Children's Health Ireland

Crumlin | Temple Street | Tallaght | Connolly

GUIDELINE FOR SETTING UP AND CHANGING THE T34™ / BD BodyGuard ™ T AMBULATORY SYRINGE PUMP FOR CHILDREN RECEIVING PALLIATIVE CARE

Area of use:	All of organisation ☒	CHI at Connolly ☐	CHI at Crumlin ☐
	CHI at Herberton ☐	CHI at Tallaght ☐	CHI at Temple Street ☐
Lead author & title:	Name: Liz O'Donoghue, Imelda Hurley, Valerie Jennings, Caoimhe Wade Title: Palliative Care Clinical Nurse Specialists Name: Moninne Howlett - Chief II Informatics Pharmacist Name: Karen Lavelle - Pharmacy		
Approved by & title:	Name: Fionnuala O'Neill Title: Nurse Practice Coordinator		
Version:	Version 4	**Approval date:**	February 2023
Qpulse reference:		**Revision due:**	February 2026
Version History			
Version: 4	**Date approved:** 28/02/2023	**Summary of changes:** Changes to ambulatory syringe pump	**Author:** Liz O'Donoghue, Imelda Hurley, Valerie Jennings, Caoimhe Wade (Palliative Care Clinical Nurse Specialists) Jean Fitzsimons - Clinical Nurse Coordinator (CNC-CLLC) Aoife Harrington – Snr Pharmacist

Contents

1.0 Introduction

The T34™/BD BodyGuard™ T Ambulatory Syringe Pump (formerly known as McKinley T34™) is a small, portable, battery-driven infusion pump, which allows medications to be infused via subcutaneous continuous infusion (CSCI) or central venous access route over a 24-hour period.

For the purpose of the document, we will refer to the T34™/BD BodyGuard™ ambulatory Syringe Pump as the T34

The T34™ Ambulatory Syringe Pump is calibrated in millilitres / hr over 24 hours. The 24-hour setting 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 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 400-440mmHg by Clinical Engineering in CHI at Crumlin, to allow prompt detection of impending occlusion / blockages.

2.0 Indications for use

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

Note: Syringe Pumps will not deliver better symptomatic management than the oral route unless there is a problem with absorption or administration.

Advantages

- Lightweight, compact, battery operated, ideal for ambulatory use.
- Suitable for subcutaneous (SC) and central venous administration.
- Plasma drug levels are maintained preventing peaks and troughs, which can occur with intermittent injections, resulting in effective symptom control.
- Control of multiple symptoms with a combination of drugs simultaneously.
- Widely acceptable route of administration in the community setting, making it possible to manage children at home when more invasive devices are not possible (Dickman 2016, Jassal 2016, Wilcock et al., 2020).

Disadvantages

- Restrictions on the patient having pump changed daily & carrying pump.
- Long-term use can lead to site selection issues / irritations.

Common groups of medicine prescribed for use in a syringe pump, with examples in brackets:

- Analgesia (Morphine, Oxycodone)
- Anti-emetic (Cyclizine, Levomepromazine)
- Sedatives (Midazolam)
- Anti-secretory drugs (Glycopyrronium, Hyoscine Butylbromide)

Note: Often the use of a syringe pump is associated with end of life. It is important to explain the use of the syringe pump as an alternative means of delivering medication and address any concerns.

3.0 Access & storage of T34™ Ambulatory Syringe Pump

CHI at Crumlin: T34™ Ambulatory Syringe Pump and necessary initial supplies can be accessed in the Palliative Care CNSp office F1 - 44 (half floor nurses home, office beside Clinical Skills Room CNNE) or on St Johns (Haematology/Oncology Dept).

Contact the CNSp in Palliative Care – Bleep 8301 or Nursing Administration to access the office *(Appendix 1 memo for accessing* T34™ Ambulatory Syringe Pump *out of hours)*

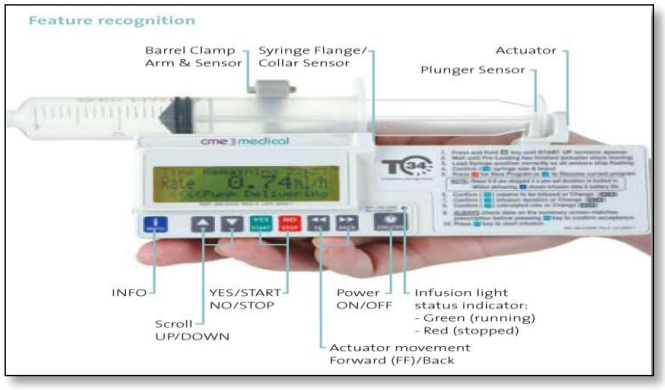
CHI at Temple Street: T34™ Ambulatory Syringe Pump and all necessary initial supplies will be kept in the Palliative Care Department / Clinical Nurse Co-Ordinator Office, which can be accessed Monday to Friday only. *(Appendix 1 memo for accessing* T34™ Ambulatory Syringe Pump *out of hours)*

Should a child require subcutaneous medication over the weekend, subcutaneous bolus's can be used. Should a continuous infusion be required a familiar infusion pump may be used until T34™ Ambulatory Syringe Pump can be acquired. *(Appendix 1 memo for accessing* T34™ Ambulatory Syringe Pump *out of hours)*

Box containing the following equipment is located in each Palliative Care Dept

- T34™ Ambulatory Syringe Pump user pocket reference guide (See appendix 7)
- T34™ Ambulatory Syringe Pump
- 9-volt Alkaline battery
- 2x Subcutaneous Devices/Cannulas (Appendix 2)
- 2x Semi permeable dressings
- 2 of each 10mL / 20mL / 30mL Luer-Lock syringes BD Plastic/Braun Omnifix (extras available from ACU Haematology/Oncology Dept, CHI at Crumlin)
- 2 x Additive Labels (white)
- Disposable disinfectant wipes
- Syringe Pump monitoring form
- Administration line with anti-syphon valve
- Water for injection (as diluent)
- Sterile needle (to draw up drug)
- Filter needle / straw / blunt fill syringe
- Lock box & key

4.0 Pump Quick set up Guide T34™ Ambulatory Syringe Pump



Info key	Repeated presses during infusion will display summary and battery level. When pump paused, access the main (info) menu Activates/deactivates keypad lock
Up arrow	Scrolls between options Increases infusion parameters during programming/titration
Down arrow	Scrolls between options Decreases infusion parameters during programming/titration
Yes/start key	Confirms selection Starts infusion
No/stop key	Stops infusion Takes user back a step during programming
FF (forward)	Moves actuator forward when no syringe in place and barrel clamp arm is down.
Back (reverse)	Moves actuator backward when no syringe in place and barrel clamp arm is down.
On/off key	Powers the pump on and off.
Led light	A green indicator lights when infusing, red when stopped.
Barrel clamp arm sensor	Detects syringe barrel loading and secures syringe in place
Collar sensor	Detects correct loading of the syringe collar
Plunger sensor	Detects correct loading of the syringe plunger
Actuator	Drives the syringe plunger to deliver syringe contents

Infusion Process for Lock on (duration) mode

- Powering on the pump
- Insert battery into back of pump
- Press the on/off button
- The pump will perform a self-test

Check battery Level

- Press blue info key
- Press green start / yes button
- Battery level will be displayed

Insertion of syringe

- Use back arrow key to move actuator to a suitable place for syringe plunger.
- Insert syringe into syringe collar
- Insert syringe plunger into plunger sensor
- Secure with barrel arm clamp

Selecting syringe size/brand

- LCD screen will show size & brand of syringe
- If correct press the green start/ok button
- If incorrect use up & down keys to choose correct size, brand, confirm with a green yes key.

Starting infusion

- Check on screen that volume, rate and duration match prescription
- Press green start/yes button

Stopping infusion

- Press the red stop/no button
- Clamp line
- Open barrel clamp arm and remove syringe (ensuring disconnected from patient prior to removal from pump).

