lumen and helps prevent the formation of fibrin clots. Administer 1ml of solution, pause for one second, and repeat until the appropriate volume has been administered. The procedure is completed using a positive pressure technique (Trigg and Mohammed 2010; Dougherty and Lister 2015).

Positive Pressure Technique: A positive pressure technique is accomplished by clamping the Hickman™ Catheter as the last 0.5 ml of Heparin Sodium (10 units per ml IV flush solution) is being instilled. Maintaining positive pressure within the catheter
prevents backflow of blood into the catheter (Trigg and Mohammed 2010, Dougherty and Lister 2015).

**Blood Return and Patency:** When not in use all lumens of the catheter must be clamped and heparinised weekly to maintain patency (Dougherty and Lister 2015). Patency of the Hickman™ Catheter is confirmed by obtaining a blood return. It must always be checked prior to instillation of any drug or infusion. If there is a suspicion that the line has dislodged i.e. cuff is visible, no blood return on aspiration, do not use it. Contact the discharging facility for advice if the line has dislodged.

**Blood Discard Volume Chart:** Prior to taking blood samples, the Hickman™ Catheter must be aspirated using a 10ml syringe. The first sample may contain Heparin Sodium, a small amount of blood, bacteria or clots and must be discarded unless being used for blood cultures. The discard volume will vary according to the age of the child. Please note that this may vary depending on the discharging facility (see Appendix IX for an example of a blood discard volume chart). The discarded sample must not be returned to the child.

7.1.3. **Blood Sampling (see Appendix X)**
When obtaining a blood sample from a multi-lumen catheter use the free lumen where possible. Ensure that the other lumens are clamped to avoid contamination of the blood sample.

7.1.4. **Needle Free Devices/Clamps**
There are many needle free device products currently in use. The hub of the catheter must always be protected with a needle free luer lock device and must be changed weekly (Bard 2010) using an aseptic non touch technique. The clamp must be kept closed while disconnecting an IV line, changing a needle free device and when the catheter is not in use. The clamp must always be closed over the reinforced catheter sleeve to prevent damage to the catheter.

7.1.5. **IV Administration Sets/Drug Administration**
IV administration sets connected to the Hickman™ Catheter must be changed every 48 hours unless the closed system is broken. However, children who are neutropenic or on TPN must have administration sets changed every 24 hours (Dougherty and Lister 2015). Attach a label with the date and time of change. The use of three-way taps is not recommended.
Where possible use a free lumen to administer bolus medications and check for blood return. Flush with Sodium Chloride (NaCl) 0.9% before and after the administration of the bolus medication (Dougherty and Lister 2015). Then flush with Heparin Sodium (10 units per ml IV flush solution) after the administration of Sodium Chloride (NaCl) 0.9%. The volume is dependent on the age and weight of the child (see Appendix VIII). Please note that this may vary depending on the discharging facility.

7.1.6. External Catheter Dressings

Exit site dressings must be changed weekly (O’Grady et al 2002). A sterile semi-permeable polyurethane transparent dressing is preferred as it allows the site to be observed. If the child becomes sensitive to this dressing, a sterile self-adhesive absorbent type dressing can be used. The frequency of dressing changes will be governed by the condition of the underlying exit site. Advice can be sought from the discharging facility if there are concerns about the condition of the exit site.

7.1.6.1. Securing a Hickman™ Catheter

The Hickman™ Catheter must be looped under the dressing for additional security to reduce the effect of pulling on the catheter. Care is needed to prevent the lumens of the catheter being caught or pulled particularly in the case of babies and young children.
7.1.7. Procedures to Guide the Care and Management of a Hickman™ Catheter

Prior to the commencement of the intervention the healthcare professional should consider the general suitability of the environment including the provision of appropriate hand hygiene facilities.

7.1.8. Catheter Dressing, Flushing, Needle Free Device Changes

**Equipment for single lumen**

- Clean Tray (plastic)
- Sterile gloves – 1 pair
- Heparin Sodium (10 units per ml IV flush solution) 5ml vial x 1 as per valid prescription or pre-filled syringe. Check expiry date*
- 10ml syringe x 1*
- Filter needle/straw/blunt fill needle x 1*
- Needle free device x 1
- Sterile semi-permeable polyurethane transparent dressing x 1
- Sterile, individually packaged, single use wipes X 8 – containing 2% w/v chlorhexidine gluconate and 70% v/v isopropyl alcohol (as recommended by discharging facility).

**Please Note:** The RCPI/HSE guidelines (2014) recommend the use of sterile chlorhexidine solution 0.5% in infants less than two months old corrected gestational age if using on the infant's skin.

- Sharps bin.

*not required if using prefilled syringes

**For each additional lumen you will need:**

- 10 ml syringe x 1*
- Filter needle/straw/blunt fill needle x 1*
- Needle free device x 1
- Heparin Sodium (10 units per ml IV flush solution) 5ml vial x 1 or pre-filled syringe*
- Sterile, individually packaged, single use wipes X 4 – containing 2% w/v chlorhexidine gluconate and 70% v/v isopropyl alcohol.

*not required if using prefilled syringes
<table>
<thead>
<tr>
<th>PROCEDURE</th>
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<tbody>
<tr>
<td>1. Explain the procedure to the child and parents/guardians. (Regarding consent, refer to HSE National Consent Policy 2013).</td>
</tr>
<tr>
<td>2. Perform hand hygiene prior to starting the procedure (RCPI/HSE 2015).</td>
</tr>
<tr>
<td>3. Wash the tray and dry it with a paper towel.</td>
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<tr>
<td>4. Wipe the top surface of the tray with a disinfection wipe and allow it to dry for 30 seconds (Loveday <em>et al</em> 2014).</td>
</tr>
<tr>
<td>5. Open the sterile glove packet onto the tray. The inside of this packet is now your ‘sterile field’.</td>
</tr>
<tr>
<td>6. Carefully open filter needle/straw/blunt fill needle, syringe, needle free device, pre-filled syringe if used and dressing onto the glove packet using an aseptic non-touch technique.</td>
</tr>
<tr>
<td>7. Open the disinfection wipes onto the packet using an aseptic non-touch technique.</td>
</tr>
<tr>
<td>8. Check the expiry date on the bottle of Heparin Sodium (10 units per ml IV flush solution/pre-filled syringe), open and leave it beside the tray.</td>
</tr>
<tr>
<td>9. Remove the child’s old dressing and discard outside the tray. Take care not to dislodge the line (the second person or the child can remove the old dressing, having first washed their hands, and taking care not to pull on the line).</td>
</tr>
<tr>
<td>11. Attach filter needle/straw/blunt fill needle onto the syringe and draw up 2.5ml (10 units per ml IV flush solution) of Heparin Sodium (Dougherty and Lister 2015) unless using pre-filled syringe.</td>
</tr>
<tr>
<td>12. Remove the filter needle/straw/blunt fill needle and discard outside of the tray. Expel the air by slowly pushing up the plunger. Place the syringe on the tray.</td>
</tr>
<tr>
<td>13. Unfold three disinfection wipes leaving remainder unfolded.</td>
</tr>
<tr>
<td>14. With one hand pick up the Hickman™ Catheter. This hand now becomes the non-sterile hand and must not touch the sterile field. Pick up an unfolded disinfection wipe in the other hand (sterile hand) and remove the needle free device by rotating it to the left.</td>
</tr>
<tr>
<td>15. Discard both the disinfection wipe and the needle free device outside of the tray. Pick up another disinfection wipe (sterile hand) and clean the open end of the Hickman™ Catheter. Discard the disinfection wipe outside of the tray. Allow it to dry for 30 seconds (Loveday <em>et al</em> 2014).</td>
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<tr>
<td>16. Attach (sterile hand) the new needle free device to the Hickman™ Catheter by rotating it to the right for a secure fit.</td>
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<tr>
<td>17. Attach (sterile hand) the 10ml syringe containing solution by pushing it firmly into the centre of the needle free device and rotating it to the right for a secure fit. Open (non-sterile hand) the clamp and slowly withdraw blood to check for the patency of the line, then slowly inject the Heparin Sodium (10 units per ml IV flush solution) into the line using push – pause method. Close (non-sterile hand) the clamp as the last 0.5ml is being injected (Dougherty and Lister 2015). Remove (sterile hand) the syringe and discard it outside of the tray.</td>
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</table>
18. Clean (sterile hand) the top of the needle free device with a disinfection wipe and allow it to dry for 30 seconds (Loveday et al 2014). Discard the disinfection wipe outside of the tray.

19. Repeat the same procedure for change of needle free devices in double and triple lumen catheters.

20. Pick up (non-sterile hand) the Hickman™ Catheter, taking care not to pull on it. Pick up (sterile hand) a disinfection wipe and carefully clean the skin around the exit site in a circular movement. Start at the catheter exit site. Discard the disinfection wipe outside of the tray.

21. Repeat the cleaning procedure with two other disinfection wipes moving a little further out from the exit site each time.

22. Now with the remaining unfolded disinfection wipe (sterile hand) gently clean the catheter from the exit site to the end of the catheter, taking care not to pull on it, and then discard outside of the tray.

23. For a double or triple lumen Hickman™ Catheter, use a separate disinfection wipe for each lumen, to clean from the triangle area down to the end of the catheter.

24. Loop the Hickman™ Catheter on to the chest wall as illustrated in Figure 2. The child or a second person (having washed their hands) may hold the loop in place. Place the sterile semi-permeable polyurethane transparent dressing over the exit site securely and press out any air under the dressing. Secure the Hickman™ Catheter (Dougherty and Lister 2015).

25. Dispose of needles and syringes into the sharps bin, and other equipment appropriately as per local guidelines.


**Figure 2: Securing and Flushing the Hickman™ Catheter**
7.1.9. Procedure for Connecting an Infusion Set to a Hickman™ Catheter

Perform hand hygiene (RCPI/HSE 2015) and collect the following:

**Equipment**
- Clean Tray (plastic)
- Sterile preparation towel
- Sodium Chloride (NaCl) 0.9%, 10ml x 1 or pre filled syringe*
- 10 ml syringe x 1*
- Blunt-fill needle x 1*
- Non-injectable bung x 1
- IV fluid prescription sheet
- Infusion set
- IV fluid for infusion
- Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 1.

* not required if using prefilled syringes

**PROCEDURE**

1. The IV fluid intended for infusion must be checked.
2. Prepare the infusion set, maintaining the sterility of the end of the line which will be connected to the Hickman™ Catheter.
3. Open preparation towel and cover the tray. Check expiry date of Sodium Chloride (NaCl) 0.9% and using blunt-fill needle draw up into syringe (volume to be advised by discharging facility). Remove the blunt-fill needle and expel the air bubbles. Attach a sterile non-injectable bung to the syringe and place it on the tray. Open disinfection wipes onto preparation towel.
4. Explain the procedure to the child and the parent/guardian.
6. Carefully clean the centre of the needle free device with a disinfection wipe and allow it to dry for a minimum of 30 seconds.
7. Remove the non-injectable bung from the syringe and attach the syringe to the centre of the needle free device by pushing it in firmly and rotating it to the right for a secure fit. Open clamp. Confirm blood return by gently withdrawing blood into the syringe and slowly inject 1-2ml of Sodium Chloride (NaCl) 0.9% using a push–pause method. Close the clamp.
8. Remove cap from the IV giving set and connect it to the needle free device by pushing it in firmly and rotating it to the right for a secure fit.
9. Do not open the Hickman™ clamp until ready to commence infusion. Ensure the correct rate is set according to the prescription.
10. Dispose of all needles and syringes immediately into the sharps bin and dispose of all other equipment appropriately and perform hand hygiene (RCPI/HSE 2015).
### Procedure for Disconnecting an Infusion Set from a Hickman™ Catheter

**Equipment**
- Clean tray (plastic) and sterile preparation towel
- 10ml syringe x 2
- Filter needle/straw/blunt fill needle x 2
- Non-injectable bung x 2
- Sodium Chloride (NaCl) 0.9% 10ml x 1 or pre-filled syringe. Check expiry date*
- Heparin Sodium (10 units per ml IV flush solution) 5ml vial x 1 as per valid prescription (or pre-filled syringe)*
- Disposable disinfection wipes x 3–70% v/v isopropyl alcohol and 2% Chlorhexidine gluconate (as recommended by discharging facility)
- Sharps bin.

*Not required if using prefilled syringes.

