# GUIDELINE FOR SETTING UP AND CHANGING THE MCKINLEY T34 SYRINGE DRIVER FOR CHILDREN RECEIVING PALLIATIVE CARE

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<thead>
<tr>
<th>Version Number</th>
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<tr>
<td>Date of Issue</td>
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<tr>
<td>Location of Copies</td>
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## Document Review History

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<td>September 2020</td>
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## Document Change History

<table>
<thead>
<tr>
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<td>Battery recommendation</td>
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<td>4.0</td>
<td>References</td>
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Appendices (as necessary)
- Appendix 1 (McKinley T34 location memo)
- Appendix 2 (Quick user guide)
- Appendix 3 (Guideline for the management of a CVAD for a child in the community)
- Appendix 4 Guide to writing a prescription for continuous infusion via the McKinley T34 syringe driver
- Appendix 5 (McKinley T34 monitoring form)
- Appendix 6 (McKinley T34 trouble shooting)
1.0 Introduction

The McKinley T34 syringe driver is a lightweight, portable, battery-driven infusion pump, which allows medications to be infused via subcutaneous or central venous access route over a 24 hour period.

The McKinley T34 is calibrated in millilitres / hr over 24 hours.

Advantages

- Lightweight, compact, battery operated, ideal for ambulatory use.
- Mobility and independence maintained.
- Suitable for subcutaneous (SC) and central venous administration.
- Subcutaneous cannulation is less traumatic than IV and the small volume infused over 24 hours is less irritant.
- Effective symptom control without the need for repeated injections or analgesia (Staurt et al. 2008).
- Plasma drug levels are maintained preventing peaks and troughs, which can occur with intermittent injections.
- Combination of drugs can be given simultaneously.
- Control of multiple symptoms with a combination of drugs (Dickman et al. 2011).
- Widely acceptable route of administration in the community setting, making it possible to manage children at home when more invasive devices are not possible (Jassal, 2015).

Other types of syringe drivers used in Palliative Care

There are various syringe drivers commonly used in palliative care.

Example:
- Graseby MS16A, which is blue in colour (mm/hr)
- Graseby MS26, is green in colour (mm/24hr)

These above mentioned drivers, are not in use in OLCHC, however, they may be used in the community Palliative Care setting. The Guidelines for use of these syringe drivers are different to that of the McKinley T34.

Ensure that the correct guidelines are followed to prevent fatal errors occurring.

The McKinley T34 syringe drivers and all necessary initial supplies, are centrally stored in Palliative Care office in E1 corridor.

Contact the CNS in Palliative Care – Bleep 8301 or the Nursing Administration to access the office: (Appendix 1 memo for accessing T34 out of hours)
2.0 Indications for use

- Child is unable to tolerate oral medication.
- Other routes of medication are ineffective or inappropriate (e.g. absent swallow)
- Symptom management: Pain, which is intractable, nausea and vomiting, resulting in medication not being absorbed (e.g. intestinal obstruction)
- Child is unconscious.
- Continuous dose of medication is required.

2.1 Box containing the following equipment is located in the Palliative Care CNS Office (F1.24):

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>McKinley T34 Syringe Pump user pocket reference guide.</td>
<td>(Appendix 2)</td>
</tr>
<tr>
<td>McKinley T34 Syringe Driver</td>
<td></td>
</tr>
<tr>
<td>Duracell® brand 9-volt (6LR61) battery</td>
<td></td>
</tr>
<tr>
<td>2x Silhouette cannula</td>
<td></td>
</tr>
<tr>
<td>2x Semi permeable dressings</td>
<td></td>
</tr>
<tr>
<td>2 of each 10ml / 20ml Luer-Lock syringes (extras available from ACU Haem / Onc Dept.)</td>
<td></td>
</tr>
<tr>
<td>2 x Additive Labels (white)</td>
<td></td>
</tr>
<tr>
<td>Disposable disinfection wipes</td>
<td></td>
</tr>
<tr>
<td>Syringe driver monitoring form</td>
<td></td>
</tr>
<tr>
<td>Administration line with antisyphon valve</td>
<td></td>
</tr>
<tr>
<td>Water for injection (as diluent)</td>
<td></td>
</tr>
<tr>
<td>Sterile needle (to draw up drug)</td>
<td></td>
</tr>
<tr>
<td>Filter needle / straw/ blunt fill syringe</td>
<td></td>
</tr>
<tr>
<td>Lock box &amp; key</td>
<td></td>
</tr>
</tbody>
</table>
**3.0 Procedure for setting up a McKinley T34**