Powering off the Pump

- Press and hold the on/off button until pump switches off

5.0 Preparation for setting up a T34™ Ambulatory Syringe Pump

To gain verbal consent, cooperation and understanding of the child and parents / guardian discuss and explain the rationale and procedure to set up the T34™ Ambulatory Syringe Pump to the child and parents / guardians.

Prior to procedure, ensure all equipment needed is available and in working order. Complete safety checks on the T34™ Ambulatory Syringe Pump prior to use. Confirm that the syringe pump is a T34™ Ambulatory Syringe Pump and has been serviced in the previous 12 months. Currently in CHI, T34™ / BD BodyGuard T Ambulatory Syringe Pump Version 2 and 3 are in use. This guideline pertains to these versions. All staff using the T34™ Ambulatory Syringe Pump must be working within their Scope of Practice and have completed local Medication Policy training.

6.0 Prescribing guidelines for continuous infusion via the T34™ Ambulatory Syringe Pump

The slow rate of the continuous infusion can take up to 4 hours until optimal levels of medication are reached (Hain et al. 2021, Wolfe et al. 2011). Refer to section 7.0 regarding PRN medications to control symptoms at the time of commencing the continuous infusion.

See appendix 4 - Writing a prescription for continuous infusion via the T34™ Ambulatory Syringe Pump. Ensure the infusion is correctly prescribed on the patient's CHI Prescription and Administration Record (Kardex). (Guidance to Nurses and Midwives on Medication Management, NMBI, 2020)

Note: 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 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 and a new syringe MUST be prepared every 24 hours. Preferably, at the same time each day unless a change of medication necessitates an early change to address symptom concerns.

REMEMBER

If the prescription is changed, a new syringe must be prepared. Never add an additional medication to the syringe after the infusion has commenced.

Check patient details as per CHI Medication Policy (2017 & 2019)

Particular attention is needed in relation to the *following (support from Pharmacy Dept and Specialist Palliative Care Team is available to guide if needed)*:

Intravenous Infusion Section:

- Diluent (Base Solution): usually Sodium Chloride 0.9% w/v (Water for Injection may also be used)
- 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
- Route: this should be written in the 'Additional Instructions' box.
- Date of Prescription

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

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. Where multiple agents are to be added to the syringe, all compatibility of drugs and diluent should be checked against an appropriate reference (APPM 2020, Dickman et al., 2016, Healthcare Improvement Scotland, 2019) or a member of the CHI Pharmacy Department for stability information. It is considered good practice to make the solution as dilute as possible to reduce the likelihood of drug incompatibility and minimize site irritation.

7.0 Drawing up the medication in the syringe

Wash hands thoroughly and prepare all the equipment required for reconstitution of the infusion using Aseptic Non-Touch Technique (ANTT) IPCT 2020. Use Sodium Chloride 0.9% v/w as the diluent unless otherwise directed.

A Luer-Lok Syringe must be used *(BD Plastipak or Braun Omnifix)* to ensure secure connection with infusion line and prevent accidental disconnection or leakage.

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

1. Prepare an additive label with the following information
   - Patient's Name
   - 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. Establish the final volume required and select the appropriate brand and size of Leur-lock syringe. Draw up the prescribed medication in a separate syringe and then add to the compatible diluent (dilute to the maximum volume recommended for the syringe brand and size) IPCT 2019. See Appendix 4 for medication example calculation.

3. If using more than one medication, draw up the prescribed amount of each medication in separate syringes. Then dilute the first medication to an appropriate volume (total volume less than volume of second drug). This ensures accuracy in the final syringe and reduces the likelihood of incompatibility. Add the second medication and mix the contents well by inverting the syringe gently several times. Observe for cloudiness or crystallisation, which may indicate incompatibility of medications and /or solution. Discard if it occurs. Seek advice from the pharmacy department if required.

4. There are occasions when a third medication may be required, in this instance, please contact the Specialist Palliative Care team for advice.

5. Attach the completed drug additive label taking care not to obscure the syringe markings.

6. Expel air from the syringe & carefully prime the administration set to prevent the risk of infusing air embolism.

7. **To avoid an inadvertent administration of a bolus dose, the syringe must be attached to the pump before being connected to the child.**

Note: If dexamethasone or cyclizine (cyclizine is compatible only with Water for Injection) are included in the mixture, add them last once the other two medications are diluted as far as possible (because they are the most common causes of incompatibility).

Note: It is considered good practice to make the solution as dilute as possible to reduce the likelihood of drug incompatibility & minimise site irritation

The maximum volume of each of the following Leur-Lock syringe is			
Syringe Brand & Size	**10 mL**	**20mL**	**30mL**
Braun Omnifix	10mL	17mL	22mL
BD Plastipak	10mL	17mL	22mL

8.0 Battery Power

Always check the battery power before commencing the infusion. Press the INFO key until the battery level option appears on the screen then press YES to confirm. The average battery life commencing at 100% is approximately 3-4 days depending on use. If the battery power has less than 30% life remaining at the start of an infusion, then this battery should be discarded and a new battery installed.

NOTE: The battery needs to fit snugly to prevent loss of battery/pump electrode contact. When the Pump is new, it may be difficult to remove the battery until the metal electrodes loosen slightly with use and over time.

To insert the battery into the pump:

1) Slide the compartment cover off at the back of the pump.

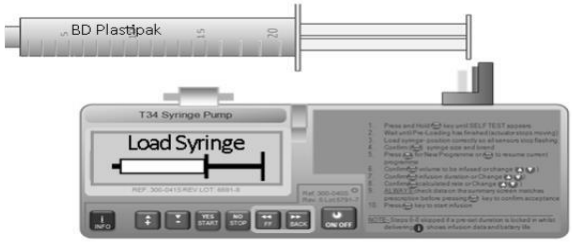
2) Insert the battery into the compartment (ensuring the battery +/- contacts are aligned). Ensure the bottom of the battery rests against the foam pad.

9.0 Loading Leur-Lock Syringe to the Pump and Syringe Detection

Press on / off key to power the T34™ Ambulatory Syringe Pump. The display will indicate pre loading and actuator will start to move. Wait until it stops moving and load the syringe-flashing screen appears.

Manual adjustment of the actuator

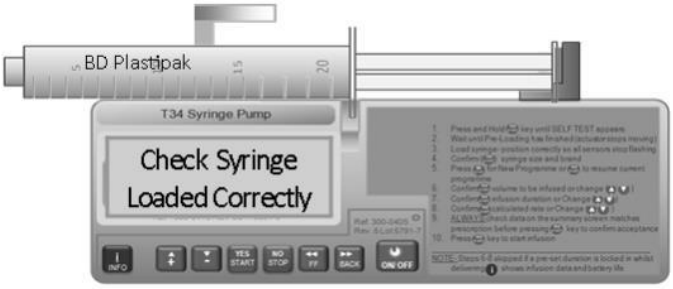
If the actuator is not in the required position to accommodate the syringe it may be necessary to manually adjust by using FF/Back key to move the actuator to the required position.



1) Ensure the barrel clamp arm is down.
2) Place the prepared syringe above the pump to visually align the syringe collar to the collar sensor.
3) Use the **FF/Back** keys (if required), to move the actuator to the correct position for placing the syringe collar and plunger into the matching pump sensor areas.

Syringe loading and detection

1) Lift the barrel clamp arm fully and turn the arm 90° (either way).



2) Place the syringe collar vertically into the pump collar slot and the syringe plunger into the pump plunger slot, (the syringe should click into position).

3) Turn and lower the barrel clamp arm onto the syringe.

As you correctly seat each point of the syringe, the flashing indicator for that sensor becomes solid on the screen display, when all three sensors detect, a syringe size and brand will display.

Syringe detection and confirmation

The pump identifies the syringe brand, size and volume by measuring the syringe dimensions from the three sensors.

Check that the syringe brand and size inserted into the pump matches the syringe brand and size displaying, if they match confirm by pressing **YES**.