**PROCEDURE**

1. Explain the procedure to the child and parents/guardians. (Regarding consent, refer to HSE National Consent Policy 2013).
3. Open the preparation towel and cover the tray (Loveday et al 2014). Check expiry date of Sodium Chloride (NaCl) 0.9% and Heparin Sodium (10 units per ml IV flush solution) or pre-filled syringe. Using a filter needle/straw/blunt fill needle draw up Sodium Chloride (NaCl) 0.9% and Heparin Sodium (10 units per ml IV flush solution) into two separate syringes as recommended by the discharging facility. Remove the filter needle/straw/blunt fill needle and discard outside of the tray, expel air bubbles and attach a non-injectable bung to each syringe tip. Place the syringes on the tray.
4. Turn off the pump, close line clamp and clamp the Hickman™ Catheter.
6. Holding the catheter in one hand, pick up a disinfection wipe and clean the connection between the IV giving set and the needle free device, allow it to dry for 30 seconds (Loveday et al 2014).
7. Rotate the giving set connection to the left, and detach it from the needle free device.
8. Carefully clean the centre of the needle free device with a disinfection wipe. Allow it to dry for 30 seconds (Loveday et al 2014).
9. Remove non-injectable bung from the syringe containing Sodium Chloride (NaCl) 0.9%. Push the syringe firmly into the centre of the needle free device and rotate to the right for a secure fit. Open the clamp and slowly inject the Sodium Chloride (NaCl) 0.9% as per instructions from discharging facility using a push-pause method (Dougherty and Lister 2015). Close clamp and
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<td>10.</td>
<td>Remove non-injectable bung from the syringe containing Heparin Sodium (10 units per ml IV flush solution) as per instructions from discharging facility, attach the syringe to the needle free device and inject the solution as above. Close the clamp as the last 0.5ml is being injected. Remove the syringe by rotating to the left and discard.</td>
</tr>
<tr>
<td>11.</td>
<td>Carefully clean the centre of the needle free device with a disinfection wipe and allow it to dry for 30 seconds. Ensure the catheter is secured safely.</td>
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7.1.11. **Procedure for Connecting a Syringe Driver to a Hickman™ Catheter**

Hickman™ Catheters may have one or more lumens, any of which can be used with the syringe driver. The priming volume (or dead space within the line) depends on the final length of the catheter when inserted in theatre. It is the responsibility of the discharging facility to notify the relevant health care professionals of the child’s individual priming volumes. In the event of families not having the required supplies, they can be organised by the PHN/Community RGN.

7.1.12. **Principles of Safe Practice when Connecting a Syringe Driver to a Hickman™ Catheter**

1. The syringe driver infusion pump must comply with safety criteria outlined in Appendix XI.

2. It is recommended that when connecting an infusion for the first time to the Hickman™ Catheter that a second 10ml/20ml leurol lock syringe containing the same medication to be administered, is drawn up. The syringe used to prime the line is then replaced with the second syringe so that the infusion will not need to be changed several hours later or early the next day. The first syringe is then discarded.

3. There is a time delay as medication travels the length of the Hickman™ Catheter before reaching the child. The duration of this delay depends on the actual length of the catheter (lumen) and it’s (the child’s) priming volume. Some children will have their individual priming volumes calculated and documented on discharge to the community. In the case of children whose priming volume is not calculated and documented, the clinician must contact the discharging hospital. This is important as there can be significant variation in priming volumes. Please note that this may vary depending on the discharging facility.

4. Once the priming volume is calculated, the length of time it will take for the medication to reach the child will depend on the type of syringe driver used. A stat dose of medication may be given via another route, e.g. orally, rectally, or subcutaneously to achieve symptom control quickly while waiting for the medication to reach the child.

5. When connecting a syringe driver to a Hickman™ Catheter for the first time, check the selected lumen for blood return to confirm the position of the catheter. The lumen can be flushed with Sodium Chloride (NaCl) 0.9% and the infusion line attached in the usual way.

6. The needle free device and the infusion line from the syringe driver needs to be changed once a week. However, if changes in a dosage of drug are made or new drugs added, the infusion line from the syringe driver must be changed. The length of the
Hickman™ Catheter must be taken into account, as a delay will occur before the new dose reaches the child.
In the event that the medication in the catheter needs to be withdrawn, aspirate and withdraw blood equivalent to its priming volume. It is then safe to flush the lumen with Sodium Chloride (NaCl) 0.9%. If reconnecting the line to that lumen please remember that the medication will take some time to reach therapeutic levels as what will infuse initially is the Sodium Chloride (NaCl) 0.9% within the lumen. A stat dose of medication may need to be given for symptom control in the intervening period. The other lumen can still be used. It must be checked for blood return and flushed prior to initial use as per procedure.

7. The lumen in use does not need to be flushed routinely when in continuous use. If the infusion is discontinued, care must be taken at all times not to inject any drugs remaining within the catheter.

8. If during a syringe driver infusion the catheter (lumen) appears to have blocked it must not be flushed with Sodium Chloride (NaCl) 0.9% as the medication within that lumen will be flushed into the circulation and could represent several hours’ worth of dosage. In this instance the line must be clearly labelled “Do not use, lumen blocked” and the parent/guardian made aware not to flush it during routine Hickman™ care. This must be documented and the child’s GP and discharging facility notified. However, if an alternative lumen is available, set up infusion as per Section 7.1.9.

9. A syringe and infusion line that was previously connected to a blocked lumen cannot be re-used. It must be discarded and a new syringe driver and infusion line commenced on an alternate lumen to prevent cross infection.
7.1.13. Equipment and Requirements for Connecting Syringe Driver to a Hickman™ Catheter

- Valid prescription
- Written instruction/medical order issued by a registered medical practitioner
- Clean Tray (plastic)
- Disposable disinfection wipes x 1 – 70% v/v Isopropyl alcohol and 2% chlorhexidine gluconate.
- 10ml syringe x 1*
- Filter needle/straw/blunt fill needle x 2*
- Luer-lock syringe 10ml/20ml/30ml for infusion
- Non-injectable bung X 1
- Prescribed medications
- Prescribed diluent
- Prescribed Sodium Chloride (NaCl) 0.9% for flush*
- Infusion line for use with syringe driver
- 1ml, 2ml, 5ml, 10ml syringes to draw up prescribed medication
- Syringe driver infusion pump (The syringe driver infusion pump must comply with safety criteria outlined in Appendix XI)
- New syringe driver batteries
- Medication label
- Sharps bin.

* Not required if using prefilled syringes.
### PROCEDURE

1. The issues highlighted in Section 7.1.2. must be considered at all times when carrying out this procedure.

2. Explain the procedure to the child and parents/guardians. (Regarding consent, refer to HSE National Consent Policy 2013).

3. Check with the parents/guardians for known allergies.

4. Check expiry date of all preparations.


6. Draw up a flush of Sodium Chloride (NaCl) 0.9% as recommended by the discharging facility in a 10ml syringe using non-touch technique.

7. Attach a non-injectable bung to the tip of the syringe to maintain sterility.

8. Label the syringe and place on the tray.

9. Select syringe type for syringe driver and size 10 ml/20 ml/30ml as appropriate for dispensed medication. Use syringe with luer-lock nozzle.

10. Fill the syringe with the prescribed medication and diluents. Load syringe on pump. Once syringe brand and size are confirmed the pump calculates and displays the volume in the syringe to be delivered in ml/hr. Press YES to confirm the calculated rate. Pump prompts ‘START INFUSION’. Select NO and remove syringe from pump. DO NOT TURN OFF PUMP. Connect the infusion line to the luer-lock of the syringe and prime the line with the prescribed medication leaving the cover on the end.

   **Note:** infusion time will be lost due to priming, as some of the prescribed medication is used. This needs to be taken into account when calculating time for subsequent reloading of syringe driver. (A second syringe may be used as in 7.1.12 point 2).

11. The syringe must be labelled with the following as a minimum: child’s name, date of birth, amount of medication strength being delivered, date and time infusion commenced, signature of clinician. Attach label to the blank side of the syringe.

12. Reload syringe on pump as per manufacturers’ instructions, local guidelines/policies/protocols. The pump will identify the type and size of syringe and display on this screen again. Press YES to resume. Pump will then display summary of volume, duration and rate.

   **PLEASE NOTE:** Duration and volume will have decreased during priming process. This is correct.

13. Perform hand hygiene adhering to aseptic non touch technique (RCPI/HSE 2015)

14. Support the Hickman™ Catheter with one hand and, clean the centre of the needle free device with disinfection wipe and discard outside of the tray. Allow to dry for 30 seconds (Loveday et al 2014).

15. Remove the non-injectable bung from the flush syringe containing the Sodium Chloride (NaCl) 0.9% syringe.

16. Support the needle free device. Attach the flush of Sodium Chloride (NaCl) 0.9% by pushing the syringe firmly into the centre of the needle
17. Open the clamp of the Hickman™ Catheter and draw back gently to assess for blood return to confirm correct position. Inject Sodium Chloride (NaCl) 0.9% flush using a push-pause method (Dougherty and Lister 2015).

18. Close the clamp, remove syringe from the needle free device by gently turning it to the left.

19. Remove the cover on the end of the primed infusion line.

20. Attach the infusion line to the end of the Hickman™ Catheter by pushing it firmly into the centre of the needle free device, rotating it to the right.

21. Open the clamp on the Hickman™ Catheter, open the clamp on the connecting infusion line and commence the infusion by pressing start on syringe driver.

22. Dispose of waste as per local guidelines.


### 7.1.14. Procedure for Daily or Alternate Day Change of Syringe

2. Close clamp on the Hickman Catheter.
3. Pause the pump and remove syringe.
4. Draw up prescribed medications for infusion into appropriate (selected) luer lock syringe using aseptic non-touch technique and attach non-injectable bung.
5. Close clamp on the extension set.
6. Clean the area where the extension set and syringe meet with the disinfection wipe and allow it to dry.
7. Remove previously used syringe.
8. Remove non-injectable bung and attach new syringe.
9. Load the syringe into the syringe driver as per manufacturers’ instructions, local guidelines/policies/protocols.
10. Open the clamp on the Hickman™ Catheter, open the clamp on the connecting infusion line and commence the infusion by pressing start on syringe driver.
11. Dispose of waste as per local guidelines.
7.1.15. Procedure for Weekly Change of Needle Free Device and Infusion Line

2. Close clamp on the Hickman Catheter.
3. Pause the pump and remove syringe.
4. Select syringe type for syringe driver and size 10 ml/20 ml/30ml as appropriate for dispensed medication. Use syringe with luer-lock nozzle.
5. Fill the syringe with the prescribed medication and diluents. Load syringe on pump. Once syringe brand and size are confirmed the pump calculates and displays the volume in the syringe to be delivered in ml/hr. Press YES to confirm the calculated rate. Pump prompts ‘START INFUSION’. Select NO and remove syringe from pump. DO NOT TURN OFF PUMP. Connect the infusion line to the luer-lock of the syringe and prime the line with the prescribed medication leaving the cover on the end.

Note: infusion time will be lost due to priming, as some of the prescribed medication is used. This needs to be taken into account when calculating time for subsequent reloading of syringe driver. (A second syringe may be used as in 7.1.12 point 2).

6. The syringe must be labelled with the following as a minimum: child’s name, date of birth, amount of medication strength being delivered, date and time infusion commenced, signature of clinician. Attach label to the blank side of the syringe.
7. Reload syringe on pump as per manufacturers’ instructions, local guidelines/policies/protocols. The pump will identify the type and size of syringe and display on this screen again. Press YES to resume. Pump will then display summary of volume, duration and rate.

PLEASE NOTE: Duration and volume will have decreased during priming process. This is correct.
8. Perform hand hygiene.
9. Open sterile glove packet onto tray. The inside of this packet is now the sterile field.
10. Carefully open needle free device onto the glove packet using an aseptic non-touch technique (Rowley and Clare 2011).
11. Open the disinfection wipes onto the glove packet using an aseptic non-touch technique.
13. Unfold the disinfection wipes.
14. With one hand pick up the Hickman Catheter. This hand now becomes the non sterile hand and must not touch the sterile field. Pick up the unfolded disinfection wipe in the other hand (sterile hand) and remove the needle free device by rotating it to the left.
15. Discard both the disinfection wipe and the needle free device outside of the tray. Pick up another disinfection wipe (sterile hand) and clean the
open end of the Hickman™ Catheter. Discard the disinfection wipe outside of the tray. Allow it to dry for 30 seconds (Loveday et al. 2014).

16. Attach the new needle free device to the Hickman Catheter by rotating it to the right for a secure fit.

17. Remove the cover on the end of the primed infusion line.

18. Attach the infusion line to the end of the Hickman Catheter by pushing it firmly into the centre of the needle free device, rotating it to the right.

19. Open the clamp on the Hickman™ Catheter, open the clamp on the connecting infusion line and commence the infusion by pressing start on the syringe driver.

20. Dispose of waste as per local guidelines.

7.2 Introduction to Tunnelled Implanted Port (Portacath™)

A Portacath™ is an implanted venous access device which is implanted subcutaneously in a convenient but inconspicuous location on the body, usually on the chest wall or forearm.

There are two basic parts to the system:
- The reservoir – a small plastic chamber sealed at the top by a rubber disc (septum) designed to withstand multiple punctures.
- A thin catheter – one end is placed into a vein inside the body and the other end is firmly attached to the reservoir.