<table>
<thead>
<tr>
<th>PREPARATION</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss and explain the rationale and procedure to set up the McKinley T34 Syringe Driver to the child and parents / guardians.</td>
<td>To gain verbal consent, cooperation and understanding of the child and parents/ guardian.</td>
</tr>
<tr>
<td>Ensure verbal informed consent is obtained</td>
<td>To avoid unnecessary stress</td>
</tr>
<tr>
<td>Prior to procedure, ensure all equipment needed is available and in working order. Complete safety checks on the McKinley T34 Syringe Driver prior to use (insert new battery). Confirm that the syringe driver is a Mc Kinley T34 Syringe Driver and has been serviced in the previous 12 months.</td>
<td>Recognition between each of the syringe driver models is essential to prevent fatal errors occurring</td>
</tr>
<tr>
<td>To insert a new battery when setting up the Mc Kinley T34 Syringe Driver for the first time, ensuring that the black rubber covers x 2 are removed from the battery ready for insertion. To fit / change the battery, slide the compartment cover at the back of the pump. Push the battery into the compartment taking care to ensure that the +/- contacts are aligned as shown on the label inside the compartment. Slide the cover back on.</td>
<td></td>
</tr>
<tr>
<td>Average battery life commencing at 100% is approx. 3-4 days depending on use.</td>
<td></td>
</tr>
<tr>
<td>If the child has a Central Venous Access Device (CVAD) in situ, it is safe and appropriate to use the CVAD device to administer medication via the McKinley T34 Syringe Driver (Appendix 3: Procedure for Connecting a Syringe Driver to a Hickman Catheter. From Guideline for the Care and Management of a Central Venous Access Device for a Child in the Community (HS/DNMSD, 2017).</td>
<td>To minimize trauma of having to use other methods (s/c) of administrating medication.</td>
</tr>
<tr>
<td>Ensure the infusion is correctly prescribed on the patient’s OLCHC Prescription and Administration Record (Kardex). <strong>Note:</strong> Although the usual route is sub-cutaneous, all prescriptions should be written in the 'Intravenous Infusion’ section. Instructions to administer via the sub-cutaneous route must be</td>
<td>To reduce risk of error,(Guidance to Nurses and Midwives on Medication Management, NMBI, 2007)</td>
</tr>
</tbody>
</table>
clearly stated in the ‘Additional Instructions’ section of the order. See Appendix 4 for further information. **Note:** This prescription must be re-signed by the prescriber every 24 hours.

**Check the following:**

- **Front Page of Kardex:**
  - Patient Name and MRN
  - Date of Birth
  - Weight

- **Intravenous Infusion Section:**
  - Diluent (Base Solution): usually Water for Injection
  - Amount of each medication to be added to the syringe
  - Final Volume
  - Total time to be infused over (usually 24 hours) – this should be written in the ‘Rate’ box

**Note:** Where a McKinley T34 Syringe Driver is not available or appropriate to use and a standard syringe driver is being used, the rate in mls/hour must also be clearly prescribed.

- Route – this should be written in the ‘Additional Instructions’ box.
- Date of Prescription

Doctor’s Signature and Registration Number. Where multiple agents are to be added to the syringe, all compatibilities should also be checked against an appropriate reference.

In general a maximum of three drugs should only be used in a single infusion to reduce the potential problems of precipitation, crystallisation, drug incompatibilities and site reactions (Dickman, A. & Schnieder, J., 2011). Before mixing drugs together it is important to check for stability information from a recognized reference source such as [http://www.palliativecare.com/](http://www.palliativecare.com/) or a member of the OLCHC pharmacy department. The medications within the syringe are stable for 24hrs (Dickman et al., 2011)

Due to the slow rate of infusion there can be a delay of up to 4-hours until optimal levels of medication are reached.

**Medication safety,** (Guidance to Nurses and Midwives on Medication Management, NMBI, 2007)

Guideline on Hand Hygiene (OLCHC, 2013)

Consider whether breakthrough analgesia or as required (PRN) medications may be required to control symptoms.

**Note:** When starting the infusion in the initial hours or for a symptomatic patient, there may be need for additional PRN medication. In this instance ensure all PRN medication are prescribed on the ‘When Required’ section of the patient’s medication Kardex.

All doses should be checked as being appropriate for the patient in the OLCHC Drug Formulary or other suitable reference.

All staff using the McKinley T34 Syringe Driver must be working within their Scope of Practice and have an up-to-date IV Policy.

**Drawing up the medication**

Wash hands thoroughly

Prepare all the equipment required for reconstitution of the infusion using Antiseptic Non-touch Technique.

Use water for injection as the diluent, unless otherwise directed.