NOTE: It is vital to identify the correct syringe brand to prevent infusion error.
To do so, scroll to select, syringe brand, then press YES to confirm.
The pump calculates and displays the volume in the syringe to be delivered in mls

Press **YES** to confirm calculated rate.

Pump prompts **START** Infusion.

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 that the pump is infusing at the correct the rates.

The volume to be infused in 24 hours **not** mL/hr will be charted in the patient medication kardex.

Driver prompts **START INFUSION?**

Ensure the infusion set is attached to the child; press yes to commence infusion (CME McKinley 2018).

10.0 Locking the Keypad and using the locked box

Keypad lock during infusions is used to minimize tampering with the device. To activate the keypad lock, press & hold the blue INFO button for a few seconds, until a progress bar has moved completely across the screen and a beep sound is heard to confirm the lock has been activated. Unlock in the same way.

The T34™ Syringe Pump should be placed into a lockbox & carry pouch.
Lockboxes are designed to help protect the syringe from displacement and/or tampering.
Disposable (single patient use) and re-useable (washable) pouches are available.

11.0 Site selection for sub-cutaneous device

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 for symptom management via the T34™ Ambulatory Syringe Pump.

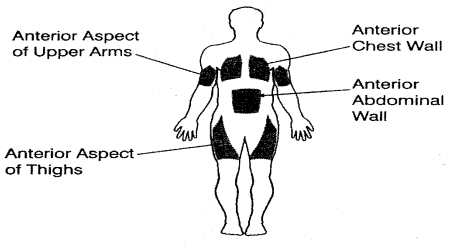
(Appendix 3: Procedure for Connecting a Syringe Pump to a Hickman Catheter. From Guideline for the Care and Management of a Central Venous Access Device for a Child in the Community (HS/DNMSD, 2021).

E-Learning Module for Connecting a Syringe Pump to a Child's Hickman Catheter (May 2020) available on HSEland: www.hseland.ie

The medication is delivered subcutaneously into a site with as much subcutaneous fat as possible (unless CVAD is being used).

Areas commonly used include:

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



Areas to avoid include:

- Skin Folds/areas where clothing may rub or constrict the flow of medication.
- Skin that is oedematous, obviously bruised, hard, red, broken or swollen, or where there is infection (Mitchell et al., 2011).
- Directly over a tumors or area that have recently been irritated or irradiated.
- Over a bony area or joints.

Additional consideration in choosing site may include:

- Age of child (e.g. do not use lower abdomen in a younger child)
- Patient and carer preference.

Note: Subcutaneous device may remain in-situ for up to 7 days once the site is intact

(See appendix 2 – How to insert subcutaneous device)

https://vimeo.com/234407783

Guideline on the Administration of Intramuscular and Subcutaneous Injections *(OLCHC 2017)*

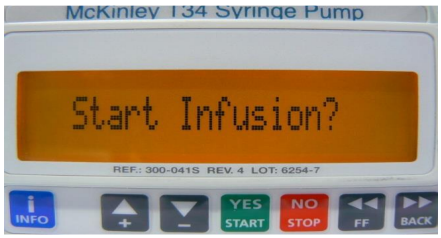
12.0 Commencing and Monitoring the Infusion

Commencing the Infusion:

The pump calculates and displays the volume in the syringe to be delivered in mls
Press **YES** to confirm calculated rate.
Pump prompts **START** Infusion.

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 that the pump is infusing at the correct the rates.
The volume to be infused in 24 hours (**not** mL/hr) will be charted in the patient medication kardex.
Syringe Pump prompts **START INFUSION?**
Ensure the infusion set is attached to the child, press yes to commence infusion.



To confirm the infusion is in progress:

a) The pump LED light will intermittently flash green

The LCD screen will display information:

- Line 1 - displays infusion time remaining
- Line 2 - displays the mL/hour infusion rate
- Line 3 - alternates between the syringe size and brand confirmed by the user during set up and <<<< Pump Delivering

Monitoring the infusion

First 15 mins of the infusion, it is recommended as best practice, to observe the syringe pump to ensure it is functioning correctly. In addition, when a syringe pump is reloaded or re-sited.

To monitor the safe administration of the medication, adequate symptom control and to ensure patient safety the Syringe Pump Monitoring Form to be completed at a minimum of 4 hourly for children receiving continuous infusions of medication via T34™ Ambulatory Syringe Pump.

Assess pain score regularly using an appropriate pain assessment tool.

The following monitoring checks should be carried out and documented on the Infusion Monitoring Chart:

- Record the date and time the syringe pump is checked
- Check the infusion site for:
    - Redness
    - Swelling
    - Discomfort / pain
    - Leakage of fluid
- Check the medication prescribed is controlling the patient's symptoms
- Check the solution in the syringe and the subcutaneous infusion line for cloudiness, presence of large air bubbles, precipitation or colour change.
- Record the volume of solution infused and check from this information that the syringe pump is delivering the medication at the desired rate
- Check the battery light is flashing. There is no need to record the battery percentage as this has been carried out already as part of the daily set-up.
- Record the location of the infusion site when the syringe pump is set-up and when the line is changed
- When the infusion site is changed, record in the notes section
- At each check, inspect the subcutaneous infusion line to ensure that it is securely attached to both the syringe and the child and that it is not leaking, kinked or trapped. Document any problems noted (NMBI 2015).

13.0 Procedure for changing syringe after 24-hours

- Stop the infusion.
- Remove the empty syringe and dispose of it accordance with hospital guidelines.
- Fit the new filled syringe and proceed as before.
- Remember to prepare the infusion syringe as described above.
- Check patient details.
- Check infusion site.

14.0 Alarm conditions

When the pump detects a problem, the following may happen:

- 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.

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

If the syringe pump is stopped before the end of the 24-hour infusion, the resume prompt screen will appear.
Press **YES**, to resume the current 24-hour infusion.
Press **NO**, to continue programming the new regime.

15.0 Managing Breakthrough Symptoms

Breakthrough pain is recognised as a transient increase in pain intensity over background pain. It can be effectively managed by the use of immediate release opioids given by the appropriate route for the child.

Anticipatory prescribing of the 4 A's: Analgesic, Anti-emetic, Anxiolytic & Anti-secretory, is a proactive approach to ensure medication is available if required for common symptoms in the last hours - days of life such a pain, upper airway secretion, anxiety & agitation (Harris 2019).

- PRN medications should be prescribed and administered by the most appropriate route for children experiencing ongoing symptom issues (Guidance for Registered Nurses and Midwives on Medication Administration 2020 NMBI).
- PRN medication should be prescribed on the 'When required' section of the child's medication kardex.

NOTE: If a child has a central venous access device (CVAD) in situ, a decision may be made to use this route for administration of PRN medication.

15.1 Guide to the administration of a bolus or breakthrough dose of subcutaneous medication for Children under the care of the Palliative Care Team.

Healthcare professionals can deliver a subcutaneous bolus or breakthrough dose of medication in both hospital and home settings, following appropriate training. This route is used to optimise the delivery of medication to provide appropriate symptom management for children who are unable to take medication by mouth for a variety of reasons which include:

- poor gut absorption
- nausea and vomiting
- Children that require a continuous infusion via the McKinley T34 syringe pump.

Indwelling subcutaneous catheter such as Neria Guard device assist in medication delivery, decrease trauma, distress and discomfort for the child. Subcutaneous device may remain in-situ for up to 7 days once the site is intact.

