McKinley T34 Syringe Pump Management

For use in: All clinical areas
For use by: Medical and Qualified Nursing Staff & Pharmacy
For use for: For use for delivery of medication via a continuous subcutaneous infusion to palliative care patients
Document owner: Palliative Care Team
Status: Approved

Purpose of the Policy
The objectives of this policy are:
To ensure the safe and effective management of a syringe pump
To ensure the safe and effective administration of medications
To prevent the occurrence of errors due to malfunction of syringe pump use

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Page 3 The McKinley T34 syringe pump; Rationale for the use of a syringe pump; Advantages and Points to remember.
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Page 6 Setting up the McKinley T34 for use; Insertion procedure for the Saf-T-Intima.
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Page 9 -10 Activation/deactivation of keypad lock; Lock boxes; Management of the infusion, Medical Devices Alert (2016); Temporarily stopping and resuming the infusion; How to stop the infusion and prime a new extension line/cannula; Changing a battery.
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Page 17-18 Development of guideline; Contributions to guideline.
Page 19- 26 Appendices (McKinley T34; cannula placement; prescription chart; Quick Set-up Guide; Algorithm of process for subcutaneous infusion by McKinley T34).
Syringe Pump to be safely and effectively managed

Rationale for the use of a Syringe Pump (see no: 1)

Ensure medication is prescribed
Check calculations (see no: 3)

Convert from oral administration to subcutaneous administration (see no: 3)

Ensure as required (PRN) medication is prescribed (see no: 4)

Are the patient’s symptoms controlled?

No
Administer loading dose (PRN) as prescribed (see no: 4)

Yes

Assemble equipment (see no: 2)

Prepare medication and diluents in syringe (see no: 5)

McKinley T34 set up (see no: 6)

Insert the cannula (see no: 7)

Commence infusion (see no: 8)

Monitor infusion and symptoms... use syringe pump prescription chart (see nos: 8, 9 & Appendix 3)

Syringe Pump delivers medication safely and effectively
RECOMMENDATIONS AND PROCEDURES

Training is obligatory for all staff before using the McKinley T34 syringe pump and replaces the Graseby MS16A (MS26) syringe driver mandatory training. Please see your ward manager.

The McKinley T34 Syringe Pump

The McKinley T34 syringe pump is calibrated in ml per hour. These pumps are used for palliative care patients at the West Suffolk Hospital (WSH) and are set up to deliver the syringe contents by continuous subcutaneous infusion over a 24 hour period. Staff must check that the display shows T34 followed by ID: WSH- asset number when switched on.

Following the ‘Rapid Response Report NPSA/2010/RRR019: Safer ambulatory syringe drivers’, the West Suffolk Hospital NHS Trust changed to the McKinley T34 syringe pump. The Graseby MS16A and MS16 are no longer to be used in the Trust. The initial McKinley T34 training is mandatory and comprises both an e-learning program and practical session to achieve competency. Online training can be accessed via education section on the End of Life Care section of the Pink Book or at http://www.mckinleymed.co.uk/online-training. For password to online training and practical assessment, please see your ward assessor or contact palliative care team. If you are unable to access online training, please read and familiarise yourself with the Trust policy prior to the practical session. On successful completion of the competency, the assessor will confirm whether the assesse has completed online training or familiarised themselves with the policy on the competency sheet. Reassessment is based on individual needs and as the Nursing and Midwifery Council (NMC 2008) state, “You must take part in appropriate learning and practice activities that maintain and develop your competence and performance”.