**Two nurses should check each stage of the following process:**

1. Prepare an additive label with the following:
   - Patient’s Name
   - Weight
   - Date of Birth
   - Medical Record Number (MRN)
   - Name and Amount of each drug to be added
   - Name of Diluent
   - Final Volume in Syringe
   - Date and Time of Preparation of the Infusion
   - Signature of both Nurses following Checks

2. Draw up the prescribed amount of each

To ensure accurate amount of drug in final syringe and avoid extra volume from the hub of the syringe in the final preparation.

To ensure secure connection with giving set and prevent accidental disconnection or leakage.

Due to the expansion of the actuator to accommodate the syringe

Cloudiness or crystallization could indicate incompatibility of medications and/or solution. Discard if it occurs. Recheck compatibility and mixing technique. Seek advice from the pharmacy department (Dickman et al. 2011)

The contents of the syringe need to be visible for monitoring purposes.

See appendix 2
medication in a separate syringe.

3. Add each medication to the final syringe and make up to the final volume with the prescribed diluent

Note: Luerlock syringe must be used, (BD Plastipack or B. Braun Omnifix)

**The maximum volume of each of the following syringe is:**

- 10ml in a 10ml syringe
- 18ml in a 20ml syringe

(Appendix 4: Guideline to write a prescription)

4. Invert the syringe several times to mix, observing for cloudiness or crystallisation, and then expel air.

5. Attach the completed additive label, taking care not to obscure the syringe measurement readings.

NOTE: A new syringe MUST be prepared every 24 hours.

**“Load, prime & re-load action” of syringe placement**

Use load, prime & load action for syringe placement

Press on / off key to power the McKinley T34 Driver up. The display will indicate pre loading and actuator will start to move. Wait until it stops moving and load the syringe flashing screen appears.

If the actuator is not in required position to accommodate syringe leave barrel clamp arm down & use the FF/Back key to move the actuator to the required position.

**Load syringe**

Position flange/collar & plunger simultaneously & lower barrel clamp arm to sit on top of the syringe barrel. Once correctly fitted/loaded the driver will display the size & brand of syringe detected. The pump calculates and displays the volume in the syringe to be delivered in mls. Press YES to confirm

The syringe must be fitted correctly and securely. If not, then the syringe may become dislodged and uncontrolled flow of medication can occur (Mc Kinley T34 operation manual 2007).

Prime the administration set to prevent the risk of infusing air embolism.

It is vital to identify the correct syringe brand to prevent infusion error. To do so scroll down to select, syringe brand, then press yes to confirm.
calculated rate. Pump prompts START Infusion, select No and remove syringe from pump. Do not turn off the pump.

Prime administration set
Remove syringe from the driver, attach extension line and subcutaneous line to leurlock syringe and carefully prime.

Reload syringe
Replace primed syringe back into driver. The driver will identify type and size of syringe. Press YES to resume and start the infusion. The pump will then display summary of volume, duration and rate. Please note duration and volume will have decreased during priming process. This is correct.

NOTE: If the volume displayed after loading the syringe is significantly different than the volume visually confirmed on the syringe scale, remove the syringe, turn off the driver, remove the driver from use & return to Clinical Engineering department for inspection, testing & recalibration.

Two nurses must independently check the rates are correct that the pump is infusing at. The volume to be infusion in 24 hours not mls/hr will be charted in the patient medication kardex.

Driver prompts START INFUSION? Ensure the giving set is attached to the child, press yes to commence infusion. To lock the keypad, press the blue INFO button for a few seconds, unlock the same way.

If the driver is stopped before the end of the 24 infusion, the resume prompt screen will appear. Press yes, to resume the current 24 hour infusion. Press no, to continue programming the new regime.

The McKinley T34 Syringe Driver, should be placed into a lockbox +/- carry pouch.

3.1 Site selection
To protect pump, syringe, & contents from damage, syringe displacement or tampering.

Positioning shallower than this may affect absorption and shorten the life of the infusion site.

To secure the site, allow visualisation of the insertion
The drugs are delivered subcutaneously into a site with as much subcutaneous fat as possible (unless CVAD is being used). The child’s wishes should always be considered if appropriate.

Preferred Sites
- Anterior chest wall.
- Anterior aspect of upper arms.
- Anterior aspect of thighs.
- Anterior abdominal wall.

Avoid broken / irradiated skin and areas of oedema and bony prominences.

Guideline on the Administration of Intramuscular and Subcutaneous Injections (OLCHC 2014)

How to insert the silhouette cannula:
1. Clean the selected insertion site with alcohol or other antiseptic wipe.
2. Hold the Silhouette insertion piece by the grey needle handle using your thumb and middle finger.
3. Hold the tape with your forefinger and remove the needle guard.
4. Pinch up your skin at the prepared site. Use your other hand to insert the needle at a 45 degree angle.
5. After it is inserted, release the skin and hold the insertion piece in place.