Commonly used breakthrough medications via subcutaneous route for effective symptom management include

Medication	Indications for use	Compatible Flushing solution
Morphine Sulphate	Pain/breathlessness	Sodium Chloride 0.9% w/v
Oxycodone	pain	Sodium Chloride 0.9% w/v
Midazolam	Seizures/ agitation	Sodium Chloride 0.9% w/v
Levompromazine	nausea	Sodium Chloride 0.9% w/v
Cyclizine	nausea	Water for Injection w/v
Glycopyrronium bromide	secretions	Sodium Chloride 0.9% w/v
Hyoscine hydromide	secretions	Sodium Chloride 0.9% w/v

15.2 Preparation and administration of PRN medication

Before administrating any regular or PRN medication check that are prescribed for the child in their medication kardex should be checked using an appropriate reference source such as the CHI Formulary or the current 'Association of Paediatric Palliative Medicine Master Formulary' available at

https://www.appm.org.uk/guidelines-resources/appm-master-formulary/

All healthcare practitioners administering medication and each registered nurse must maintain their individual knowledge of medication management, as per CHI Medication Policy (2017).

Prepare the following equipment:

- Indwelling subcutaneous catheter (Neria Guard) size 6/9 mm with line **length 12cm** for prn/stat
- Appropriate size leur-lock syringe to draw up medication (1ml or 2 ml)
- Filter needle/straw/ blunt needle x 2
- 10ml vial of appropriate flushing fluid (to flush the medication)
- 1ml or 2 ml leur-lock syringe for sodium chloride 0.9% w/v flush
- Disinfectant wipes
- Non-injectable bungs
- Sharps container

NOTE: to ensure secure connection with the Neria Guard and prevent accidental disconnection or leakage leur-lock syringes must be used.

Two nurses should check each stage of the following process.

1. Preform hand hygiene.
2. Draw up medication in accordance with the CHI Medication Policy (2017) and refer to the Palliative Care Teams' symptom management plan if appropriate.
3. Prepare and explain the procedure to the child (if appropriate) and parents/carers.
4. Clean the needle free device on the infusion line of the Neria Guard with a disinfectant wipe and allow to dry.
5. Administer the prescribed medication via the infusion line of the Neria Guard.
6. Administer compatible flushing solution as per priming volume depending on infusion line length (see appendix 2) to ensure the medication is delivered to the child.
7. Repeat point 5 and 6 if additional medication is required.
8. Observe the Neria Guard site whilst administering medication and sodium chloride 0.9% w/v flush, noting signs of blanching, redness or pain, which may indicate the site is no longer appropriate for subcutaneous medication.
9. Carefully remove the leur-lock syringe.
10. Using a disinfectant wipe clean the needle free device on the infusion line of the Neria Guard.
11. Dispose of any waste in appropriate containers.
12. Complete relevant documentation. The following information needs to be recorded in the child's nursing notes:
    - The date, procedure and site of Neria Guard insertion.
    - Observation of site for sign of complications
    - The date and reason the Neria Guard was removed
    - All medication administered should be recorded in the medication kardex.

NOTE: Maximum volume via subcutaneous bolus is 2 mL, including mediation(s) and flush combined

16.0 Syringe Pump maintenance & cleaning

Syringe Pump maintenance - All syringe pumps must be serviced regularly according to local guidance and at least annually, whether used or not, to ensure their function is maintained. Should be sent to the Clinical Engineering Dept. in CHI when due for service. Syringe Pumps should be sent for maintenance checks immediately if they have been dropped, suffered fluid ingress (for example had fluid spilt over them or dropped in a bath) or if there is any doubt as to their functional operation whilst in use.

Servicing – If an alert for servicing is visible on syringe pump, press 'Yes' to continue and acknowledge. Pump will continue to work, however it is important to contact Clinical Engineering to arrange for servicing of pump at earliest available opportunity.

Cleaning and Decontamination - Carry out cleaning of the syringe pump and lockbox with a detergent wipe between each patient use (IPCT 2019 & 2017). The syringe pump must never be submerged in water. If it is accidentally dropped in water, it must be withdrawn from use and sent to the Clinical Engineering Department immediately.

Protect the T34™ Ambulatory Syringe Pump from direct sunlight or heat.

Mobile phone use - children should be aware that there is a small risk of mobile phones interfering with the T34™ syringe pump. To reduce this risk, children and carers should only use a mobile phone outwit 1 metre of the pump as recommended by the manufacturers and should preferably switch off the phone when not in use. If the child requires to use a mobile phone, it should be held in the opposite hand from the side where the syringe pump is situated. If the phone is left switched on, it should be kept 1 metre away from the syringe pump (Healthcare Improvement Scotland, 2019).

17.0 Documentation

Complete the following documentation:

- Syringe Pump Monitoring Form (See Appendix 5)
- Medication Kardex
- Patients nursing notes

Document the effectiveness of therapy, at least 4 hourly, together with any side effects or problems encountered.

18.0 References

- APPM: Association of Paediatric Palliative Medicine Master Formulary (2020) 5th Edition http://www.appm.org.uk/
- Children's Health Ireland at Temple Street (2019) *Medication Policy*, CHI, Dublin, Ireland.
- CME Mc Kinley UK Ltd (2018) T34 ™ Syringe Pump System operation manual, Lancashire: CME Mc Kinley UK Ltd.
- Dickman A, Schneider J. (2016) *The Syringe Driver: Continuous subcutaneous infusions in palliative care*. 4 ed. ed. Oxford, UK: Oxford University Press.
- Hain, R., et al. (2021) Oxford Textbook of Palliative Care for Children. 3rd Edition. Oxford University Press. Oxford.
- Harris D. (2019) ''Safe and effective prescribing for symptom management in palliative care''. British Journal of Hospital Medicine (London, England) 80 (12): C184-189.
- Healthcare Improvement Scotland (2019) *Guidelines for the Use of the* T34™ Ambulatory Syringe Pump *for Adults in Palliative Care,* NHS Scotland.
- HSEland (May 2020) E-Learning Module for Connecting a Syringe Pump to a Child's Hickman Catheter
- Infection Prevention and Control Team, IPCT (2020) *Hand Hygiene Policy*, Children's Health Ireland @ Crumlin, Dublin, Ireland. Infection Prevention and Control Team, IPCT (2020) *Hand Hygiene Policy*, Children's Health Ireland at Temple Street, Dublin, Ireland.
- Infection Prevention and Control Team, IPCT (2019) *Guideline on Standard Precautions*, Children's Health Ireland @ Crumlin, Dublin, Ireland. Infection Prevention and Control Team, IPCT (2019) *Standard Precautions Policy*, Children's Health Ireland at Temple Street, Dublin, Ireland.
- Infection Prevention and Control Team, IPCT (2017) *Guideline on Cleaning and Disinfection*, Children's Health Ireland at Crumlin, Dublin, Ireland.
- Infection Prevention and Control Team, IPCT (2019) *Guideline on the Handling and Storage of Sharps*, Children's Health Ireland at Crumlin, Dublin, Ireland. Occupational Health Department (2019) *Policy on safe use and disposal of sharps,* Children's Health Ireland @Temple Street, Dublin, Ireland.
- Jassal S.S. (2016) Basic symptom Control in Paediatric Palliative Care, Edition 9.5. The Rainbows Children's Hospice Guidelines www.togetherforshortlives.org.uk

- Lister S., et al (2020) Chapter 17: Vascular access devices: insertion and management. *The Royal Marsden Manual of Clinical Nursing Procedures*, *Professional Edition 10th edition*. Wiley-Blackwell Publishing, Oxford.
- Mitchell K., Pichard J., Herbert A., Lightfoot J., Roberts D. (2011) *Incidence and causes for syringe pumpsite reactions in palliative care: A prospective hospice based study.* Palliative Medicine 26(8), 979-985.
- Nursing and Midwifery Board of Ireland (2020*) Guidance for Registered Nurses and Midwives on Medication Administration.* Bord Altranais, Nursing and Midwifery Board of Ireland (NMBI).
- Nursing and Midwifery Board of Ireland (2015) *Recording Clinical Practice. Professional guidance*. Bord Altranais, Nursing and Midwifery Board of Ireland (NMBI).
- Our Lady's Children's Hospital (2017) *Medication Policy,* OLCHC (now Children's Health Ireland @ Crumlin), Dublin, Ireland.
- OLCHC 'Guidelines on the administration of Intramuscular and Subcutaneous Injections'
- Wilcock A, Howard P, Charlesworth S. (2020) (PCF7) Palliative Care Formulary 7th Edition, Pharmaceutical Press.
- Wolfe J., Hinds P.S., Sourkes B.M. (2011) Textbook of interdisciplinary Paediatrics Palliative Care. Elsvier Health Science.