A Portacath™ is normally inserted under general anaesthetic. A subcutaneous pocket is surgically created to hold the reservoir and a separate incision, usually in the neck, is made to locate the vein into which the catheter will be placed. The catheter is tunneled under the skin from the reservoir and inserted via the internal or external jugular vein with the tip sitting within the Superior Vena Cava. The Portacath™ may be used immediately following insertion once the position is confirmed on an x-ray and the system is flushed to ensure it is working properly.

Implanted ports require minimal site care as there is an intact skin layer over the Portacath™. Portacaths™ are easy to access for IV fluids, administration of medications and blood sampling.

7.2.1 Guidelines for the Care of a Tunnelled Implantable Port (Portacath™)

1. Local anaesthetic cream as per valid prescription can be applied prior to access (subject to patient preference), refer to medication leaflet for specific instructions.
2. An aseptic non-touch technique must be observed when accessing the Portacath™.
3. The skin over the Portacath™ site must be cleaned with a disinfection wipe prior to accessing the Portacath™ (2%w/v chlorehexidine gluconate/70% v/v isopropyl alcohol) as recommended by the discharging facility (Loveday et al 2014).
   **Please note:** The RCPI/HSE Guidelines (2014) recommend the use of sterile chlorhexidine solution 0.5% in infants less than two months old corrected gestational age.
4. To access the Portacath™ use a non-coring needle i.e. a needle that does not damage the port by coring the silicone on insertion (Dougherty 2006). Non-coring needles are available in various gauges and lengths. Choose the appropriate size for the individual child as advised by the discharging facility.
5. A non-coring needle may stay in place for up to two weeks depending on the child’s condition. In the neutropenic child a non-coring needle may remain in place for seven days (Dougherty and Lister 2015).

6. Use only 10ml syringes or larger when accessing or flushing the Portacath™ (Weinstein 2007, Dougherty and Lister 2015, Perucca 2001).

7. Correct needle placement must be confirmed with blood return (Dougherty 2006). In the event of no blood return, contact the discharging facility for advice.

7.2.2. Care and Maintenance

7.2.2.1 Flushing and Maintaining Patency
A non-coring needle and a 10ml syringe (or larger) must always be used to access the Portacath™. The non-coring needle is inserted through the skin and the silicone rubber septum into the portal chamber for repeated venous access e.g. for antibiotic therapy. Prior to accessing the Portacath™ for flushing and blood sampling, refer to the discharging facility guidance (see Appendix VIII for an example of Volume of Flush Solutions). Please note that this may vary depending on the discharging facility.

7.2.3 Blood Sampling (see Appendix X(b))
A non-coring needle is inserted into the Portacath™ to obtain blood samples (see Appendix X(b), which details how to perform this procedure).

7.2.4. Needle Free Devices/Clamps
There are many needle free device products currently in use. A needle free device must be connected to the extension set of the non-coring needle and must be changed weekly (Bard 2010) using an aseptic non touch technique. The clamp/s must be kept closed while disconnecting an IV line, changing a needle free device and when the catheter is not in use.

7.2.5. IV Administration Sets/Drug Administration
In order to administer IV fluids/IV drugs, a non-coring needle needs to be in-situ. The discharging facility will advise regarding priming of IV administration sets and how often IV administration sets need to be changed. Before and after the administration of the bolus medication the Portacath™ must be flushed with Sodium Chloride (NaCl) 0.9% (Dougherty and Lister 2015) followed by Heparin Sodium flush (see Appendix VIII). The discharging facility will advise regarding the volume which is dependent on the age and weight of the child.
7.2.6. External Catheter Dressings
Portacaths™ do not require an external dressing when not in use. When a non-coring needle is to remain in situ, a sterile semi-permeable polyurethane transparent dressing is used to hold the needle in position and prevent dislodgement. Ongoing monitoring of the site is required observing for needle position, leakage, dressing integrity and signs of infection.

7.2.7. Procedures to Guide the Care and Maintenance of a Portacath™
Prior to the commencement of nursing intervention the healthcare professional should consider the general suitability of the environment including the provision of appropriate hand hygiene facilities.

7.2.8. Procedure for Insertion of a Non-coring Needle and Flushing of Implantable Port

Equipment and Requirements
- Clean Tray (plastic)
- Local anaesthetic cream as per valid prescription and manufacturer’s leaflet to be applied prior to access
- A sterile semi-permeable polyurethane transparent dressing
- Sterile gloves
- Heparin Sodium (10 units per ml IV flush solution) 5ml vial x 1 as per valid prescription*
- 10 ml syringe x 3 *
- Sodium Chloride (NaCl) 0.9% 10ml x 1
- Filter needle/straw/blunt fill needle x 2*
- Sharps bin
- Needle free device x 1
- Non-coring needle x 1
- Disposable disinfection wipes x 5– 70% v/v isopropyl alcohol and 2% w/v chlorhexidine gluconate as recommended by discharging facility.

Please note that the RCPI/HSE Guidelines (2014) recommend the use of sterile chlorhexidine solution 0.5% infants less than two months old corrected gestational age.

* Not required if using prefilled syringes.
**PROCEDURE**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Explain the procedure to the child and parents/guardians. (Regarding consent, refer to HSE National Consent Policy 2013).</td>
</tr>
<tr>
<td>2.</td>
<td>Wash the skin with soap and water to remove the ointment based anaesthetic cream and dry.</td>
</tr>
<tr>
<td>3.</td>
<td>Perform hand hygiene prior to starting the procedure (RCPI/HSE 2015).</td>
</tr>
<tr>
<td>4.</td>
<td>Assist the patient into a comfortable position.</td>
</tr>
<tr>
<td>5.</td>
<td>Wash the tray and dry with a paper towel (Dougherty and Lister 2015).</td>
</tr>
<tr>
<td>6.</td>
<td>Wipe the entire top surface of the tray with a disinfection wipe. Discard outside the tray and allow the tray to dry (Loveday <em>et al</em> 2014).</td>
</tr>
<tr>
<td>7.</td>
<td>Open the glove packet onto the tray. The inside of this packet is now your “sterile field” (Dougherty and Lister 2015).</td>
</tr>
<tr>
<td>8.</td>
<td>Carefully open syringes, filter needle/straw/blunt fill needles, needle free device, non-coring needle and dressing onto the glove packet using an aseptic non-touch technique.</td>
</tr>
<tr>
<td>9.</td>
<td>Open the disinfection wipes onto the packet in the same way.</td>
</tr>
<tr>
<td>10.</td>
<td>Open the bottle of Heparin Sodium (10 units per ml IV flush solution) and Sodium Chloride (NaCl) 0.9% and place them beside the tray (outside the sterile field).</td>
</tr>
<tr>
<td>12.</td>
<td>Attach filter needle/straw/blunt fill needle to the syringe and draw up Heparin Sodium as recommended by the discharging facility. Remove the filter needle/straw/blunt fill needle and discard outside the tray. Expel the air by slowly pushing up the plunger. Place the syringe on the tray (Dougherty and Lister 2015).</td>
</tr>
<tr>
<td>13.</td>
<td>Attach second filter needle/straw/blunt fill needle to the second syringe and draw up Sodium Chloride (NaCl) 0.9% as recommended by the discharging facility. Remove the filter needle/straw/blunt fill needle and discard outside the tray. Expel the air by slowly pushing up the plunger. Attach the needle free device to the end of the non-coring needle and extension set. Prime the line with the Sodium Chloride (NaCl) 0.9% until fluid exits. Clamp the line. Do not remove the syringe (Dougherty, 2006).</td>
</tr>
<tr>
<td>14.</td>
<td>Clean the raised access site of the Portacath™ and surrounding skin using disinfection wipe, working in a clockwise direction from the raised centre outwards. Repeat three times, using each wipe once only and allow the site to dry (Trigg and Mohammed, 2006; Dolan and Dougherty, 2000).</td>
</tr>
<tr>
<td>15.</td>
<td>Pick up both the non-coring needle with the attached Sodium Chloride (NaCl) 0.9% syringe in one hand.</td>
</tr>
<tr>
<td>16.</td>
<td>Hold the syringe of Sodium Chloride (NaCl) 0.9% in the palm of the dominant hand and the non-coring needle with two fingers.</td>
</tr>
<tr>
<td>17.</td>
<td>Remove the protective cover from the non-coring needle with the other hand.</td>
</tr>
<tr>
<td>18.</td>
<td>Palpate the edges of the Portacath™, holding the outer edges through the skin with two fingers of the non-dominant hand, to stabilise the port (ensure the Portacath™ is secure and non-mobile) (Dougherty and Lister 2015).</td>
</tr>
<tr>
<td>19.</td>
<td>Insert the non-coring needle firmly through the skin and port at a 90 degree angle until it hits the bottom of the Portacath™ chamber.</td>
</tr>
</tbody>
</table>
20. Check for blood return. If there is no blood return, stop the procedure and contact the discharging facility. If there is blood return, flush the line with Sodium Chloride (NaCl) 0.9% as prescribed (Dougherty and Lister 2015).

21. Attach the syringe containing Heparin Sodium to the needle free device. Open clamp and inject the Heparin solution, closing the clamp as the last 0.5ml is being injected (Krzywda, 1999).

22. If removing the non-coring needle, press down on the Portacath™ with two fingers to stabilise the port. Withdraw the non-coring needle. It may be necessary to apply a plaster if site is oozing.

23. If on-going care dictates the non-coring needle can remain in situ. It may be necessary to place a small piece of gauze under the non-coring needle to secure its position. Cover with a transparent dressing (Loveday et al 2014).

24. Ensure that the child is comfortable and that the line is well secured.


27. The non-coring needle may remain in place for up to two weeks unless the child is neutropenic. Use a sterile semi-permeable polyurethane transparent dressing to secure the needle and avoid dislodgement.

Figure 3: Inserting the Non-Coring Needle into the Portacath™ Chamber
7.2.9. Procedure for Connecting an Infusion Set to a Portacath™ (with non-coring needle in situ)

Perform hand hygiene (RCPI/HSE 2015) and collect the following:

**Equipment**
- Clean Tray (plastic)
- Sterile preparation towel
- Sodium Chloride (NaCl) 0.9%, 10ml x 1 or pre filled syringe*
- 10 ml syringe x 1*
- Filter needle/straw/blunt-fill needle x 1*
- Non-injectable bung x 1
- IV fluid prescription sheet
- Infusion set
- IV fluid for infusion
- Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 1.

* not required if using prefilled syringes.

**PROCEDURE**

1. The IV fluid intended for infusion must be checked.
2. Prepare the infusion set, maintaining the sterility of the end of the line which will be connected to the Portacath™.
3. Open preparation towel and cover the tray. Check expiry date of Sodium Chloride (NaCl) 0.9% and using blunt-fill needle draw up into syringe (volume to be advised by discharging facility). Remove the blunt-fill needle and expel the air bubbles. Attach a sterile non-injectable bung to the syringe and place it on the tray.
4. Explain the procedure to the child and the parent.
6. Carefully clean the centre of the needle free device with a disinfection wipe and allow it to dry for a minimum of 30 seconds.
7. Remove the non-injectable bung from the syringe and attach the syringe to the centre of the needle free device by pushing it in firmly and rotating it to the right for a secure fit. Open clamp. Confirm blood return by gently withdrawing blood into the syringe and slowly inject 1-2ml of Sodium Chloride (NaCl) 0.9% using a push–pause method. Close the clamp.
8. Remove cap from the IV giving set and connect it to the needle free device by pushing it in firmly and rotating it to the right for a secure fit.
9. Do not open the non-coring needle extension set clamp until ready to commence infusion. Ensure the correct rate is set according to the prescription.
10. Dispose of all needles and syringes immediately into the sharps bin and dispose of all other equipment appropriately and perform hand hygiene (RCPI/HSE 2015).
7.2.10. Procedure for Disconnecting an Infusion Set from a Portacath™

Perform hand hygiene (RCPI/HSE 2015) and collect the following Equipment:

- Clean tray (plastic) and sterile preparation towel
- Sodium Chloride (NaCl) 0.9% 10ml x 1 or prefilled syringe
- Heparin Sodium Flushing Solution (10 units/ml) 5ml vial x 1 or prefilled syringe*
- 10ml syringe x 2*
- Filter needle/straw/blunt fill needle x 1*
- Non – injectable bung x 2
- Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 3. *Not required if using prefilled syringes.

PROCEDURE


2. Open the preparation towel and cover the tray. Check expiry date of Sodium Chloride (NaCl) 0.9% and Heparinised Sodium. Using blunt-fill needle draw up 3ml of Sodium Chloride (NaCl) 0.9% and using filter needle draw up 2.5 ml of Heparin Sodium into two separate syringes. Remove the blunt-fill needle/filter needle, expel air bubbles and attach a non-injectable bung to each syringe tip. Place the syringes on the tray.

3. Take the tray to the patient’s bedside and explain the procedure to the patient/parents. (Regarding consent, refer to HSE National Consent Policy 2013).