To Remove the Introducer Needle:
1. Peel the paper from the front part of the adhesive and press the adhesive securely against your skin.
2. Squeeze the arms on the grey needle handle and pull it back to remove the site and prevent the introduction of infection.

Confirms the syringe driver is working. To ensure accuracy and avoid error.

Maintains accountability through accurate recording of nursing intervention (An Bord Altranais 2002)
introducer needle.

3. Peel the rest of the paper without lifting the infusion set too far from your skin. Press the adhesive securely to your skin.

4. Connect the primed infusion set tubing by sliding the site connector into the s/c device.

5. Cover with a transparent dressing & start infusion.

6. Check machine is infusing, recheck the rate setting is correct.

7. Place the syringe driver into the clear box and lock with key provided.

Complete documentation (Appendix 5)
- Syringe driver monitoring form
- Medication Kardex
- Patients case notes

Document the effectiveness of therapy, together with any side effects or problems encountered.
### ACTION

**Monitoring the infusion**

Assess pain score regularly using an appropriate pain assessment tool

Observe the skin site for erythema, leakage, hardness or swelling.

Observe the syringe and infusion set for kinks in the tubing, leakage, or precipitation or discoloration of medication.

It is recommended that regular checks are performed on the progress of the infusion.

**Simple check include:**

Check LCD display to confirm the pump is still running at the same infusion rate as originally set.

Check the green LED is flashing and/or “…pump delivery…” animation appears intermittently on the bottom line of the LCD display.

Syringe level **MUST** be recorded 4-hourly and recorded.

**Press the blue info key to check:**

Volume to be infused (VTBI) & volume infuse (VI)

Double press for battery life remaining as shown as a percentage & in graph form.

**NEVER** remove the syringe from the syringe driver to measure the remaining length.

Check that the syringe has delivered the medication over the prescribed time period. The syringe should be empty at the end of 24 hours if the line was primed before measuring the length of the fluid.

If the prescription remains unchanged, there is no

### RATIONALE AND REFERENCE

To monitor the safe administration of the medication, adequate symptom control and to ensure patient safety.

Abscess formation can occur. If any of these are observed change the site as absorption of medication will be affected (Mitchell 2011).

If discoloration/precipitation occurs – STOP and discard infusion, check compatibilities and mixing technique, seek advice. (Wilcock et al., 2006).

To intervene and counteract any problems or side effects promptly (Wilcock et al, 2006).

To check that the child/adolescent has received the required amount of medication and to ensure that the driver is functioning correctly.

The **first syringe will infuse in less than 24 hours** because the line and cannula have not been **primed with** the prescribed medication.
need to re-prime the infusion line.

Prepare the infusion syringe as described above.
- Check patient details.
- Check infusion site
- Replace syringe

**Alarm conditions**

When the pump detects a problem, 4 things occur:
- The infusion stops.
- An audible alarm is activated.
- A message appears on the display screen indicating the cause of the alarm.
- The LED indicator turns red.

**Alarms include:**

Occlusion, battery status, near end of infusion, syringe displaced & syringe malfunction, paused too long.

**The event log** shows a complete time & date record of the last 512 pump events.

**To view event log:**
- Press stop to temporarily interrupt infusion
- Press inform key & scroll to ‘event log’ press yes to confirm selection
- Use up & down arrow keys to scroll through events to find the events of interest

**Volume over time** i.e. 24 hours.

This mode / duration is locked so the user cannot change it. This prevents programming error & makes setting up an infusion very simple. The contents of the syringe will always be required to be delivered over the same duration of 24 hours.

Set up parameters should only be changed by clinical or technical staff with the user code access rights only.

**Pressure setting** of pump is generally pre-set at 720 mmHg, but changed to 440mmHg by clinical
engineering in OLCHC to allow prompt detection of impending occlusion/blockages.

### Managing Breakthrough Symptoms

PRN medications should be prescribed and administered by the most appropriate route for children experiencing ongoing symptom issues.

All doses should be prescribed on the ‘When Required’ section of the patient’s drug kardex.

If SC bolus doses are required for breakthrough symptoms a second SC access device needs to be sited (see previous heading how to insert a silhouette cannula).

Pre-prime this infusion set with Water for Injection OR Sodium Chloride 0.9%w/v and connect to SC device.

Ensure tubing is secured safely to skin.

Maximum volume via SC bolus is 2 mls.

Before administering any PRN medication, doses should be checked using an appropriate reference source such as the OLCHC Formulary or ‘The Association of Paediatric Palliative Medicine Master Formulary’

**Two Nurses must check all stages of drug administration and sign for each dose on the patient’s medication kardex as per OLCHC hospital medication policy**

Draw up required drug for breakthrough symptom and administer via tubing.