Appendix 1 - Location of T34™ Ambulatory Syringe Pump (CHI at Crumlin)

Palliative Care CNSp: Liz O'Donoghue, Imelda Hurley, Valerie Jennings, Caoimhe Wade

Bleep 8301 / Ext 6985 can be contacted to access the T34 ™

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

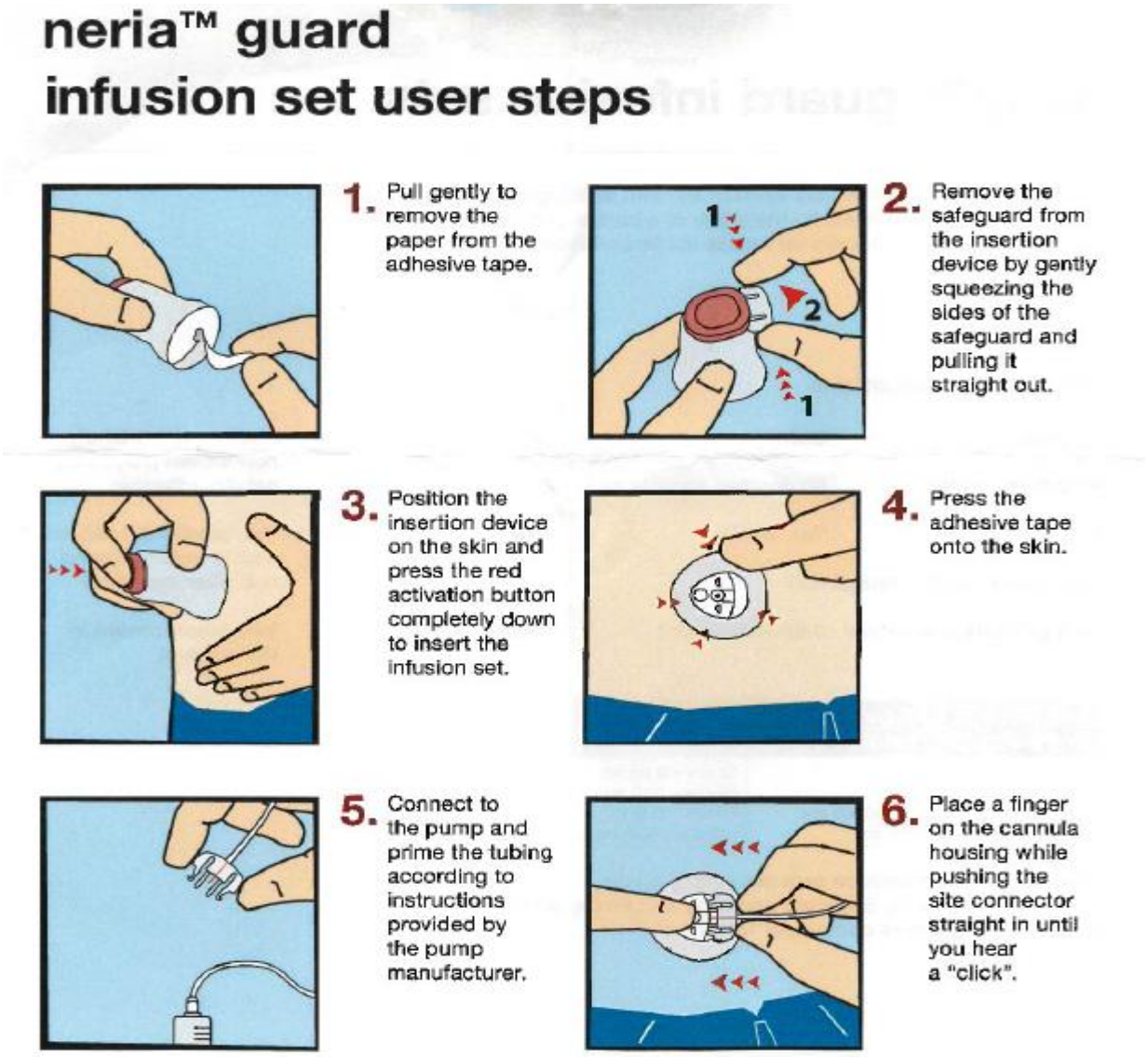
Location of T34 ™	• Palliative Care CNSp office • Room F1-44 • Half floor Nurses Home, office beside Clinical Skills Room (CCNE).
Access	• Spare set of keys located in top drawer of desk facing door in Switch (in biscuit tin). • Keys marked PC CNSp office. Please return after use.
Procedure when removing T34 ™ from PC CNSp office	• T34™ Ambulatory Syringe Pump (plus user manual, syringe pump lock-a-box, subcutaneous device / cannula subcutaneous devices and relevant equipment) kept in black storage box on shelf facing door in PC CNSp office. • Please sign for T34™ Ambulatory Syringe Pump on whiteboard in CNSp office: include ward, name of child syringe pump needed for and date removed from office. • In the event that further supplies / equipment needed, please access storage box in CNSp office.

Location of McKinley T34 Syringe pump (CHI at Temple Street)

Clinical Nurse Coordinators for Children with Life Limiting Conditions Jean Fitzsimons or Alison Cashell can be contacted via hospital switch 01-8784200 to arrange collection of T34 Monday to Friday. If you are unable to contact either CNC or neither CNC in hospital to assist, please follow procedure below.

Location of T34	• Clinical Nurse Coordinator for Life Limiting Conditions office • Floor 1, Harry Clarke House, 6 North Frederick Street, Dublin 1 *(3 minute walk from hospital).*
Access	• The office is usually occupied within normal working hours. Ring bell for access if unable to gain entry with hospital ID card. The office is on the 1st floor, on the right hand side at top of the stairs.
Procedure when removing T34 from CNC-CLLC's office	• If unable to contact either CNC the T34 (plus user manual, syringe pump lock-a-box, subcutaneous device / cannula subcutaneous devices and relevant equipment) is kept in black storage box on shelf in office as above. • Please contact both CNC's by email jean.fitzsimons@cuh.ie or Alison.cashell@cuh.ie to inform us T34 has been removed, including the ward, name of child syringe pump needed for and date removed from office.

Appendix 2 - How to insert subcutaneous device and priming volumes



NERIA™ GUARD		
Soft cannula lengths	**Infusion line lengths**	**Priming volumes**
6mm and 9mm	12, 60 and 110cm	12cm – 0.04mL 60cm – 0.1mL 110cm - 0.15mL

Appendix 3 – Guideline for the Care and Management of a CVAD for a Child in the Community

E-Learning Module for Connecting a Syringe Driver (Pump) to a Child's Hickman Catheter (2020) available on HSEland www.hseland.ie

Connecting a Syringe Driver to a Child's Hickman™ Catheter

by Aurion

0 Reviews

Welcome to this e-learning module which will provide you with the knowledge and skills to enable you to connect a syringe driver to a child's Hickman™ Catheter in the community or in an acute setting.

It is designed to support Community Specialist Palliative Care Teams (SPCT's) along with healthcare professionals, in the management of children's symptoms and at end of life, in the practical use of the child's Hickman™ Catheter.
This module is based on the Guideline for the Care and Management of a Central Venous Access Device for a Child in the Community (2017).

Learning Type: Online

Available Languages: • English

Duration: 30 minutes

Session(s): Connecting a Syringe Driver to a Child's Hickman™ Catheter — Seats: Unlimited

Enrol

www.hseland.ie

A new eLearning programme has been launched on HSeLanD to provide applicable healthcare professionals with the knowledge and skills to connect a syringe driver to a child's

The new eLearning module, Connecting a Syringe Driver to a Child's Hickman™ Catheter, has been designed specifically for community Specialist Palliative Care Teams (SPCT's) along with

Developed by HSE ONMSD and CHI at Crumlin, the new eLearning module is based on the Guideline for the Care and Management of a Central Venous Access Device for a Child in the

The eLearning programme contains instructional videos on connecting a syringe driver and changing the syringe. It also contains an assessment, with certification produced on successful completion...