1. RATIONALE FOR THE USE OF A SYRINGE PUMP:

The use of a syringe pump should be carefully considered. Syringe pumps are used for the administration of medication for patients with the following:

- Persistent nausea and vomiting
- Swallowing difficulties
- Severe weakness
- Unconsciousness, dying

Advantages of a syringe pump:

- Continuous relief of multiple symptoms via one route
- Variations in plasma concentration levels are avoided
- Avoids repeated injections
- Maintains independence and mobility when appropriate
- Loaded once a day only

Points to remember:

Prior to starting the syringe pump, its use should be fully discussed with the patient and family. Offer to give patient/family a syringe pump information leaflet. http://staff.wsha.local/CMSdocuments/PatientLeaflets/PalliativeCare/5584-2SyringePumps.pdf. Discussion to include:

- Syringe pumps are not better at controlling symptoms than oral medication given regularly. They are used as an alternative route when the oral route is not suitable and/or there are problems with medication absorption via the oral route
- They should only be used after a full assessment of the patients condition and suitability
They may be for short term use and patients may then revert to the oral route
They do not hasten a patient's decline
Do not use mobile phones near the syringe pump

2. SETTING UP THE **McKINLEY SYRINGE PUMP**- EQUIPMENT REQUIRED:

- McKinley T34 syringe pump. **This is obtained through the Medical Equipment Library (MEL) between 08:00-19:00hrs Monday- Friday and via Porters outside these hours**
- 9 volt battery. A new battery is supplied when pump is obtained and will last for approximately 4-5 days depending on use. Replacement batteries should be stored in the syringe pump box located on the ward
- Lockbox and key
- 20ml Luer Lock Braun Omnifix syringe
- Saf-T-Intima cannula
- 100cm extension set. Use BMS Critical Care Ltd, code no: 20-7100 ONLY (this has a small priming volume of 0.78mls)
- Transparent adhesive dressing e.g. Tegaderm

Each ward is supplied with a syringe pump box containing a supply of spare 9 volt batteries, 20ml Luer Lock syringes, extension lines, Saf-T-Intima cannulae and transparent adhesive dressings. A designated member of the nursing team is responsible for replenishment of supplies to this box.

3. ENSURE MEDICATION IS PRESCRIBED:

Most drugs are not licensed for use as a continuous subcutaneous infusion. See WSH policy for use of unlicensed medications.

**To convert from oral morphine to a subcutaneous morphine or diamorphine infusion**

- Assess & add up the analgesic requirements of the patient for the previous 24 hour period: include as required (PRN) doses
  - **Divide the total oral morphine dose by 2** to give the 24 hour subcutaneous morphine dose
  - **Divide the total oral morphine dose by 3** to give the 24 hour subcutaneous diamorphine dose
- On commencing the syringe pump, medicine will take 4-6 hours to reach its maximum effect. If patient is symptomatic always give a stat dose as the pump is commenced
- Accurate records must be kept and an infusion and symptom control checklist is integral in the syringe pump prescription chart

**NB:** It is West Suffolk Hospital NHS trust policy that **no more than three medications are added to one syringe.** If additional medication is required, or there are incompatibilities with certain medication mixtures, then commencement of a second pump may be necessary. Or consider alternative route of administration, if feasible.

**Contact the Palliative Care Team or Pharmacy for support. Outside office hours, advice can be sought from on call Palliative Medicine Consultant via switchboard, or on call hospital Pharmacist.**

**Sedatives -**
Midazolam, levomepromazine, haloperidol

**Anti-emetics** -
Haloperidol, cyclizine, metoclopramide, levomepromazine

**Antispasmodic/antisecretory** -
Hyoscine butylbromide (Buscopan)

**NB:** Diazepam, chlorpromazine and prochlorperazine should not be given via the subcutaneous route.

Contact WSH Pharmacy Medicines Information to check for compatibility of medications, Palliative Care Team or visit [www.pallcare.info](http://www.pallcare.info) (found via the ‘Education and Resource’ link on the End of Life Care section of the Pink Book). Click on ‘syringe drivers’ on left hand side then ‘search’ for compatibilities.

4. **AS REQUIRED (PRN) MEDICATION:**

**Morphine or Diamorphine** -

A “breakthrough” as required (PRN) dose, calculated as 1/6th of the 24 hour total dose, should be prescribed subcutaneously on the patient’s standard medication chart.

**Other Medications** –

For breakthrough symptoms if medications in the pump are at the optimum level, prescribe an alternative medication, depending on the clinical need ie: in a patient treated for nausea with cyclizine 150mg in the syringe pump, prescribe haloperidol 0.5mg subcutaneously three times a day as required.