Follow with a flush of sufficient volume i.e. if using a silhouette SC device infusion line volume is 0.2 mls.

Commonly used breakthrough drugs via SC route for effective symptom management include:

- Analgesics e.g. opioids (morphine, oxycodone, hydromorphone)
- Anti-emetics e.g. cyclizine, levomepromazine,
- Anti-secretory e.g. glycopyrrolate,
- Anxiolytic e.g. midazolam

To control breakthrough symptoms in addition to the medications in the syringe drive. This prevents a delay in the patient receiving the new prescription. Due to the slow rate of infusion there can be a delay of up to 4-hours until optimal levels of medication are reached (Goldman *et al.* 2012, Wolfe *et al.* 2011)
If the prescription is changed before the end of the 24 hour period, then a new syringe of medication should be prepared and set up. Never add medication to existing syringe or alter the rate of syringe driver in order to change drug order.

Remove the empty syringe and dispose of it accordance with hospital guidelines.
Fit the new filled syringe and proceed as before.
SILHOUETTE may remain in-situ for up to 7 days once the site is intact.

Return syringe driver to palliative care department (8301)

To prevent needle stick injury (Infection control department OLCHC 1997). To ensure safety and to prevent any leakage of medication.

To ensure the driver is available to other children when needed.

Incident reporting in accordance with hospital policy

4.0 References

• Nursing and Midwifery Board of Ireland: Guidance to Nurses and Midwives on Medication Management, NMBI, 2007
• Our Lady’s Children’s Hospital (2001) Medication Policy, OLCHC, Dublin Ireland
Appendix 1

Memo re Syringe Diver: McKinley T34  
(May 2014)

Palliative Care CNS: Liz O’Donoghue, Imelda Hurley & Valerie Jennings - Bleep 8301 / Ext 6985 can be contacted to access T34.

If CNS or member of Palliative Care Team are not on-duty, please contact Nursing Administration and follow procedure outlined:

<table>
<thead>
<tr>
<th>Location of T34</th>
<th>Access</th>
<th>Procedure when removing T34 from PC CNS office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palliative Care CNS office</td>
<td>Spare set of keys located in top drawer of desk facing door in Switch (in biscuit tin).</td>
<td>T34 (plus user manual, syringe driver lock-a-box, silhouette sub cut needles and relevant equipment) kept in black storage box on shelf facing door in PC CNS office.</td>
</tr>
<tr>
<td>Room F1-24</td>
<td>Keys marked PC CNS office. Please return after use.</td>
<td>Please sign for T34 on whiteboard: include ward, name of child syringe driver needed for and date removed from office.</td>
</tr>
<tr>
<td>First floor nurses home, corridor adjacent to Switchboard.</td>
<td></td>
<td>In the event that further supplies / equipment needed, please access storage box located under desk.</td>
</tr>
</tbody>
</table>
Appendix 2

Alert and alarm conditions

When the ALERT activates:
1. The infusion continues
2. Three beeps are heard approximately every three/four minutes
3. A screen message alternates with the infusion running screen until the end alarm activates
Alerts activate approximately 15-30 before end alarm

When the ALARM activates:
1. The infusion stops
2. The LED indicator light turns from green to red
3. The alarm sound continuously until either the pump is paused or the problem is rectified
4. A screen message indicates the alarm cause

Troubleshooting

Screen Prompts

- Keypad Locked
  Only the STOP, START, and INFO keys are accessible.
  Disengage keypad lock if further access required.

- Press YES to Resume, NO for New Syringe
  The current programme has been interrupted and two options are available for programming
  Press YES resumes the current programme. Press NO to delete the current programme to allow a new programme to be set up.

- Pump Stopped
  The infusion has been stopped.
  Press YES to Resume the infusion or press NO to continue stopped state.

Alerts and Alarms

- Program Nearly Complete
  Alarm: Programme is about to end/syringe is almost empty.
  Prepare to change syringe or discontinue pump use.

- Low Battery
  Alarm: Battery is almost depleted.
  Prepare to change battery.

- Pump Paused Too Long
  Alarm: The pump has been stopped/paused for more than 2 minutes without any key presses.
  Either press YES to resume the infusion, press NO to continue pause for another two minutes or turn the power off.

- Syringe Empty, Remove Syringe
  Alarm: Current infusion programme has completed/ syringe is empty.
  Prepare to change syringe or discontinue pump use.

- End Battery
  Alarm: Battery will fail imminently.
  Change battery.

- Syringe Displaced, Check Syringe
  Alarm: One or more of the syringe detection sensors is not detecting.
  Check the syringe and re-seat as necessary. Check screen messages for assistance.