5. Turn off the pump, close line clamp and close clamp on non-coring needle.

6. Holding the catheter in one hand, pick up a disinfection wipe and clean the connection between the IV giving set and the needle free device. Allow it to dry for a minimum of 30 seconds.

7. Rotate the giving set connection to the left, and detach it from the needle free device.

8. Carefully clean the centre of the needle free device with another disinfection wipe and allow it to dry for a minimum of 30 seconds.

9. Remove non injectable bung and attach the syringe containing Sodium Chloride (NaCl) 0.9% by pushing firmly into the centre of the needle free device and rotating to the right for a secure fit. Open the clamp and slowly inject (volume as instructed by discharging facility), using a push-pause method. Close clamp and remove syringe by rotating to the left and discard.

10. Remove non-injectable bung from the syringe containing heparinised sodium, attach the syringe to the needle free device and inject the solution as above. Close the clamp as the last 0.5ml is being injected. Remove the syringe by rotating to the left and discard.

11. Carefully clean the centre of the needle free device with disinfection wipes and allow it to dry for a minimum of 30 seconds. Ensure the catheter is secured safely.

12. Dispose of needles and syringes immediately into a sharps bin and dispose of all other equipment appropriately.
7.2.11. Principles of Safe Practice when Connecting a Syringe Driver to a Portacath™

1. The syringe driver infusion pump must comply with safety criteria outlined in Appendix XI.

2. It is recommended when connecting an infusion for the first time to the Portacath™, to draw up two leurolock syringes (10ml/20ml/30ml) containing the same medication to be administered. The first syringe is used to prime the line and is then discarded. The second syringe is attached for infusion. The infusion will therefore not need to be changed several hours earlier due to the priming procedure.

3. There is a time delay as medication travels the length of the Portacath™, before reaching the child. The clinician must contact the discharging hospital for advice regarding priming volume. This is important as there can be significant variation in priming volumes. Please note that this may vary depending on the discharging facility.

4. A stat dose of medication may be given via another route, e.g. orally, rectally, or subcutaneously to achieve symptom control quickly while waiting for the medication to reach the child.

5. When connecting a syringe driver to a Portacath™ for the first time it is necessary to check for blood return to confirm the position of the Portacath™. Once confirmed the Portacath™can be flushed with Sodium Chloride (NaCl) 0.9% (refer to Appendix VIII for flush volumes or to the discharging facility) and the infusion line attached in the usual way. In an event of no blood return, please contact the discharging facility for advice.

6. The needle free device and the infusion line from the syringe driver needs to be changed once a week. However, if changes in a dosage of drug are made or new drugs added the infusion line from the syringe driver must be changed.

7. The Portacath™ does not need to be flushed routinely when in continuous use. Care must be taken at all times not to inject any drugs remaining within the catheter if the infusion is discontinued.

8. If during a syringe driver infusion the Portacath™ appears to have blocked it must not be flushed with Sodium Chloride (NaCl) 0.9% as the medication within the Portacath™ will be flushed into the circulation and could represent several hours’ worth of dosage. In this instance contact the discharging facility for advice. The infusion line must be clearly labelled “Do not use” and the parent/guardian made aware not to flush it during routine Portacath™ care. This must be documented and the child’s GP and other relevant stakeholders notified.

Equipment and Requirements

- Valid prescription
- Written instruction/medical order issued by a registered medical practitioner
- Clean Tray (plastic)
• Disposable disinfection wipes x 1 – 70% v/v Isopropyl alcohol and 2% chlorhexidine gluconate

  **Please note** that the RCPI/HSE Guidelines (2015) recommend the use of sterile chlorhexidine aqueous solution 0.5% in infants less than two months old corrected gestational age if touching the skin.

• Non-coring needle x 1
• Filter needle/straw/blunt fill needles x 2*
• Luer-lock syringe 10ml/20ml/30ml for infusion*
• Non-injectable bung X 1
• Prescribed medications
• Prescribed diluent
• Prescribed Sodium Chloride (NaCl) 0.9% for flush*
• Infusion line for use with syringe driver
• 1ml, 2ml, 5ml, 10ml syringes to draw up prescribed medication
• Syringe driver infusion pump (The syringe driver infusion pump must comply with safety criteria outlined in Appendix XI)
• New syringe driver batteries
• Medication label
• Sharps bin.

* Not required if using prefilled syringes.
### PROCEDURE

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<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong></td>
<td>The issues highlighted in Section 7.1.2. must be considered at all times when carrying out this procedure.</td>
</tr>
<tr>
<td><strong>2.</strong></td>
<td>Explain the procedure to the child and parents/guardians. (Regarding consent, refer to HSE National Consent Policy 2013).</td>
</tr>
<tr>
<td><strong>3.</strong></td>
<td>Check with the parents/guardians for known allergies.</td>
</tr>
<tr>
<td><strong>4.</strong></td>
<td>Insert non-coring needle as per Section 7.2.8</td>
</tr>
<tr>
<td><strong>5.</strong></td>
<td>Check expiry date of all preparations.</td>
</tr>
<tr>
<td><strong>6.</strong></td>
<td>Perform hand hygiene (RCPI/HSE 2015).</td>
</tr>
<tr>
<td><strong>7.</strong></td>
<td>Draw up a flush of Sodium Chloride (NaCl) 0.9% as recommended by the discharging facility in a 10ml syringe using non-touch technique.</td>
</tr>
<tr>
<td><strong>8.</strong></td>
<td>Attach a non-injectable bung to the tip of the syringe to maintain sterility.</td>
</tr>
<tr>
<td><strong>9.</strong></td>
<td>Label the syringe and place on the tray.</td>
</tr>
<tr>
<td><strong>10.</strong></td>
<td>Select syringe type for syringe driver and size 10 ml/20 ml/30ml appropriate to dispensed medication. Use syringe with luer-lock nozzle.</td>
</tr>
<tr>
<td><strong>11.</strong></td>
<td>Fill the syringe with the prescribed medication and diluents. Load syringe on pump. Once syringe brand and size are confirmed the pump calculates and displays the volume in the syringe to be delivered in ml/hr. Press YES to confirm the calculated rate. Pump prompts ‘START INFUSION’. Select NO and remove syringe from pump. DO NOT TURN OFF PUMP. Connect the infusion line to the luer-lock of the syringe and prime the line with the prescribed medication leaving the cover on the end.</td>
</tr>
<tr>
<td><strong>12.</strong></td>
<td><strong>Note:</strong> Infusion time will be lost due to priming, as some of the prescribed medication is used. This needs to be taken into account when calculating time for subsequent reloading of syringe driver (<strong>A second syringe may be used as in 7.2.11 point 2</strong>).</td>
</tr>
<tr>
<td><strong>13.</strong></td>
<td>The syringe must be labelled with the following as a minimum: child’s name, date of birth, amount of medication strength being delivered, date and time infusion commenced, signature of clinician. Attach label to the blank side of the syringe.</td>
</tr>
<tr>
<td><strong>14.</strong></td>
<td>Reload syringe on pump as per manufacturers’ instructions, local guidelines/policies/guidelines. The pump will identify the type and size of syringe and display this on screen again. Press YES to resume. Pump will then display summary of volume, duration and rate.</td>
</tr>
<tr>
<td><strong>15.</strong></td>
<td><strong>PLEASE NOTE:</strong> Duration and volume will have decreased during priming process. This is correct.</td>
</tr>
<tr>
<td><strong>16.</strong></td>
<td>Perform hand hygiene, adhering to aseptic non touch technique (Rowley and Clare 2011).</td>
</tr>
<tr>
<td><strong>17.</strong></td>
<td>Support the extension set with one hand and, clean the centre of the needle free device with disinfection wipe and discard outside of the tray. Allow to dry for 30 seconds (Loveday et al 2014).</td>
</tr>
<tr>
<td><strong>18.</strong></td>
<td>Remove the non-injectable bung from the flush syringe containing the Sodium Chloride (NaCl) 0.9% syringe.</td>
</tr>
<tr>
<td><strong>19.</strong></td>
<td>Support the needle free device. Attach the flush of Sodium Chloride</td>
</tr>
</tbody>
</table>
(NaCl) 0.9% by pushing the syringe firmly into the centre of the needle free device rotating to the right to secure the fit (Dougherty and Lister 2015).

20. Open the clamp on the extension set and draw back gently to assess for blood return to confirm correct position. Inject Sodium Chloride (NaCl) 0.9% flush using a push-pause method (Dougherty and Lister 2015).

21. Close the clamp, remove syringe from the needle free device by gently turning it to the left (Dougherty and Lister 2015).

22. Remove the cover on the end of the primed infusion line.

23. Attach the infusion line to the end of the extension set by pushing it firmly into the centre of the needle free device, rotating it to the right (Dougherty and Lister 2015).

24. Open the clamp on the extension set, open the clamp on the connecting infusion line and commence the infusion.

25. Dispose of waste as per local guidelines.

**7.2.12. Procedure for Daily or Alternate Day Change of Syringe**

2. Close the clamp on the non-coring needle extension set.
3. Pause the pump and remove syringe.
4. Draw up prescribed medications for infusion into appropriate (selected) luer lock syringe using aseptic non touch technique and attach non-injectable bung.
5. Close Portacath™ catheter clamp and the infusion line clamp.
6. Clean the area where the infusion line and syringe meet with the disinfection wipe and allow it to dry.
7. Remove previously used syringe.
8. Remove non-injectable bung and attach new syringe.
9. Load the syringe into the syringe driver as per manufacturers’ instructions, local guidelines/policies/protocols by pressing start on syringe driver.
10. Open the clamp on the Portacath™ Catheter, open the clamp on the connecting infusion line and commence the infusion.
11. Dispose of waste as per local guidelines.

**7.2.13. Procedure for Weekly Change of Needle Free Device and Infusion Line**

2. Close clamp on the non-coring needle extension set.
3. Pause the pump and remove syringe.
4. The syringe must be labelled with the following as a minimum: child’s name, date of birth, amount of medication strength being delivered,
date and time infusion commenced, signature of clinician. Attach label to the blank side of the syringe.

5. Reload syringe on pump. The pump will identify the type and size of syringe and display this on screen again. Press YES to resume. Pump will then display summary of volume, duration and rate.

6. **PLEASE NOTE:** Duration and volume will have decreased during priming process. This is correct.

7. Perform hand hygiene.

8. Open sterile glove packet onto tray. The inside of this packet is now your ‘sterile field’.

9. Carefully open needle free device onto the glove packet using an aseptic non-touch technique.

10. Open the disinfection wipes onto the glove packet using an aseptic non-touch technique.


12. Unfold the disinfection wipes.

13. With one hand pick up the non-coring needle extension set with needle free device attached. This hand now becomes the non sterile hand and must not touch the sterile field. Pick up the unfolded disinfection wipe in the other hand (sterile hand) and remove the needle free device by rotating it to the left.

14. Discard both the disinfection wipe and the needle free device outside of the tray. Pick up another disinfection wipe (sterile hand) and clean the open end of the non-coring needle extension set. Discard the disinfection wipe outside of the tray. Allow it to dry for 30 seconds (Loveday et al 2014).

15. Attach the new needle free device to the non-coring needle extension set by rotating it to the right for a secure fit.

16. Remove the cover on the end of the primed infusion line.

17. Attach the infusion line to the end of the non-coring needle extension set with new needle free device attached, by pushing it firmly into the centre of the needle free device and rotating it to the right.

18. Perform hand hygiene, adhering to aseptic non-touch technique (Rowley and Clare 2011).

19. Support the extension set with one hand and, clean the centre of the needle free device with disinfection wipe and discard outside of the tray. Allow to dry for 30 seconds (Loveday et al 2014).

20. Remove the non-injectable bung from the flush syringe containing the Sodium Chloride (NaCl) 0.9% syringe.

21. Support the needle free device. Attach the flush of Sodium Chloride (NaCl) 0.9% by pushing the syringe firmly into the centre of the needle free device rotating to the right to secure the fit (Dougherty and Lister 2015).

22. Open the clamp on the extension set and draw back gently to assess for blood return to confirm correct position. Inject Sodium Chloride (NaCl) 0.9% flush using a push-pause method (Dougherty and Lister 2015).
23. Close the clamp, remove syringe from the needle free device by gently turning it to the left (Dougherty and Lister 2015).
24. Remove the cover on the end of the primed infusion line.
25. Attach the infusion line to the end of the extension set by pushing it firmly into the centre of the needle free device, rotating it to the right (Dougherty and Lister 2015).
26. Open the clamp on the extension set, open the clamp on the connecting infusion line and commence the infusion by pressing start on the syringe driver.
7.3. Introduction to Peripherally Inserted Central Catheters (PICC)

A Peripherally Inserted Central Catheter (PICC) is a single or double lumen catheter that is inserted via a peripheral vein into a central vein, the tip of which terminates centrally in the Superior Vena Cava (SVC) (Dougherty and Lister 2015).