Connecting a Syringe Driver to a Child's Hickman™ Catheter will take approximately 30 minutes to complete...

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

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

Is this document a: Policy Procedure Protocol Guideline x

Office of the Nursing & Midwifery Services Director,

Clinical Design & Innovation, Office of the Chief Clinical Officer,

Office of the Nursing & Midwifery Services Director

Title of PPPG Development Group:	Guideline for the Care and Management of a Central Venous Access Device for a Child in the Community
Approved by:	Dr Geraldine Shaw, Director, Office of the Nursing and Midwifery Services (ONMSD), HSE
Reference Number:	ONMSD 2021-001
Version Number:	5
Publication Date:	2020
Date for revision:	2023
Electronic Location:	https://healthservice.hse.ie/about-us/onmsd/onmsd-publications/

Version	Date Approved	List section numbers changed	Author
1.	2011		ONMSD
2.	March 2012		ONMSD
3.	January 2017		ONMSD
4.	May 2020		ONMSD
5.	January 2021		ONMSD

Procedure for Connecting a Syringe Pump to a Hickman™ Broviac™/ Catheter

Hickman™/ Broviac™ 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 in the discharge process to notify the relevant health care professional of the child's individual priming volumes. In the event of families not having the required supplies, they can be organised by the RPHN/CRGN/RN.

Principles for Safe Practice when Connecting a Syringe Pump to a Hickman™ Broviac™/ Catheter

The syringe driver infusion Pump must comply with safety criteria outlined in (Appendix VIII) and NMBI Guidance to Nurses and Midwives on Medication Management 2007.

When connecting a syringe driver to a Hickman™ Catheter/ Broviac™ 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 0.9% w/v and the infusion line attached in the usual way.

It is recommended that when connecting an infusion for the first time to the Hickman™ / Broviac™ Catheter that a second 10mL/20mL Luer-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.

There is a time delay as medication travels the length of the Hickman™/ Broviac™ catheter and 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 health care professional must contact 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. oral, buccal, rectal or subcutaneous to achieve symptom control quickly while waiting for the medication to enter the child's blood stream.

The needle free device and the infusion line from the syringe driver need to be changed once a week. However, if changes in a dosage of medication are made or new medications added, the infusion line from the syringe driver must be changed. The length of the Hickman™/ Broviac™ catheter and must be taken into account, as a delay will occur before the new dose enters the child's blood stream.

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 0.9% w/v. 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 0.9% w/v 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.

If during a syringe driver infusion, the catheter, (lumen) appears to have blocked it must not be flushed with Sodium Chloride 0.9%, w/v 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™/ Broviac™ catheter and care. This must be documented and the child's GP and discharging facility notified. If an alternative lumen is available, set up infusion as per Section 2.1.3.

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 and infusion line commenced on an alternate lumen to prevent cross infection.

Procedures for Connecting a Syringe Driver (Pump) to a Hickman™/ Broviac™ Catheter *(including syringe and line changes)*

Equipment

- Valid prescription and medications; expiry dates checked
- Clean plastic tray
- Individually wrapped disinfectant wipes x 1
- 10mL syringe x 1*
- Withdrawal needle/blunt fill needle x 2*
- Luer-lock syringe 10mL/20mL/30mL for infusion
- Non-injectable bung X 1
- Diluent
- Sodium Chloride 0.9% w/v*
- Infusion line for use with syringe driver
- 1mL, 2mL, 5mL, 10mL syringes to draw up medication
- Gloves
- Syringe driver infusion Pump (The syringe driver infusion Pump must comply with safety criteria outlined in (Appendix VIII)
- New syringe driver batteries
- Medication labels
- Sharps bin

Procedure for Connecting Syringe Driver (Pump) to a Hickman™/ Broviac™ Catheter

- Gather all equipment, prepare equipment and environment
- Explain the procedure to the child and parent/guardian
- Perform hand hygiene (RCPI/HSE 2015)
- Wipe the surface of the clean tray with a disinfectant wipe and allow to dry
- Draw up Sodium Chloride 0.9% w/v using a 10mL syringe
- Attach a non-injectable bung to the tip of the syringe to maintain asepsis
- Label the syringe and place on the tray
- Select syringe type for syringe driver and size 10 mL/20 mL/30mL as appropriate for prescribed medication. Use syringe with Luer-lock tip
- Fill the syringe with the medication and diluent
- The syringe must be labelled with the following as a minimum: child's name, date of birth, volume and strength of medication being delivered, date and time infusion commenced, signature of health care professional. Attach label to the blank side of the syringe
- 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 medication leaving the cover on the end
- 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
- Note: Duration and volume will have decreased during priming process
- Perform hand hygiene (RCPI/HSE 2015)
- Support the needle free device on the extension set with the non-aseptic hand, clean the centre of the needle free device with disinfectant wipe (scrub the hub), and discard outside of the tray.
- Remove the non-injectable bung from the syringe containing the Sodium Chloride 0.9% w/v
- Support the needle free device. Attach the Sodium Chloride 0.9% w/v by pushing the syringe firmly into the centre of the needle free device rotating to the right for a secure fit
- Open the clamps on the Hickman™/ Broviac™ catheter and draw back gently to assess for blood return to confirm correct position. Inject 1-2 mL Sodium Chloride 0.9% w/v using a push-pause method
- 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™/ Broviac™ catheter by pushing it firmly into the centre of the needle free device, rotating it to the right for a secure fit
- Open the clamp on the Hickman™/ Broviac™ catheter, open the clamp on the connecting infusion line and commence the infusion by pressing start on syringe driver
- Dispose of all needles and syringes immediately into the sharps bin and dispose of all other equipment as per local policy
- Perform hand hygiene (RCPI/HSE 2015)
- Document procedure as per local guidelines and HSE Standards and Recommended Practices for Healthcare Records Management (2011)

Procedure for Daily or Alternate Day Change of Syringe

Refer to Principles for Safe Practice for the Care and Management of a Hickman™/ Broviac™ Catheter and Porta Cath™ section 2.1

- Gather all equipment, prepare equipment and environment
- Explain the procedure to the child and parent/guardian
- Wipe the surface of the clean tray with a disinfectant wipe and allow to dry
- Perform hand hygiene (RCPI/HSE 2015)
- Draw up medications for infusion into appropriate Luer-lock syringe and attach non-injectable bung
- The syringe must be labelled with the following as a minimum; child's name, date of birth, volume and strength of medication been delivered, date and time infusion commenced and signature of health care professional. Attach label to the blank side of the syringe
- Close clamp on the Hickman™/ Broviac™ catheter and on the infusion line and disconnect used syringe
- Pause the Pump and remove syringe from the syringe driver. Dispose of the syringe in accordance with local policy
- Clean the area where the infusion line and syringe meet with the disinfectant wipe, (scrub the hub technique)
- Securely attach the new syringe on to the infusion line
- Load the syringe into the syringe driver as per manufacturers' instructions as per local guideline
- Open the Hickman™/ Broviac™ catheter clamp, open the clamp on the connecting infusion line and commence the infusion by pressing start on syringe driver

- Dispose of all needles and syringes immediately into the sharps bin and dispose of all other equipment as per local policy
- Perform hand hygiene (RCPI/HSE 2015)
- Document procedure as per local guidelines and HSE Standards and Recommended Practices for Healthcare Records Management (2011)

Procedure for Weekly Change of Needle Free Device and Infusion Line

Refer to Principles for Safe Practice for the Care and Management of a Hickman™/ Broviac™ Catheter and Porta Cath™ section 2.1