- Occlusion Empty Syringe, Check Line
  Alarm: Clamped line, occluded or knotted. Actuator has reached the minimum travel position.
  Release the clamp, flush/replace the access device or clear the occlusion.

- System Error, Press & Hold INFO for Details
  Alarm: An internal system error has occurred.
  The user may be prompted to power off and restart, which may rectify the error. If error recurs, take pump out of use. Press INFO to obtain error message, record error code and summary of fault and return pump to designated service centre.

CME Medical Device and Advanced User training is RCN accredited and Skills for Health Quality Marked

The information contained in this guide is a summary only, based on default settings. Refer to Operating Manual for full operating instructions. Users must have undertaken training before operating this device.

Screen information is representative only and some text wording/screen information may vary slightly with different software versions. You must refer to local policy and procedures for specific guidance on pump settings/ set-up and use of accessories (e.g. cannula and administration lines).

Always follow screen prompts. Before pressing keys to proceed, ensure selections made correspond with what is required.
Starting an infusion LOCK OFF (Load and Prime)

Scenario

- **Pump settings:** Lock OFF, default duration 24 hours
- **Infusion required:** Deliver syringe contents over 24 hours. Decrease delivery time to account for priming volume.
- **Syringe and volume:** 20ml BD Plastipak, 70μL volume
- **Set priming volume:** Priming volume 0ml

1. Prepare syringe
2. Check the pump, ensure that the device is clean, visually intact and appropriate for the intended use.
3. Insert battery
4. Power on and observe Pre-Loading
   - Press the ON/OFF key until the screen illuminates (with no syringe in place and barrel clamp arm down).
   - **WARNING:** During Pre-Loading, keep fingers away from actuator moving parts.
   - Observe Pre-Loading, automatic actuator movement and the screen information that displays:

<table>
<thead>
<tr>
<th>T34 Version NCAT xxxx ID: (Hospital name)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Loading Use NO to Interrupt</td>
</tr>
<tr>
<td>Occlusion XXX mmHg Max rate 5.0 ml/h</td>
</tr>
<tr>
<td>Program lock PCB Battery status 99%</td>
</tr>
</tbody>
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5. Check battery level
   - Press **INFO**
   - Press **Battery Level Select ↑↓, Press YES**

   *Battery Level*
   - 89% Full
   - Empty

   *Wait for the “Load Syringe” prompt to display*

6. Align the syringe to pump syringe fitting sensors. Use the **FF/BACK** keys to move the actuator as necessary.

   *Fit the syringe into the correct position.*

   *Confirm syringe brand/size*
   - If the syringe size/brand displayed matches the one used, confirm by pressing **YES**
   - If they do not match, use **↑↓** keys to select the matching syringe.

7. Programme the pump
   - Visibly check if the volume in the syringe matches the volume displayed. Change if necessary, confirm by pressing **YES**.
   - If the duration is changed, a screen prompt displays to check ml/hour rate.
   - Confirm by pressing **YES**
   - Check and confirm by pressing **YES**

   *Infusion summary displays. DO NOT CONFIRM. Remove syringe and place barrel clamp arm down.*

   *Manually prime the set. Reload the syringe (use the FF key to move actuator forward).*

   *If the syringe size/brand displayed matches the one used, confirm by pressing **YES**.*
   - If they do not match, use **↑↓** keys to select the matching syringe.

   *Press **YES to Resume** (to decrease delivery duration)*

   *Note reduced volume and duration: if the programme is correct for the prescription, press **YES**.*

   *If purging, press **FF** key before pressing **YES** and follow screen prompts.*

8. Connect set/cannula to patient and start infusion
   - When ready, start the infusion by pressing **YES**
   - To confirm the infusion is running, this screen is visible and the green light flashes intermittently.

   **NOTE:** The bottom line alternates with “20ml BD Plastipak”

Monitoring whilst infusion is running

- Press **INFO** key once:
  - Infusion Summary
  - Battery Level

- Press **INFO** key twice:
  - Infusion Summary
  - Battery Level

9. Pump features and functions
   - **Programme protection**
     - There is only the current “programme” available in the pump memory at any one time and it is possible to resume a programme in certain circumstances.
     - - Pre-Loading (automatic actuator movement) will clear a programme from the pump memory.
     - - Power interruption or failure does not clear a programme. When “Resume” is pressed, the ml/hour rate resumes.

   **Key press options of “Resume” and “New Syringe”**
   - A programme (infusion) may be interrupted, for example, by alarm activation (e.g. syringe displacement or occlusion) or the pump is powered off for any reason and powered on with a syringe in place.
   - Following an interruption to the programme and during the start-up sequence, the user will be prompted to re-confirm the correct syringe brand and size.