**Figure 4: Position of the Peripherally Inserted Central Catheter**

![PICC Diagram]

*Graphic copyright Our Lady’s Children’s Hospital Crumlin.*

7.3.1. Guidelines for the Care of a PICC

1. Strict hand hygiene is essential prior to handling the catheter at all times (RCPI/HSE2015).
2. All procedures are carried out using an aseptic non-touch technique (Rowley and Clare 2011) (see Appendix VI (a)). Sterile gloves must also be worn when accessing the catheter for taking blood cultures, changing the needle free device and connecting or disconnecting Total Parenteral Nutrition (TPN) infusion lines.
3. The use of sterile gloves is unnecessary when administering bolus medication or attaching and detaching intravenous infusions (Rowley and Clare 2011).
4. The PICC must remain clamped when not in use.
7.3.2. Care and Maintenance

7.3.2.1. Flushing and Maintaining Patency
It is essential to follow certain general principles prior to flushing and maintaining the patency of a PICC:

**Syringe Size:** It is recommended that a 10 ml syringe (or larger) be used for withdrawing blood samples or injecting into any PICC as infusion pressure must not exceed 25 psi (a catheter will rupture at pressures in excess of 25 psi). Small syringes generate very high internal pressures with very little force (Bard 2010).

**Flush Volumes:** Sodium Chloride (NaCl) 0.9% is used before and after drug administration. It is used after blood sampling and after disconnecting lines. Heparin Sodium (10 units per ml IV flush solution) is then instilled to maintain patency (Dougherty and Lister 2015). The volume varies depending on the age and weight of the child. Please refer to instructions from the discharging facility.

**Push-Pause Method:** It is important to use a push-pause method when flushing the PICC as this creates turbulence within the lumen and helps prevent the formation of fibrin clots. Administer 1ml of solution, pause for one second, and repeat until the appropriate volume has been administered. The procedure is completed using a positive pressure technique (Trigg and Mohammed 2010, Dougherty and Lister 2015).

**Positive Pressure Technique:** A positive pressure technique is accomplished by clamping the PICC as the last 0.5 ml of Heparin Sodium (10 units per ml IV flush solution) is being instilled. Maintaining positive pressure within the catheter prevents backflow of blood into the catheter (Trigg and Mohammed 2010, Dougherty and Lister 2015).

7.3.3 Blood Sampling
Blood is not usually taken from PICC lines as the lumen of the line can be quite narrow.

7.3.4. Needle Free Devices/Clamps
There are many needle free device products currently in use. The hub of the catheter must always be protected with a needle free luer lock device and must be changed weekly using an aseptic non-touch technique. The clamp must be kept closed while disconnecting an IV line, changing a needle free device and when the catheter is not in use.
7.3.5. IV Administration Sets/Drug Administration

IV administration sets connected to the PICC must be changed every 48 hours unless the closed system is broken. However, children who are neutropenic or on TPN must have administration sets changed every 24 hours (Dougherty and Lister 2015). Attach a label with the date and time of change. The use of three-way taps is not recommended.

7.3.6 External Catheter Dressings

A suitable dressing for a PICC is a sterile semi-permeable polyurethane transparent dressing. A securement device is recommended to secure the line.
7.3.7 Procedures to Guide the Care and Management of a Peripherally Inserted Central Catheter (PICC)

Prior to the commencement of the intervention the healthcare professional should consider the general suitability of the environment including the provision of appropriate hand hygiene facilities.

7.3.8 Catheter Dressing, Flushing, Needle Free Device Changes

**Equipment and Requirements**

- Valid prescription
- Clean Tray (plastic)
- Pair sterile gloves
- 10ml syringe x 1*
- Sterile semi-permeable polyurethane transparent dressing x 1
- Stabilisation device
- Filter needle/straw/blunt fill needle x 1*
- Needle free device x 1
- Heparin Sodium (10 units per ml IV flush solution) 5ml vial x 1 as per valid prescription (or prefilled syringe)*
- Sterile, individually packaged, single use wipes X 8 – containing 2% w/v chlorhexidine gluconate and 70% v/v isopropyl alcohol (as recommended by discharging facility)

Please note that the RCPI/HSE guidelines (2015) recommend the use of sterile chlorhexidine solution 0.5% in infants less than two months old corrected gestational age.

- Sharps bin.

**For each additional lumen you will need:**

- 10 ml syringe x1*
- Filter needle/straw/blunt fill needle x 1*
- Needle free device x 1
- Heparin Sodium (10 units per ml IV flush solution) 5ml vial x 1 or prefilled syringe*
- Sterile, individually packaged, single use wipes X 4 – containing 2% w/v chlorhexidine gluconate and 70% v/v isopropyl alcohol.

* Not required if using prefilled syringes.
1. Explain the procedure to the child and parents/guardians. (Regarding consent, refer to HSE National Consent Policy 2013).

2. Perform hand hygiene prior to starting the procedure (RCPI/HSE 2015).

3. Wash the tray and dry it with a paper towel.

4. Wipe the top surface of the tray with a disinfection wipe and allow it to dry for 30 seconds (Loveday et al 2014).

5. Open the sterile glove packet onto the tray. The inside of this packet is now your ‘sterile field’.

6. Carefully open filter needle/straw/blunt fill needle(s), syringes, needle free device, pre-filled sterile heparin syringe if used, stabilisation device and dressing onto the glove packet using an aseptic non touch technique.

7. Open the disinfection wipes onto the packet using an aseptic non touch technique.

8. Check the expiry date on the bottle of Heparin Sodium (10 units per ml IV flush solution/pre-filled syringe), open and leave it beside the tray.

9. Remove the child’s old dressing and discard outside the tray. Take care not to dislodge the line (the second person or the child can remove the old dressing, having first washed their hands, and taking care not to pull on the line).


11. Attach filter needle/straw/blunt fill needle onto the syringe and draw up 2.5ml (10 units per ml IV flush solution) of Heparin Sodium (Dougherty and Lister 2015) unless using pre-filled sterile heparin syringe.

12. Remove the filter needle/straw/blunt fill needle and discard outside of the tray. Expel the air by slowly pushing up the plunger. Place the syringe on the tray.

13. Unfold two disinfection wipes leaving remainder unfolded.

14. With one hand pick up the PICC. This hand now becomes the non sterile hand and must not touch the sterile field. Pick up an unfolded disinfection wipe in the other hand (sterile hand) and remove the needle free device by rotating it to the left.

15. Discard both the disinfection wipe and the needle free device outside of the tray. Pick up another disinfection wipe (sterile hand) and clean the open end of the PICC line. Discard the disinfection wipe outside of the tray. Allow it to dry for 30 seconds (Loveday et al 2014).

16. Attach (sterile hand) the new needle free device to the PICC by rotating it to the right for a secure fit.

17. Attach (sterile hand) the syringe containing Heparin Sodium solution by pushing it firmly into the centre of the needle free device and rotating it to the right for a secure fit. Open (non-sterile hand) the clamp and slowly withdraw blood to check for the patency of the line, then slowly inject the Heparin Sodium (10 units per ml IV flush solution) into the line using push–pause method. Close (non-sterile hand) the clamp as the last
0.5ml is being injected (Dougherty and Lister 2015). Remove (sterile hand) the syringe and discard it outside of the tray.

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<tr>
<td>18.</td>
<td>Clean (sterile hand) the top of the needle free device with a disinfection wipe and allow it to dry for 30 seconds (Loveday et al 2014). Discard the disinfection wipe outside of the tray.</td>
</tr>
<tr>
<td>19.</td>
<td>Repeat the same procedure for change of needle free devices in double lumen catheters.</td>
</tr>
<tr>
<td>20.</td>
<td>Pick up (non-sterile hand) the PICC, taking care not to pull on it. Pick up (sterile hand) a disinfection wipe and carefully clean the skin around the exit site in a circular movement. Start at the catheter exit site. Discard the disinfection wipe outside of the tray.</td>
</tr>
<tr>
<td>21.</td>
<td>Repeat the cleaning procedure with two other disinfection wipes moving a little further out from the exit site each time.</td>
</tr>
<tr>
<td>22.</td>
<td>Now with the remaining unfolded disinfection wipe (sterile hand) gently clean the catheter from the exit site to the end of the catheter, taking care not to pull on it, and then discard outside of the tray.</td>
</tr>
<tr>
<td>23.</td>
<td>For a double lumen PICC, use a separate disinfection wipe for each lumen, to clean from the triangle area down to the end of the catheter.</td>
</tr>
<tr>
<td>24.</td>
<td>Place the sterile semi-permeable polyurethane transparent dressing over the exit site securely and press out any air under the dressing.</td>
</tr>
<tr>
<td>25.</td>
<td>Secure the PICC using a stabilisation device.</td>
</tr>
<tr>
<td>26.</td>
<td>Place the stabilisation device on the skin and place the PICC in it and close to secure.</td>
</tr>
<tr>
<td>27.</td>
<td>Dispose of needles and syringes into the sharps bin, and other equipment appropriately as per local guidelines.</td>
</tr>
<tr>
<td>28.</td>
<td>Perform hand hygiene.</td>
</tr>
</tbody>
</table>

7.3.9. **Procedure for Connecting an Infusion Set to a PICC**

Perform hand hygiene (RCPI/HSE 2015) and collect the following:

**Equipment**
- Clean Tray (plastic)
- Sterile preparation towel
- Sodium Chloride (NaCl) 0.9% 10ml x 1 or pre filled syringe*
- 10 ml syringe x 1*
- Filter needle/straw/blunt-fill needle x 1*
- IV fluid prescription sheet
- Infusion set
- IV fluid for infusion
- Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 1.

*Not required if using prefilled syringes*
**PROCEDURE**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The IV fluid intended for infusion must be checked.</td>
</tr>
<tr>
<td>2.</td>
<td>Prepare the infusion set, maintaining the sterility of the end of the line which will be connected to the PICC.</td>
</tr>
<tr>
<td>3.</td>
<td>Open preparation towel and cover the tray. Check expiry date of Sodium Chloride (NaCl) 0.9% and using blunt-fill needle draw up into syringe (volume to be advised by discharging facility). Remove the blunt-fill needle and expel the air bubbles. Attach a sterile non-injectable bung to the syringe and place it on the tray. Open disinfection wipes onto preparation towel.</td>
</tr>
<tr>
<td>4.</td>
<td>Explain the procedure to the child and the parent/guardian.</td>
</tr>
<tr>
<td>6.</td>
<td>Carefully clean the centre of the needle free device with a disinfection wipe and allow it to dry for a minimum of 30 seconds.</td>
</tr>
<tr>
<td>7.</td>
<td>Remove the non-injectable bung from the syringe and attach the syringe to the centre of the needle free device by pushing it in firmly and rotating it to the right for a secure fit. Open clamp. Confirm blood return by gently withdrawing blood into the syringe and slowly inject 1-2ml of Sodium Chloride (NaCl) 0.9% using a push–pause method. Close the clamp.</td>
</tr>
<tr>
<td>8.</td>
<td>Remove cap from the IV giving set and connect it to the needle free device by pushing it in firmly and rotating it to the right for a secure fit.</td>
</tr>
<tr>
<td>9.</td>
<td>Do not open the clamp until ready to commence infusion. Ensure the correct rate is set according to the prescription.</td>
</tr>
<tr>
<td>10.</td>
<td>Dispose of all needles and syringes immediately into the sharps bin and dispose of all other equipment appropriately and perform hand hygiene (RCPI/HSE 2015).</td>
</tr>
</tbody>
</table>
7.3.10. Procedure for Disconnecting an Infusion Set from a PICC

Equipment
- Clean tray (plastic) and sterile preparation towel
- 10ml syringe x 2*
- Filter needle/straw/blunt fill needle x 2*
- Non-injectable bung x 2
- Sodium Chloride (NaCl) 0.9% 10ml x 1 or pre-filled sterile normal saline syringe*
- Heparin Sodium (10 units per ml IV flush solution) 5ml vial x 1 as per valid prescription or prefilled sterile heparin syringe*
- Disposable disinfection wipes x 3– 70% v/v isopropyl alcohol and 2% Chlorhexidine gluconate (as recommended by discharging facility)
- Sharps bin.

* Not required if using prefilled syringes.