- Gather all equipment, prepare equipment and environment
- Explain the procedure to the child and parent/guardian
- Wipe the surface of the clean tray with a disinfectant wipe and allow to dry
- Perform hand hygiene (RCPI/HSE 2015)
- Close clamp on the Hickman™/Broviac™ catheter and on infusion line
- Pause the Pump and remove syringe
- Draw up medications for infusion into appropriate Luer-lock syringe and attach non injectable bung
- The syringe must be labelled with the following as a minimum: child's name, date of birth, the volume and strength of medication being delivered, date and time infusion commenced, signature of health care professional. Attach label to the blank side of the syringe
- 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 medication leaving the cover on the end
- Reload syringe on Pump as per manufacturers' instructions and local guideline. 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
- Note: Duration and volume will have decreased during priming process.
- Perform hand hygiene (RCPI/HSE 2015)
- Open sterile glove packet onto tray. The inside of this packet is now the aseptic field
- Open needle free device onto the aseptic field
- Open the disinfectant wipes onto the aseptic field
- Perform hand hygiene again and put on sterile gloves (RCPI/HSE 2015)
- Unfold the disinfectant wipes
- With the non-aseptic hand pick up the Hickman™/Broviac™ catheter. This hand now becomes the non-aseptic hand and must not touch the aseptic field. Pick up the unfolded disinfectant wipe in the aseptic hand and remove the needle free device by rotating it to the left
- Discard both the disinfectant wipe and the needle free device outside of the tray. Pick up another disinfectant wipe (using aseptic hand) and clean the open end of the Hickman™/ Broviac™ catheter (scrub the hub technique)
- Attach the new needle free device to the Hickman™/Broviac™ catheter by rotating it to the right for a secure fit

- Attach the infusion line to the end of the Hickman™/Broviac™ catheter by pushing it firmly into the centre of the needle free device, rotating it to the right for a secure fit
- Open the clamp on the Hickman™/Broviac™ catheter, open the clamp on the connecting infusion line and commence the infusion by pressing start on the syringe driver
- Dispose of all needles and syringes immediately into the sharps bin and dispose of all other equipment as per local policy
- Perform hand hygiene (RCPI/HSE 2015)
- 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 T34™ Ambulatory Syringe Pump

GUIDE TO WRITING A PRESCRIPTION FOR CONTINUOUS INFUSION

VIA THE CME T34™ AMBULATORY SYRINGE PUMP

(By either sub-cutaneous or IV route)

1. All prescriptions should be written in the patient's CHI at Crumlin 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 T34™ Ambulatory Syringe Pump and hence it is not necessary to calculate/prescribe the rate in mL/hour as the infusion Pump calculates this automatically.

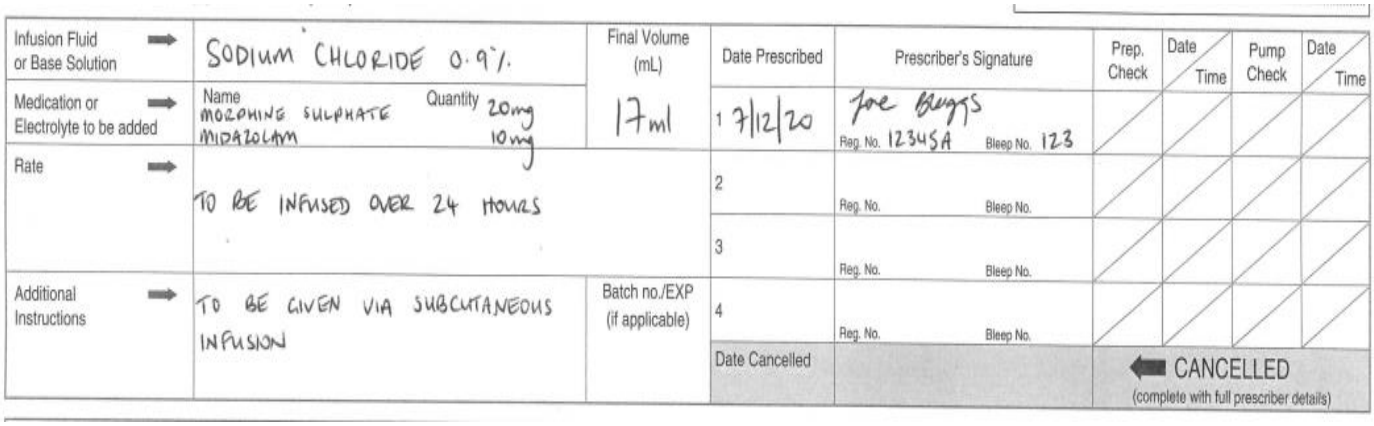
Note: Where an alternative syringe pump is being used e.g. PICU patients, the rate in mL/hour MUST also be prescribed.

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 sodium chloride 0.9% w/v (isotonic) unless contraindicated. Occasionally water for injection (hypotonic) may be used.
5. 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
6. 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.

7. 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.
8. To ensure the syringe fits into the T34™ Ambulatory Syringe Pump the following maximum volumes must be adhered to:
   - 10mL in a 10mL syringe
   - 17mL in a 20mL syringe
   - 22mL in a 30mL syringe

Sample 1



Infusion Fluid or Base Solution ➡	SODIUM CHLORIDE 0.9%	Final Volume (mL)	Date Prescribed	Prescriber's Signature	Prep. Check	Date / Time	Pump Check	Date / Time
Medication or Electrolyte to be added ➡	Name MORPHINE SULPHATE Quantity 20mg MIDAZOLAM 10mg	17ml	1 7/12/20	Joe Bloggs Reg. No. 12345A Bleep No. 123				
Rate ➡	TO BE INFUSED OVER 24 HOURS		2	Reg. No. Bleep No.				
			3	Reg. No. Bleep No.				
Additional Instructions ➡	TO BE GIVEN VIA SUBCUTANEOUS INFUSION	Batch no./EXP (if applicable)	4	Reg. No. Bleep No.				
			Date Cancelled		⬅ CANCELLED (complete with full prescriber details)			

Example Preparation Details: *Please refer to Procedure for Preparation of Syringe above for full guidance. Please note product strengths are liable to change.*

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 10mg in 1 mL ampoules.
    Dose required = 20mg = 2 mL

    b) Midazolam 10 mg in 2 mL ampoules (Hypnovel®)
    Dose required = 10mg = 2 mL

2. Add the first medication to the final 20mL Leur-lock syringe

3. Calculate the amount of prescribed diluent needed to make up to final volume (17mL)
    2mL morphine + 2mL midazolam = 4mL
    17mL – 4 mL = 13mL

4. Add 13mL of diluent to the final 20mL Leur-lock syringe

5. Add the second medication to the final 20mL Leur-lock syringe

Appendix 5 – T34™ Ambulatory Syringe Pump Monitoring Form

Children's Health Ireland

Syringe Pump Monitoring Form

Full Name: .....
Address: .....
.....
HCR No.....

Please Complete 4 hourly or more frequently if condition indicates										
Patient Name			HcRN			Ward:				
Medication Driver										
Note – To be Completed every 4 hours										
Date										
Time										
Volume to be infused *(VTBI)*										
Site *(Intact (i), redness(r), swelling(s), pain/discomfort(p) leaking fluid(lf))*										
Symptom Management *(pain score, symptoms present, NB reassess within one hour, document pain score)*										
Battery Check *(advise to change when <30%)*										
Signed										
NMBI										
To be filed in the Healthcare Record										

For additional advice, please contact Palliative Care CNSp – Bleep 8301 – last updated 24.11.21

Appendix 6 - T34™ Ambulatory Syringe Pump: Troubleshooting Guide

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

Appendix 7 – T34™ Ambulatory Syringe Pump

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 Press YES to Resume	The infusion has been stopped.	Press **YES** to Resume the infusion or press **NO** to continue stopped sate.