   *20ml BD Plastipak Select ↑↓, Press YES*

   - When the syringe brand and size matches the one placed into the pump, press **YES**.

   *The user has two options:*
   - Press **YES to Resume, NO for New Syringe**
   - Press **NO** to delete the current programme. A new programme is then calculated.

   **The important feature to remember is that “Resume” protects the infusion rate for the current programme, so:**
   - If the syringe volume is increased and the infusion is resumed, the duration of delivery will increase.
   - If the syringe volume is decreased and the infusion is resumed, the duration of delivery will decrease

   **NOTE:** Follow local policy procedure for the appropriate option to press when this screen displays following purge.

---

**Palliative Care Department**

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Appendix 3

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

<table>
<thead>
<tr>
<th>Document reference number</th>
<th>ONMSD 2017-002</th>
<th>Document developed by</th>
<th>Office of the Nursing and Midwifery Services (ONMSD)</th>
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<td>Revision number</td>
<td>2</td>
<td>Document approved by</td>
<td>HSE Director of Nursing and Midwifery Services</td>
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<td>Approval date</td>
<td>19th January 2017</td>
<td>Responsibility for implementation</td>
<td>Nurse Managers and Medical Personnel with responsibility for care and management of the child with a CVAD</td>
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Approved by:
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Signature: [Signature] 19 January 2017
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Signature: [Signature] 19 January 2017
Dr Aine Carroll
National Director of Clinical Strategy & Programmes Division HSE

Palliative Care Department
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**
- Explain the procedure to the child and parents / guardians. Regarding consent, refer to HSE National Consent Policy 2013).
- Perform hand hygiene (RCPI/HSE 2015).
- 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.
- Turn off the pump, close line clamp and clamp the Hickman™ Catheter.
- Perform hand hygiene (RCPI/HSE 2015).
- 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).
- Rotate the giving set connection to the left and detach it from the needle free device.
- Carefully clean the centre of the needle free device with a disinfection wipe.
• Allow it to dry for 30 seconds (Loveday et al, 2014).

• 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.

• 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.

• 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.


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.

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

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

• It is recommended that when connecting an infusion for the first time to the Hickman™ Catheter that a second 10ml/20ml leurlock 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.

• 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.

• 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.

- 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.

- 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.

- 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.

- 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.

- 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.

**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

- The issues highlighted in Section 7.1.2 must be considered at all times when carrying out this procedure.
- Explain the procedure to the child and parents/guardians. (Regarding consent, refer to HSE National Consent Policy 2013).
- Check with the parents/guardians for known allergies.
- Check expiry date of all preparations.
- Perform hand hygiene (RCPI/HSE 2015).
- Draw up a flush of Sodium Chloride (NaCl) 0.9% as recommended by the discharging facility in a 10ml syringe using non-touch technique.
- Attach a non-injectable bung to the tip of the syringe to maintain sterility.
- Label the syringe and place on the tray.
- Select syringe type for syringe driver and size 10 ml/20 ml/30ml as appropriate for dispensed medication. Use syringe with luer-lock nozzle.
- 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).
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.

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.

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

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).

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

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.

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).

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

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

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.

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.

Dispose of waste as per local guidelines.


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

- Perform hand hygiene (RCPI/HSE 2015).
- Close clamp on the Hickman Catheter.
- Pause the pump and remove syringe.
- Draw up prescribed medications for infusion into appropriate (selected) luer lock syringe using aseptic non-touch technique and attach non-injectable bung.
- Close clamp on the extension set.
- Clean the area where the extension set and syringe meet with the disinfection wipe and allow it to dry.
- Remove previously used syringe.
- Remove non-injectable bung and attach new syringe.
- Load the syringe into the syringe driver as per manufacturers’ instructions, local guidelines / policies / protocols.
- 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.
- Dispose of waste as per local guidelines.

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

- Perform hand hygiene (RCPI/HSE 2015).
- Close clamp on the Hickman Catheter.
- Pause the pump and remove syringe.
- Select syringe type for syringe driver and size 10 ml/20 ml/30ml as appropriate for dispensed medication. Use syringe with luer-lock nozzle.
- 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).

- 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.
- 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.

- Perform hand hygiene.
Open sterile glove packet onto tray. The inside of this packet is now the sterile field.

Carefully open needle free device onto the glove packet using an aseptic non-touch technique (Rowley and Clare 2011).

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

Perform hand hygiene again and put on the sterile gloves (RCPI/HSE 2015).

Unfold the disinfection wipes.

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.

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 HickmanTM Catheter. Discard the disinfection wipe outside of the tray. Allow it to dry for 30 seconds (Loveday et al 2014).