PROCEDURE

1. Explain the procedure to the child and parents/guardians. (Regarding consent, refer to HSE National Consent Policy 2013).
3. Open the preparation towel and cover the tray (Loveday et al 2014). Check expiry date of Sodium Chloride (NaCl) 0.9% and Heparin Sodium (10 units per ml IV flush solution or pre-filled sterile heparin syringe). Using a filter needle/straw/blunt fill needle draw up Sodium Chloride (NaCl) 0.9% and Heparin Sodium (10 units per ml IV flush solution) into two separate syringes as recommended by the discharging facility. Remove the filter needle/straw/blunt fill needle and discard outside of the tray, expel air bubbles and attach a non-injectable bung to each syringe tip. Place the syringes on the tray.
4. Turn off the pump, close line clamp and clamp the PICC.
5. Perform hand hygiene.
6. Holding the catheter in one hand, pick up a disinfection wipe and clean the connection between the IV giving set and the needle free device, allow it to dry for 30 seconds (Loveday et al 2014).
7. Rotate the giving set connection to the left, and detach it from the needle free device.
8. Carefully clean the centre of the needle free device with a disinfection wipe. Allow it to dry for 30 seconds (Loveday et al 2014).
9. Remove non-injectable bung from the syringe containing Sodium Chloride (NaCl) 0.9%. Push the syringe firmly into the centre of the needle free device and rotate to the right for a secure fit. Open the clamp and slowly inject the Sodium Chloride (NaCl) 0.9% as per instructions from discharging facility using a push-pause method (Dougherty and Lister 2015). Close clamp and remove syringe by rotating to the left and discard.
10. Remove non-injectable bung from the syringe containing Heparin Sodium
(10 units per ml IV flush solution) as per instructions from discharging facility, attach the syringe to the needle free device and inject the solution as above. Close the clamp as the last 0.5ml is being injected. Remove the syringe by rotating to the left and discard.

11. Carefully clean the centre of the needle free device with a disinfection wipe and allow it to dry for 30 seconds. Ensure the catheter is secured safely.


7.3.11. Procedure for Connecting a Syringe Driver to a PICC
   Not applicable to connect a syringe driver to a PICC. There is no evidence to support the use of a syringe driver with a PICC.

7.3.12. Principles of Safe Practice when Connecting a Syringe Driver to a PICC
   Not applicable to connect syringe driver to a PICC.

7.3.13. Procedure for Daily or Alternate Day Change of a Syringe Driver
   Not applicable to connect a syringe driver to a PICC.
8.0. Documentation and Liaison with Key Stakeholders

Integrated discharge planning must commence as soon as possible following the child’s admission to hospital. Health care professionals, where possible, require a minimum notice of three working days in advance of the discharge of a child with a CVAD to the community (see Section 3.1 and 3.2). In order to facilitate preparation of staff, it is recommended that hospital staff contact the PHN/Community RGN once a CVAD has been inserted. The PHN/Community RGN is then aware from an early stage that a child from his/her area is in hospital who will be coming home with a CVAD, giving the PHN/Community RGN time to access any support/education required to upskill.

8.1. Criteria for Discharge Planning

When discharging a child with a CVAD the following points require attention with consideration for local Policies/Procedures/Protocols and Guidelines (PPPGs):

- The CNSp/designated nurse co-ordinating discharge from the discharging facility will provide education for whoever is responsible for the care of the child’s CVAD including the parent or guardian. The PHN may be required to review and reinforce the education at home. In situations where the PHN/Community RGN is required to administer medication via the CVAD, the CNSp/designated nurse co-ordinating discharge will provide education.
- Written parent/guardian information for the care and management of a CVAD for a child in the community will be provided. The relevant community services are contacted regarding the child’s discharge by the CNSp/designated nurse co-ordinating discharge.
- The pharmacy is contacted prior to discharge and the relevant medications ordered by the CNSp/designated nurse co-ordinating discharge.
- The parent/guardian receives a medical prescription from the CNSp/designated nurse co-ordinating discharge for medications required.
- The parent/guardian will be provided with contact details of who to contact if they have any concerns after discharge or for further information or advice.
- The GP will receive details of the child’s condition, medical history and requirements for care from the discharging facility.
- Referral will be made to the DPHN/PHN by the CNSp/designated nurse co-ordinating discharge prior to the child’s discharge to include a discharge summary related to all aspects of the child’s care. This will include a list of required equipment/appliances.
- If required, referral will be made to the Specialist Palliative Care Team.
- The DPHN/PHN will assist with the discharge plan for care at home. A care plan developed collaboratively between the discharging facility and the PHN will also assist in the delivery of care to the child.
- If appropriate, referral is made to the Children’s Outreach Nurse (CON).
A sample of services that may need to be contacted on child’s discharge is contained in Appendix II.
9.0. Dissemination of Guideline

This guideline applies to all HSE staff and healthcare professionals providing care on behalf of the HSE for a child with a CVAD in the community. The guideline will be disseminated by the Office of the Nursing and Midwifery Director to Directors of Public Health Nursing, Directors of Nursing of Children’s Hospital and Directors of Nursing in acute hospitals with a Children’s Unit and Directors of Nursing Specialist Palliative Care Services. It is the responsibility of Directors of Public Health Nursing to ensure that this guideline has been disseminated to all Public Health Nurses and Community RGNs. The guideline is also available to download from:


It is the responsibility of each healthcare professional required to care for a child with a CVAD to read and comply with this guideline.
10.0. Education

An education programme, to include an elearning component, will be developed to support the implementation of this guideline.

11.0. Review and Audit

The content and structure of this guideline will be reviewed after two years.
References


• Health Service Executive (2013b) National Consent Policy. Dublin: Health Service Executive.


• Health Service Executive (2015b) Scope of Nursing and Midwifery Practice Framework. Dublin: Health Service Executive.


• Nursing and Midwifery Board of Ireland (2015) Scope of Nursing and Midwifery Practice Framework. Dublin: Nursing and Midwifery Board of Ireland.


• Our Lady’s Children’s Hospital Crumlin (2013a) Supportive Care Guidelines, Paediatric, Haematology and Oncology. Version 3 Dublin: Our Lady’s Children Hospital.

• Our Lady’s Children Hospital Crumlin (2013b) Guideline on the Care of CVAD for Clinical Staff. Dublin: Our Lady’s Children Hospital.


• Royal College of Nursing (2003) *Restraining, holding still and containing children and young people (Guidance for nursing staff)*. London: Royal College of Nursing.


Appendix I: Psychological, pharmacological and non-pharmacological methods of pain relief for procedural pain in children

- Please refer to local guidelines and policies on pain scales and distraction techniques, pharmacological and non-pharmacological methods of pain relief.
- Pain scales used when appropriate should be developmentally, physically, emotionally and cognitively suitable for the child.

<table>
<thead>
<tr>
<th>Stage – Age</th>
<th>Understanding of pain and responses to pain and Fears and concerns</th>
<th>Measuring pain suggested pain scales: (used where appropriate)</th>
<th>Family Involvement</th>
<th>Distraction techniques and pharmacological and non-pharmacological methods of pain relief</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants 0-1 year</td>
<td>Exhibit facial expressions of pain – brows lowered and drawn together, eyes tightly closed, mouth opened and squarish. Cry intensely, loudly, inconsolable. Poor oral intake. Changes in sleep/awake cycles, activity level. Exhibit hypersensitivity or irritability. Becomes withdrawn unresponsive.</td>
<td>FLACC (Face, legs, arms, cry and consolability scale): Behavioural assessment scale that uses body movements and sounds to assess the pain of infant and toddlers (Hockenberry and Wong 2003).</td>
<td>- Explain procedure to parents/guardians and reason for same. - Encourage parental tactile contact and encourage parent/guardian to hold and comfort but not to restrain the child (RCN 2003). - Explain to the child that the ethyl chloride spray can feel cold. - Also explain that Ametop or Emla can be called ‘magic cream or gel’ as it ‘disappears’ when used.</td>
<td>- Sucrose and Glucose as prescribed. - Application of topical Anaesthetic (e.g. Tetracaine 4% Gel Ametop as Emla is not recommended for children under 1 year) (Please refer to manufacturer’s guidelines and local organisational guidelines) Infants should be supervised when applied in case of ingestion. - Use of ethyl chloride spray (if appropriate). (Davies and Molloy 2006, Scales 2008 and Dougherty and Lister 2015). (Please refer to local guidelines, policies and manufactures’ instructions) - Oral pacifiers (soothers) or if mum is breastfeeding encourage same. - May cry from discomfort on being held rather than being in pain.</td>
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<tr>
<td>Toddler (1-3 year)</td>
<td>Changed behaviour: Irritability, crying, screaming, unusual posture, unusual quietness. Increased clinging, loss of appetite. Restlessness, disturbed sleep pattern. Fears and concerns: Little fear of danger. Fear of separation from parents/guardians. Limited language and understanding of procedure. Threat of immediate pain is overwhelming.</td>
<td>FLACC Pain scale: same as above.</td>
<td>- Same as infant. - Ascertain from parent/guardian common word for pain (hurt) and ways of alleviating pain. - Parents/guardians should be encouraged to hold and comfort the child prior, during and after procedure. - Encourage parents/guardians to decorate cot of child with pictures and toys. - Parents/guardians may read a story book to child with clinical procedure explained in a child friendly manner (Broome 2000 and Willock et al. 2004).</td>
<td>- Application of topical anaesthetic agents or ‘magic cream’ (e.g Tetracaine 4% Gel Ametop Gel) and Lidocaine and Prilocaine 5% (Emla Cream). Refer to manufacturer’s instructions and local organisational guidelines. - Toddlers should be supervised when applied in case of ingestion. (Tak and van Bon 2006 and Franuirk et al 2000). - Be honest with child and let them know that they will feel a pinch and let them know when they will feel it. - Listen to music recordings of family voices or child’s favourite story/song. - Distract child with favourite toy or game. - Oral pacifiers (soothers) or if mum is breastfeeding encourage same. - Reassure the child that you are only taking a small amount of blood and that they will have sufficient blood left. - Ascertain the advice/support of play therapist and psychologist if indicated. - Distraction techniques 10 minutes prior to the procedure to minimise fear.</td>
</tr>
<tr>
<td>Stage – Age</td>
<td>Understanding of pain and responses to pain and Fears and concerns</td>
<td>Measuring pain Suggested Pain scales: (used where appropriate)</td>
<td>Family Involvement</td>
<td>Distraction techniques and pharmacological and non pharmacological methods of pain relief</td>
</tr>
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</table>
| Preschool age children (4-6yr) | Able to use more descriptive adjectives and attachments of associated emotions (e.g. sad, painful, mad) | **Wong-Baker Face Rating Scale**  
Suggested age group 4 years and over and older children with different languages. (Hockenberry and Wong 2003) | - Advised to have parent/guardian present to assist with comforting the child and gaining child’s cooperation (if the parents/guardians and/or child does not speak English arrangements must be made according to organisational policy to organise an interpreter).  
- Reassure the child that they have done nothing wrong and are not being punished.  
- Parent/guardian may read a story book to child with the clinical procedure explained in a child friendly manner. | - Same as with toddler  
- Ascertain what the child likes to play with as this could be used as a distraction technique.  
- Child will have developed magical thinking which can be used for fantasy scenes in guided imagery.  
- Allow child to be involved in the decision making process for procedure. |
| School age children (6-12yr) | Clearer differentiation of pain intensity.  
Beginning to use cognitive coping strategies. Wants explanation of why pain hurts.  
**Fears and concerns:**  
Fear loss of self-control.  
More willing to participate and less dependent on parent/guardian.  
Concerns of pain or procedure limiting current activities rather than future abilities. | **Numerical scale rating**  
Child rates pain intensity from 1-10.  
**Wong-Baker Face Rating Scale**  
Can be used for child with different languages. (Hockenberry and Wong 2003 and Trigg and Mohammed 2006)  
**FLACC**  
Pain scales have been proven to be beneficial in this age group. (Nilsson et al, 2008) | - Child may not want parent/guardian present.  
- Parents/guardians and practitioner can use diagrams, models to explain procedure.  
- Encourage parents/guardians to bring in child’s favourite music and books. | - Important to allow child to be involved in the decision making process.  
- Child will want more explanations of need for procedure.  
- Child will have developed magical thinking which can be used for fantasy scenes in guided imagery.  
- Child can be distracted by reading books, listening to music or T.V. (Doverty 1992). |
<table>
<thead>
<tr>
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<th>Measuring pain Suggested Pain scales: (used where appropriate)</th>
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<th>Distraction techniques and pharmacological and non pharmacological methods of pain relief</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescences 13 yrs +</td>
<td>Pain acknowledged as a 'feeling' May be hyper responsive to pain, minor procedures magnified. Fears and concerns: Want to be consulted with decisions regarding procedure. Sense of identity. Maybe embarrassed to show fear. May act hostile to hide fear. Separation from peers. (Duff 2008, Melhuish and Payne 2006 and Willock et al. 2004).</td>
<td>As above</td>
<td>- Child may not want parent present. - Child may be resistant to parental and authority figures. - Explanation should be given in adult terms.</td>
<td>- Consulted in the decision making process. - Give as much time as possible for advanced warning of procedure. - Reality conversation - Guided imagery - Listening to music, reading books. - Explanation of equipment and function, allow time for questions.</td>
</tr>
<tr>
<td>Children with special needs/ Intellectually challenged</td>
<td>Indications of pain: Increased flexion or extension Crying or alteration in type of sounds made Quieter/withdrawn Hypersensitivity Breath holding Colour changes Changes of facial expression Protective posture Fears and concerns: Similar in age appropriate behaviours that are based on their developmental level (Duff 2008).</td>
<td>FLACC Behavioural assessment scale that uses body movements and sounds to assess older children that are cognitively and verbally impaired.</td>
<td>- Parent/family member or carer should sit with the child and assist if necessary. - Ascertain from parent/family member or carer how the child normally reacts to pain or discomfort and the comforting measures that they use. - Explain procedure to parent/family member or carer and reason for same. (Hockenberry and Wong 2003 and Trigg and Mohammed 2006).</td>
<td>- Similar to age appropriate behaviours that are based on their developmental level.</td>
</tr>
</tbody>
</table>

Adapted from Psychological, pharmacological and non pharmacological methods of pain relief for IV Cannulation and Venepuncture in children (HSE 2010a).
Appendix II: Sample of services that may need to be contacted prior to child's discharge

This is not an exhaustive list and is individualised for each child

1. GP
2. DPHN/PHN/Community RGN
3. The Community Specialist Palliative Care Team
4. Children’s Outreach Nurse
5. Local Hospital
6. Community Pharmacist
Appendix III: Troubleshooting Hickman™/Broviac™

Exit Site Infections

1. If the exit site appears red, inflamed or a discharge is evident, a swab for culture and sensitivity from the site should be taken. If the exit site has a discharge a sterile self-adhesive absorbent type dressing should be used, to allow the exudate to be absorbed. The dressing should be changed daily (Supportive Care Guidelines Paediatric Haematology and Oncology (Version 3, OLCHC 2013).)