Alerts and Alarms

Program Nearly Complete	**Alert:** Programme is about to end/syringe is almost empty.	Prepare to change syringe or discontinue pump use.
Low Battery	**Alert:** Battery is almost depleted.	Prepare to change battery.
Pump Paused Too Long	**Alarm:** The pump has been stopped/paused for kore 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 kinked. 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. If problem persists send pump for service. ERROR Startup MotMov Fail If problem persists send pump for service.	**Alarm:** An internal system error has occurred. *Two examples of system failure screen messages are shown here, refer to the T34 service manual for a full list.*	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.

Doc Ref: T34 QUG/ Lock OFF L-P/v2/ Sept 2014 – QU G04

Ambulatory Syringe Pump

LOCK OFF (Load and Prime)

Quick user guide

T34

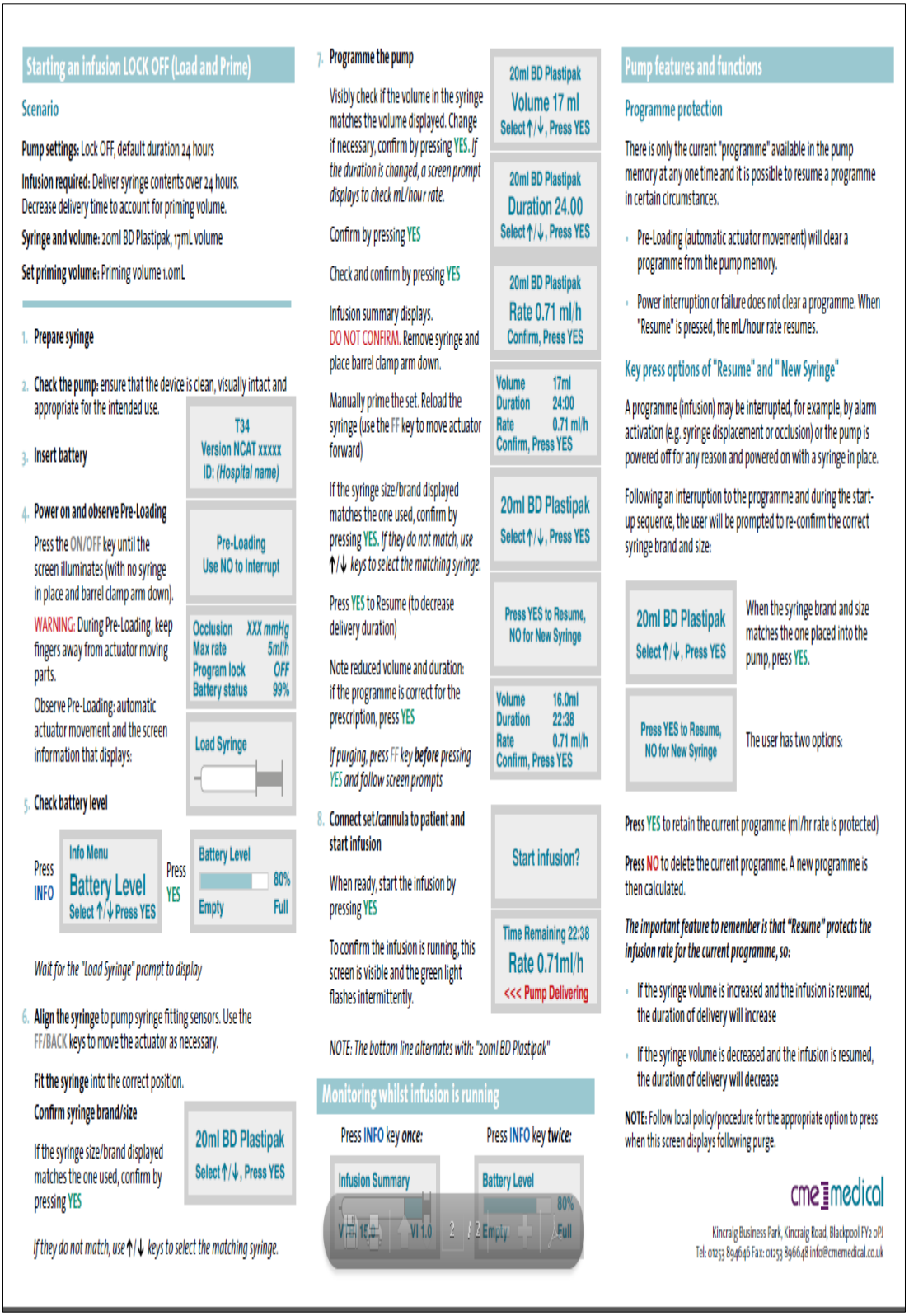
Feature recognition

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, 17mL volume
Set priming volume: Priming volume 1.0mL
1. Prepare syringe
2. Check the pump: ensure that the device is clean, visually intact and appropriate for the intended use.
3. Insert battery
T34
Version NCAT xxxxx
ID: (Hospital name)
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).
Pre-Loading
Use NO to Interrupt
WARNING: During Pre-Loading, keep fingers away from actuator moving parts.
Occlusion XXX mmHg
Max rate 5ml/h
Program lock OFF
Battery status 99%
Observe Pre-Loading: automatic actuator movement and the screen information that displays:
Load Syringe
5. Check battery level
Press INFO
Info Menu
Battery Level
Select ↑/↓ Press YES
Press YES
Battery Level
80%
Empty Full
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
20ml BD Plastipak
Select ↑/↓, Press YES
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.
20ml BD Plastipak
Volume 17 ml
Select ↑/↓, Press YES
Confirm by pressing YES
20ml BD Plastipak
Duration 24.00
Select ↑/↓, Press YES
Check and confirm by pressing YES
20ml BD Plastipak
Rate 0.71 ml/h
Confirm, Press YES
Infusion summary displays.
DO NOT CONFIRM. Remove syringe and place barrel clamp arm down.
Volume 17ml
Duration 24:00
Rate 0.71 ml/h
Confirm, Press YES
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.
20ml BD Plastipak
Select ↑/↓, Press YES
Press YES to Resume (to decrease delivery duration)
Press YES to Resume, NO for New Syringe
Note reduced volume and duration: if the programme is correct for the prescription, press YES
Volume 16.0ml
Duration 22:38
Rate 0.71 ml/h
Confirm, Press YES
If purging, press FF key before pressing YES and follow screen prompts
8. Connect set/cannula to patient and start infusion
Start infusion?
When ready, start the infusion by pressing YES
Time Remaining 22:38
Rate 0.71ml/h
<<< Pump Delivering
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:
Press INFO key twice:
Infusion Summary
Battery Level
80%
Empty Full
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.
Press YES to Resume, NO for New Syringe
The user has two options:
Press YES to retain the current programme (ml/hr rate is protected)
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.
cme medical
Kincraig Business Park, Kincraig Road, Blackpool FY2 0PJ
Tel: 01253 894646 Fax: 01253 896648 info@cmemedical.co.uk

Appendix 8 - Different versions of T34™ Ambulatory Syringe Pump

Currently the T34™ Ambulatory Syringe Pumps in use across CHI is Version 2.

Version 3 - is now available and expected to be in use in future.

The visual differences between Version 2 and 3 are demonstrated below.

2nd edition T34™ Ambulatory Syringe Pump

Writing displayed on buttons. T34™ Ambulatory Syringe Pump larger and to right of screen/ CME smaller and above screen (see below).

Label on battery cover instructing re fitting battery correctly with foam pad. Warning sticker in yellow about sunlight sensitivity (see below).

Grey sponge inside battery compartment. No small fluid drainage hole (see below).

3rd edition T34™ Ambulatory Syringe Pump

Universal symbols displayed on buttons. CME name larger, to right of screen / T34™ Ambulatory Syringe Pump smaller, and above screen (see below).

No label on battery cover as sponge not required. No need for warning as problem re sunlight resolved (see below).

No need for sponge inside battery compartment. Small fluid drainage hole in place (see below).

3rd Edition – T34™ Bodyguard™ T