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

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

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.

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

Dispose of waste as per local guidelines.

Document procedure as per local guidelines and HSE Standards and Recommended Practices for Healthcare Records Management (2011)
Appendix 4

GUIDE TO WRITING A PRESCRIPTION FOR CONTINUOUS INFUSION VIA THE MCKINLEY T34 SYRINGE DRIVER
(By either sub-cutaneous or IV route)

1. All prescriptions should be written in the patient’s OLCHC Prescription and Administration Record (Medication Kardex)
   a. The infusion prescription should be written in the ‘Intravenous Infusion’ section – this includes both SC infusions and those to be administered via a CVAD.

   Note: For SC infusions, it must be stated clearly in the ‘Additional Instructions’ section that the infusion is to be administered via the sub-cutaneous route.

   b. Breakthrough medications should be written in the ‘When Required’ section

2. The majority of palliative care patients will receive their infusions via a McKinley T34 syringe driver and hence it is not necessary to calculate/prescribe the rate in mls/hour as the McKinley infusion pump calculates this automatically.

   Note: Where an alternative syringe driver is being used e.g. PICU patients, the rate in mls/hour MUST also be prescribed.

3. A single drug or combination of drugs is added to a syringe and the total dose is set to infuse over a defined time (usually 24 hours).

4. The diluent must be prescribed and is usually water for injection (hypotonic) unless contraindicated. Occasionally sodium chloride 0.9 % (isotonic) may be used. When choosing a diluent consider the final concentration of each medication, bearing in mind that more dilute solutions may reduce irritation at injection site but may not be tolerated by smaller patients

5. When more than one drug is being added to a syringe all drug compatibilities should be checked.

   Note: Morphine and Midazolam are known to be compatible.

6. In general a maximum of three drugs should only be used in a single infusion. This reduces the potential problems of precipitation, crystallisation, drug incompatibilities and infusion site reactions.

7. To ensure the syringe fits into the McKinley pump the following maximum volumes must be adhered to:
   - 10ml in a 10ml syringe
   - 18ml in a 20ml syringe
Sample 1

**Preparation Details:** Please refer to Procedure for Preparation of Syringe above for full guidance

1. Withdraw required volume of each medication into an appropriately sized syringe to allow accurate measurement (*The smallest syringe size should be used*)
   
   a) Morphine Sulphate injection 10mgs in 1 ml ampoules.  
      Dose required = 20mgs = 2 mls
   
   b) Midazolam 10 mgs in 2 ml ampoules (Hypnovel®)  
      Dose required = 10mgs = 2 ml

2. Add both medication to the final 20ml leur lock syringe

3. Make up to final volume (18mls) with prescribed diluent (18mls – 4 mls = 14mls)
Please complete four hourly or more frequently if condition indicates

Patient’s Name: ................................................................. Hospital No: ................................

Medication in driver: ...........................................................

Ward: .................................................................

NOTE: To completed every 4 hours

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Volume to be infused (VTBI)</th>
<th>Site (Intact, red, rash, leaking)</th>
<th>Symptom management (pain score, symptoms present)</th>
<th>INTERVENTION DETAILS (Breakthrough medications inc. dose or other intervention). N.B: Re-assess within 1 hour</th>
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Battery check (advise to change when <33%)

Signed

For additional advice contact: Palliative Care CNSp 8301
## Appendix 6

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<th>ACTION</th>
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<tr>
<td>Pump will not start</td>
<td>No battery present</td>
<td>Fit a new battery</td>
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<tr>
<td></td>
<td>Battery is wrong way</td>
<td>Service required</td>
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<tr>
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<td>Battery is low</td>
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<td></td>
<td>Pump is faulty</td>
<td></td>
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<tr>
<td>The infusion is going too quickly has ended</td>
<td>Incorrect rate set</td>
<td>Check displayed rate against prescription &amp; change if</td>
</tr>
<tr>
<td>early or too slowly or volume remaining in</td>
<td></td>
<td>required.</td>
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<tr>
<td>syringe at end of infusion</td>
<td>Wrong syringe brand confirmed during set up</td>
<td>Retrain user to prevent repeat of event</td>
</tr>
<tr>
<td></td>
<td>Pump faulty or incorrectly calibrated</td>
<td>Service/calibration required</td>
</tr>
<tr>
<td>Pump has stopped before emptying the syringe</td>
<td>Exhausted battery</td>
<td>Fit new battery, turn on pump and confirm syringe &amp;</td>
</tr>
<tr>
<td></td>
<td>Blocked/ trapped infusion set</td>
<td>brand, select resume to continue infusion.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clear the occlusion</td>
</tr>
</tbody>
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