2. Ensure that the catheter is firmly secured to prevent accidental dislodgement whilst the exit site is infected.

3. Depending on the sensitivity of the exit site infection appropriate topical and/or antibiotic treatment is applied.

4. If the infection spreads to include the skin tunnel and tracks upwards refer to the discharging facility supervising the child’s treatment for specific guidelines.

Intra Lumen Infection

A Hickman™ Catheter line infection is suspected if a child experiences rigors during or after flushing of the catheter. This warrants immediate medical attention. Please refer to the hospital supervising the child’s treatment as it is necessary to obtain blood cultures from each lumen to determine the cause of infection and treat with appropriate antibiotics.

Oclusion

Obstruction secondary to thrombus formation is one of the complications associated with CVAD (Trigg and Mohammed 2010, Dougherty and Lister 2015). If the line is blocked it will not flush or yield blood on aspiration. Do not attempt to force totally occluded catheters as it may cause rupture of the catheter or dislodge a catheter embolus. Always check the following - cuff position, the line is not kinked and clamp is open. Consider asking the child to change position and cough, as this may improve blood flow. Contact the discharging facility regarding advice/treatment of occlusion.

Catheter Dislodgement

Hickman™ Catheters may accidentally become dislodged and the dacron cuff of the catheter may become visible. Secure the catheter with tape to the chest. Contact the discharging facility for further advice. Do not use the line until it is medically confirmed as safe to use once again (Supportive Care Guidelines Paediatric Haematology and Oncology, OLCHC (Version 3, OLCHC 2013).

If the catheter falls out, apply a sterile dressing over the exit site and apply direct pressure over the entrance site (neck site) and the exit site to stop any bleeding. A chest x-ray should be performed to ensure that there is no residual tubing in situ. Contact the discharging facility for further advice (Supportive Care Guidelines Paediatric Haematology and Oncology, OLCHC (Version 3, OLCHC 2013).
Extravasation
CVADs have decreased the incidence of extravasation. Whilst the incidence of extravasation is lower, the severity of the injuries is far greater as detection tends to occur later and is therefore more serious requiring immediate management. Extravasation can occur as a result of a leaking or damaged catheter or fibrin sheath formation. It may present clinically as leakage of fluid around the catheter exit site, dull aching pain in the shoulder area, tingling, burning or a warm sensation of the chest wall or fever of unknown origin.

Catheter Damage
Catheter damage may occur in the form of a weakness/split of the catheter wall resulting in leakage from the catheter. If this happens:

1. Clamp the catheter between the child and above the damaged area with a smooth-edged, atraumatic clamp, to prevent air entering the catheter via the damaged area and to prevent any blood loss.
2. Seal damaged area with a sterile occlusive dressing to prevent infection and air entry.
3. Contact the discharging facility to arrange catheter repair (Supportive Care Guidelines Paediatric Haematology and Oncology (Version 3, OLCHC 2013)).
Appendix IV: Troubleshooting Portacath™

**Portacath™ Infection**
A documented rise in temperature in a clinically well child following flushing of the Portacath™. It is associated with a chill/rigor, fatigue or decreased activity. It is necessary to contact the discharging facility immediately as this may warrant admission.

**Port Occlusion**
Obstruction secondary to thrombus formation is one of the complications associated with implantable Portacath™. Do not force flushing solution into the Portacath™ as it may dislodge a catheter embolus or result in the device bursting. Contact the discharging facility, as Urokinase may need to be prescribed to unblock the line occlusion.

**Port Erosion**
If skin breaks down over the port reservoir cover with a sterile dressing and contact the discharging facility supervising the child’s care. Once port erosion occurs the device usually requires removal.

**Splitting of the Portacath™**
If there is a suspected break on the internal part of the catheter the child may experience pain or swelling along the catheter track, while flushing the Portacath™. Stop using the Portacath™ immediately and seek advice from the discharging facility. The child may need a lineogram to confirm the breakage.

**Portacath™ Not Yielding Blood**
If there is no blood return from the Portacath™, check that the non-coring needle is reaching the bottom of the reservoir. Check the catheter is unclamped and there are no obvious kinks. Following these measures, if the Portacath™ is still not yielding blood, insert a new non-coring needle and contact the discharging facility.

**Port Pocket Infection**
Swelling, tenderness and redness at the port site or along the catheter tract suggests port pocket infection. Do not access device and contact the discharging facility immediately.
Appendix V: Troubleshooting for Peripherally Inserted Central Catheter (PICC)

Peripherally Inserted Central Catheter Exit Site Infections
1. If the exit site appears red, inflamed, tenderness or discharge is evident, then if possible a swab could be taken. If the exit site has a discharge, a sterile self-adhesive absorbent type dressing should be used, to allow the exudate to be absorbed. Contact your local paediatric team or discharging facility or if possible the specialist team.
2. Ensure that the catheter is firmly secured but available to visualise if required.
3. If the infection spreads to include the skin tunnel and tracks upwards refer to the discharging facility supervising the child’s treatment for specific guidelines.

PICC Catheter Infection
A PICC line infection is suspected if a child experiences rigors during or after flushing of the catheter. This warrants immediate medical attention. Contact your local paediatric team or discharging facility.

Bleeding from the Site
Line displacement trauma or injury is likely to be the cause of bleeding from the site. Place a sterile gauze pad over the site and hold in place until bleeding stops. It is acceptable to have a small amount of blood on the dressing post line insertion but this should not persist after 24 hours. If bleeding persists then contact should be made with your local paediatric team or discharging facility.

Fluid Leaking from the Line
Fluid leaking from the line is generally as a result of line breakage or displacement. If a breakage is noted clamp the line above the breakage and contact your local paediatric team or discharging facility.

Securement Device becomes Loose
In the event that the dressings become loose do not try to further loosen them to remove them. Place a line of tape and another sterile dressing over the securement device and refer to the local paediatric team or discharging facility.

PICC Line Comes Out
If the PICC lines comes out place a sterile gauze pad over the site and press firmly until bleeding stops. When bleeding stops place a sterile gauze dressing over the site and secure in place and contact your local paediatric team or discharging facility.
Appendix VI (a): Aseptic (non touch) Technique

1. Hand hygiene - Wash with an antimicrobial liquid soap and water, or if hands are physically clean, applying an alcohol based hand rub. Hands that are visibly soiled or contaminated with dirt or organic material must be washed with liquid soap and water before using an alcohol hand rub.

2. Prepare an aseptic surface. Procedure trolleys/trays must be cleaned using a detergent and disinfectant.

3. Gather equipment for procedure.

4. Hand hygiene and put on gloves:
   a. Clean, non-sterile gloves: if the procedure can be completed without touching key parts (intravenous drug administration, blood sampling, connecting or disconnecting intravenous fluids except TPN).
   b. Sterile gloves if the procedure cannot be completed without touching key parts (e.g. line manipulation, insertion site dressing changes, connecting TPN and connecting or disconnecting catheters used for haemodialysis).

5. Identify ‘key parts’ e.g., cannula hub, port, infusion line, lumen.

6. Prepare equipment and patient ensuring that all key parts are protected.

7. Protect key parts at all-time using a non-touch technique. Non key parts can be touched with confidence.

8. Carry out procedure taking care to avoid contamination of sterile fields/items/key parts.

9. Dispose of waste and sharps appropriately.

10. Remove gloves.

11. Hand hygiene as per point one above.
### Appendix VI (b): Levels of hand hygiene techniques


<table>
<thead>
<tr>
<th></th>
<th>Social handwash</th>
<th>Antiseptic hand hygiene Wash/rub</th>
<th>Surgical hand hygiene Scrub/rub</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rationale</strong></td>
<td>• To attain socially clean hands</td>
<td>• To achieve a higher level of cleanliness than that achieved during social hand washing</td>
<td>• To remove all transient micro-organisms.</td>
</tr>
<tr>
<td></td>
<td>• To remove dead skin cells and most transient micro-organisms (section 1.2)</td>
<td>• To remove all transient microorganisms</td>
<td>• To obtain a substantial reduction in resident microorganisms</td>
</tr>
<tr>
<td><strong>Hand hygiene agent</strong></td>
<td>• Good quality liquid soap and warm water</td>
<td>• Antiseptic soaps such as Chlorhexidine†</td>
<td>Suitable antiseptic soaps such as:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Alcohol handrub products on visibly clean hands</td>
<td>• Chlorhexidine or Providine Iodine based soaps x 2 - 6 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Plain soap &amp; water followed by 3-5 minute alcohol hand rub</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>• At least 15 seconds</td>
<td>• At least 15 seconds</td>
<td>• Antisepctic soap x 2-6 minutes††</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Alcohol rub 3-5 minutes ††</td>
</tr>
<tr>
<td><strong>Indication</strong></td>
<td>Before:</td>
<td></td>
<td>Before</td>
</tr>
<tr>
<td></td>
<td>• Commencing work</td>
<td></td>
<td>• Any non-surgical procedure that requires aseptic technique.</td>
</tr>
<tr>
<td></td>
<td>• Eating</td>
<td></td>
<td>• Entering isolation rooms</td>
</tr>
<tr>
<td></td>
<td>• Handling food</td>
<td></td>
<td>• Entering critical care areas</td>
</tr>
<tr>
<td></td>
<td>• Each patient contact</td>
<td></td>
<td>After</td>
</tr>
<tr>
<td></td>
<td>• drainage bags, giving injections etc.</td>
<td></td>
<td>• Leaving isolation rooms</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td></td>
<td>• Same as for social hand hygiene</td>
</tr>
<tr>
<td></td>
<td>• Removing gloves</td>
<td></td>
<td>Before</td>
</tr>
<tr>
<td></td>
<td>• Handling soiled equipment and materials</td>
<td></td>
<td>• Any invasive surgical procedure</td>
</tr>
<tr>
<td></td>
<td>• Using the lavatory</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Using handkerchiefs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• End of duty each day</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Technique</strong></td>
<td>• Remove jewellery</td>
<td>• Same as for social hand wash</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Turn on taps</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wet hands</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Apply 5mls (1 tsp.) soap to hands</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wash using method as outlined in Appendix II</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Rinse well</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Turn off tap using hands free method or paper towel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Pat dry well with disposable paper towels</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Discard paper towel into waste bin - open bin by foot pedal only</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Do not touch taps with clean hands</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† Recognised antisepctic soaps/detergents as documented in TFM ’95 and / or EN 1500, EN1499 and for pre-operative hand hygiene TFM ’95, prEN 12054, prEN

†† AS PER MANUFACTURER’S ADVICE, recommendations re: suitability, volume and duration of use
Appendix VII: Your 5 Moments for Hand Hygiene

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this document. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader, in no event shall the World Health Organization be liable for damages arising from its use. WHO acknowledges the Hopitaux Universitaires de Geneve (HUG), in particular the members other Infection Control Programme, for their active participation in developing this material.
### Appendix VIII: Volume of Flush Solution for use in Hickman™, Portacath™ and Peripherally Inserted Central Catheter

<table>
<thead>
<tr>
<th>Volume</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hickman/Broviac</strong></td>
<td></td>
</tr>
<tr>
<td>Before and after drug administration</td>
<td>3mls</td>
</tr>
<tr>
<td><strong>Peripherally inserted Central Catheter (PICC)</strong></td>
<td></td>
</tr>
<tr>
<td>Before and after drug administration</td>
<td>3mls</td>
</tr>
<tr>
<td><strong>Implantable port with open ended Catheter</strong></td>
<td>(Paediatric)*</td>
</tr>
<tr>
<td>4-weekly flush</td>
<td>3ml</td>
</tr>
<tr>
<td>Before and after drug administration</td>
<td>4-5 ml</td>
</tr>
<tr>
<td>After Blood withdrawal</td>
<td>10 ml</td>
</tr>
<tr>
<td>Prior to blood sampling when</td>
<td>20 ml</td>
</tr>
</tbody>
</table>

*All flush volumes are as per discharging consultant*

### Principles of safe practice

**Please note the difference in Heparin sodium dose.**

- **10 units** per ml of Heparin sodium can be used after intermittent drug administration or infusion if the needle remains in situ and the device is used at least 8 hourly.

- If the device will not be in use for 4 weeks, to maintain patency, **100 units** per ml of Heparin sodium is recommended to flush the Portacath®.

*If there is any doubt about flush volumes please contact the discharging hospital*
Appendix IX: Example of a Blood Discard Volume Chart

<table>
<thead>
<tr>
<th>Age</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td>1.5ml</td>
</tr>
<tr>
<td>1-3 years</td>
<td>2.5 ml</td>
</tr>
<tr>
<td>&gt;3 years</td>
<td>5 ml</td>
</tr>
</tbody>
</table>

Reference: Our Lady’s Children’s Hospital Crumlin (2013) Supportive Care Guidelines, Paediatric, Haematology and Oncology. Version 3
Appendix X: Procedure for Blood Sampling

Appendix X (a): Procedure for Taking Blood Sample from a Hickman™ Catheter

Perform hand hygiene (RCPI/HSE 2015).

Equipment and Requirements:
- Clean tray (plastic) and sterile preparation towel
- Gloves (non sterile)
- Large disinfection wipes x 3
- 10ml syringe x 4 (Two syringes required if using pre filled syringes)
- Blood bottles and forms
- Non – injectable bung x 4 ( x 2  if using pre filled syringes)
- Filter needle/straw/blunt fill needle x 2 (not required if using prefilled syringes)
- Sodium Chloride (NaCl) 0.9% solution 10ml x 1 or pre-filled syringe
- Heparin Sodium (10 units per ml IV flush solution) 5ml vial x 1 or pre-filled syringe
- Sharps bin.

PROCEDURE

2. Wash tray and dry with paper towel.
3. Open the preparation towel and cover the tray. Check expiry date of Sodium Chloride (NaCl) 0.9% solution, using a filter needle/straw/blunt fill needle and 10ml syringe draw up Sodium Chloride (NaCl) 0.9% (amount to be advised by referring hospital). Remove the filter needle/straw/blunt fill needle, expel all air and attach a non-injectable bung to the syringe tip. Place the syringe on the tray.
4. Draw up Heparin Sodium solution into a separate 10ml syringe using a filter needle/straw/blunt fill needle. Remove the filter needle/straw/blunt fill needle, expel air bubbles and attach a non-injectable bung to the syringe tip. Place the syringe on the tray.
5. Open the other two 10ml syringes and attach non-injectable bungs to maintain the sterility of the syringe tips and place them on the tray.
6. Take the tray, disinfection wipes and blood bottles to the patient’s bedside and explain the procedure to the child/parents/guardians.
7. Open the disinfection wipes and place them on the tray.
9. Carefully clean the centre of the needle free device with a disinfection wipe (discard same) and allow it to dry for 30 seconds. Place an opened out disinfection wipe under the needle free device.
10. Remove the non-injectable bung from a 10ml syringe, attach the
syringe by pushing firmly into the centre of the needle free device rotating to the right for a secure fit. Open the clamp and slowly withdraw appropriate discard volume of blood (as advised by referring hospital). Close clamp, remove the syringe by rotating it to the left and discard the blood and the syringe with the blood in it.

| 11. | If there is any difficulty in withdrawing blood from the catheter, change the position of the patient. Asking the patient to cough may improve the flow or instil 2-3 ml of Sodium Chloride (NaCl) 0.9% and try again. |
| 12. | Remove the non-injectable bung and attach 2nd 10ml syringe (as before), open the clamp and withdraw the required amount of blood. Close clamp, remove syringe by rotating to the left, and place it on a clean tray. |
| 13. | Attach the syringe with Sodium Chloride (NaCl) 0.9% solution (as before), open the clamp and slowly inject same using push – pause method. Close the clamp, remove the syringe by rotating to the left and discard the syringe. |
| 14. | Attach the syringe with Heparin Sodium solution (10 units per ml IV flush solution), inject slowly using push-pause method. Close the clamp as last 0.5ml being injected and remove the syringe as above and discard. Discard the disinfection wipe from underneath the needle free device. |
| 15. | Carefully clean the centre of the needle free device with a disinfection wipe and allow it to dry for 30 seconds. Ensure the Hickman™ Catheter is secured safely. |
| 16. | Place blood in appropriate bottle and label correctly at the patient’s bed side (fill U+E bottle before FBC bottle to prevent EDTA contamination of U+E sample). |
| 17. | Dispose of needles and syringes immediately into a sharps bin and dispose of all other equipment appropriately. Ensure bloods are transported to the laboratory with the appropriate forms. |
Appendix X (b): Procedure for Taking Blood Sample from Portacath™
(with non-coring needle in situ)

Perform hand hygiene (RCPI/HSE 2015).

**Equipment and Requirements**

- Clean Tray (plastic)
- Sterile preparation towel x 1
- Heparin Sodium (10 units per ml IV flush solution) 5ml vial x 1 as per valid prescription or pre-filled syringe
- 10 ml syringe x 4  (Two syringes required if using pre filled syringes)*
- Sodium Chloride (NaCl) 0.9% 10ml x 1. Check expiry date (or pre filled syringes)*
- Filter needle/straw/blunt fill needle x 1 ( not required if using prefilled syringes)*
- Blunt-fill needle (21g) x 1 ( not required if using prefilled syringes)
- Non injectable bung x 4 ( x 2  if using pre filled syringes)
- Disposable disinfection wipes x 2 (70% v/v isopropyl alcohol and 2% w/v chlorhexidine gluconate) as recommended by discharging facility.

**Please note:** The RCPI/HSE guidelines (2014) recommend the use of sterile chlorhexidine solution 0.5% in infants less than two months old corrected gestational age.

- Blood bottles and forms
- Sharps bin
- Pair non sterile gloves.

* not required if using prefilled syringes.

**PROCEDURE**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Wash the tray and dry with a paper towel (Dougherty and Lister 2015).</td>
</tr>
<tr>
<td>2.</td>
<td>Wipe the entire top surface of the tray with a disinfection wipe. Discard outside the tray and allow the tray to dry (Pratt Po 2014).</td>
</tr>
<tr>
<td>3.</td>
<td>Place a sterile preparation towel on the tray. Carefully open syringes, filter needle/straw/blunt fill needles, needle free devices onto the towel.</td>
</tr>
<tr>
<td>4.</td>
<td>Open the disinfection wipes onto the packet in the same way.</td>
</tr>
<tr>
<td>5.</td>
<td>Open the bottle of Heparin Sodium (10 units per ml IV flush solution) and Sodium Chloride (NaCl) 0.9% and place them beside the tray (outside the sterile field).</td>
</tr>
<tr>
<td>7.</td>
<td>Attach filter needle/straw/blunt fill needle to the syringe and draw up Heparin Sodium as recommended by the discharging facility. Remove the filter needle/straw/blunt fill needle and discard outside the tray. Expel the air by slowly pushing up the plunger. Place the syringe on the tray (Dougherty and Lister 2015).</td>
</tr>
<tr>
<td>8.</td>
<td>Attach blunt-fill needle to the second and third syringe and draw up Sodium Chloride (NaCl) 0.9%, volume as recommended by the discharging facility. Remove the needle and discard outside the tray.</td>
</tr>
<tr>
<td>Step</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>9.</td>
<td>Open the other two 10ml syringes and attach non-injectable bungs to maintain the sterility of the syringe tips and place them on the tray.</td>
</tr>
<tr>
<td>10.</td>
<td>Take the tray, disinfection wipes and blood bottles to the patient’s bedside.</td>
</tr>
<tr>
<td>11.</td>
<td>Explain the procedure to the child and parents/guardians</td>
</tr>
<tr>
<td>12.</td>
<td>Assist the patient into a comfortable position.</td>
</tr>
<tr>
<td>13.</td>
<td>Perform hand hygiene (RCPI/HSE 2015) prior to starting the procedure and put on gloves.</td>
</tr>
<tr>
<td>14.</td>
<td>Carefully clean the centre of the needle free device with a disinfection wipe and allow to dry for a minimum of 30 seconds.</td>
</tr>
<tr>
<td>15.</td>
<td>Remove the non-injectable bung from a 10ml syringe, attach it by pushing firmly into the centre of the needle free device rotating to the right for a secure fit. Open the clamp and slowly withdraw appropriate discard volume of blood. Close clamp, remove the syringe by rotating it to the left and discard the blood and the syringe.</td>
</tr>
<tr>
<td>16.</td>
<td>Remove the non-injectable bung and attach second 10ml syringe (as before), open the clamp and withdraw the required amount of blood. Close clamp, remove syringe by rotating to the left, and place it on a clean tray (plastic).</td>
</tr>
<tr>
<td>17.</td>
<td>Attach the syringe with Sodium Chloride (NaCl) 0.9% solution (as before), open the clamp and slowly inject 3ml using push–pause method. Close the clamp, remove the syringe by rotating to the left and discard the syringe.</td>
</tr>
<tr>
<td>18.</td>
<td>Attach the syringe with 2.5ml of Heparin Sodium solution (10ml/ml); inject slowly using push-pause method. Close the clamp as last 0.5ml being injected and remove the syringe as above and discard. Discard the disinfection wipes from underneath the needle free device.</td>
</tr>
<tr>
<td>19.</td>
<td>Carefully clean the centre of the needle free device with disinfection wipes and allow it to dry for a minimum of 30 seconds. Ensure the catheter is secured safely.</td>
</tr>
<tr>
<td>20.</td>
<td>Place blood in appropriate bottles and label correctly at the patient’s bedside.</td>
</tr>
<tr>
<td>21.</td>
<td>Dispose of needles and syringes into a sharps bin and dispose of all other equipment appropriately. Ensure bloods are transported to the laboratory with the appropriate forms.</td>
</tr>
<tr>
<td>23.</td>
<td>Ensure that the child is comfortable and that the line is well secured.</td>
</tr>
</tbody>
</table>

**Note:** The non-coring needle may remain in place for up to two weeks unless the child is neutropenic, in which case it is changed after one week. Use a transparent waterproof dressing to secure the needle and avoid dislodgement.
Appendix XI: Important safety features for a syringe driver infusion pump

(as stipulated by the Irish Medical Board Safety Notice Medical Devices: SN2014 (22) Issue Date: 30 April 2014)

Due to the discontinuation of the MS16A and MS26 Graseby Syringe Driver devices from July 2014, the IMB wishes to remind those users who seek an alternative device to consider the following safety features when purchasing syringe drivers: -

a. Rate settings in millilitres (ml) per hour  
b. Mechanisms to stop infusion if the syringe is not properly and securely fitted  
c. Alarms that activate if the syringe is removed before the infusion is stopped  
d. Lock-box covers and/or lock out controlled by password  
e. Provision of internal log memory to record all pump events

Note: This is not an exhaustive list.

Further information may be obtained from the following IMB Safety Notices:

- IMB Safety Notice SN2006(03) The Procurement and Commissioning of Medical Equipment for Hospitals  
- IMB Safety Notice SN2003(08) Equipment Management: Guidance for the Maintenance and Timely Replacement of Medical Equipment

During 2014/2015, the McKinley T34 syringe driver was identified as a replacement for Graseby MS16A.

Please note further safety information relating to Graseby Syringe Drivers (MS16A & MS26) is available at:

Appendix XII: Guideline Development Working Group

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Ms. Virginia Pye, National Lead for Public Health Nursing, Office of the Nursing & Midwifery Services Director, Clinical Strategy and Programmes Division, HSE.

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Ms. Alice Ward, Clinical Nurse Facilitator, Haematology/Oncology Our Lady's Children's Hospital, Crumlin, Dublin.
Appendix XIII: Consultation Trail

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Ms. Anne Marie Carroll, Director of Nursing/Chairperson Directors of Nursing Specialist Palliative Care Services Group.

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Ms. Anne Lynott, Director of Public Health Nursing/Chairperson Directors of Public Health Nursing Forum.

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Mr. Darragh O’Loughlin, Secretary General, Irish Pharmacy Union.

Ms Sheila Rochford, Chair of the Quality & Standards Committee, The Irish College of General Practitioners.

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Dr. Fergal Twomey, Consultant in Palliative Medicine, UL Hospital Group and Milford Care Centre/Chair Palliative Medicine Consultant Group.