**NB:** A separate Saf-T-Intima cannula primed with 0.9% Normal Saline should be sited purely for administration of PRN subcutaneous medication (see section 7 for insertion procedure).

5. **PREPARE MEDICATION & DILUENTS:**

**Diluents** -

- Use water for injection as a diluent **except** when using:
  - ketamine
  - octreotide
  - ondansetron

**NB:** Always use water for injection with cyclizine

- Draw up prescribed medication into 20ml Braun Omnifix luer lock syringe and then add diluent to make a **total volume of 17mls**
- Draw up a little air into syringe, invert it gently several times to mix and then dispel the air. Take care not to expel any of the medication

Contact the Palliative Care Team if the volume of drug(s) is greater than 17mls or does not allow room for the diluent.

- Complete medication additives label as per drug administration policy and attach label to the syringe
• Ensure the label does not interfere with the mechanism of the infusion device, ie, where there is contact with the barrel clamp arm. The syringe scale must be visible for monitoring of the infusion

6. SETTING UP THE MCKINLEY T34 SYRINGE PUMP FOR USE:
a) Initial set up:
• Connect the extension line securely to the luer lock syringe
• With a new extension line and Saf-T-Intima, gently depress the syringe plunger to manually prime the line and Saf-T-Intima

b) Pre-loading procedure:
• Install the battery. Switch on device ensuring that the barrel arm clamp is in the down position. The LCD display will read ‘PRE-LOADING’ and the actuator will start to move. Wait until it stops moving and the syringe driver sensor detection screen (with syringe graphic) appears.
• Check battery life by pressing ‘INFO’ key once and then press ‘YES’ to confirm. **Discard the battery if there is less than 30% life remaining at the start of the infusion.** The maximum battery life starting at 100% is 5 days, depending on use

**NB:** During Pre-Loading the actuator always returns to the start position of the last infusion programmed.

c) Fitting the syringe to the syringe pump:

**NB:** There are three position sensors to ensure correct syringe placement in the device. Plunger sensor, collar sensor and barrel clamp. The device will not infuse if the syringe is not correctly loaded.

• **Align the filled syringe to the pump so that the collar sits above the central rest.** The syringe collar should be vertical. Ensure that the scale on the syringe barrel is facing upwards so that it can be easily read
• If the actuator is not in the correct position to accommodate the syringe plunger use the ‘FF’ or ‘BACK’ buttons on the keypad to move the actuator

**NB:** Forward movement of the actuator is set up to move in pulses and requires repeated presses of the ‘FF’ key. Backwards movement is not restricted.

• Once the syringe is correctly aligned, fit it into position and lower the barrel clamp arm to secure syringe barrel to pump
• The syringe graphic on the screen ceases to flash when the syringe is correctly seated at all 3 points
• The syringe size and brand option, 20ml Braun Omnifix, will then be displayed on the screen. Confirm that the syringe size and brand match the screen message. Press ‘YES’ to confirm.

7. INSERTING THE PRIMED CANNULA:
Administration should be via a SAF-T-INTIMA cannula.
Do not use a metal butterfly needle.
Suitable sites for insertion include:

- Infraclavicular, upper arm, back/shoulders, thigh, abdomen

But:

- Avoid areas of ascites or oedema
- Avoid upper arms if patient is to be turned frequently

And:

- Use area with the most flesh for patients who are emaciated
- Ensure skin is clean. Wash area with soap and water if visibly soiled
- Remove excess hair if necessary, using single use razor

Insertion procedure -

- Remove the sheath from the cannula
- Ensure the bevel is uppermost (if not twist the white cannister until the bevel is in the correct position)
- The pebble side of the cannula wings should lie on the patients skin, therefore grasp the pebbled side of wings between finger and thumb, pinching firmly
- Approaching slowly at a very LOW angle insert cannula almost parallel to the skin. Advance the entire unit and release wings. After insertion it should be possible to feel the cannula under the skin, if not replace at a lower angle. If it is too deep it may prevent delivery of medication and pump will stop
- Stabilise cannula wings, place a finger and thumb firmly on each wing to prevent movement of the s/c cannula
- Grasp the white cannister, on the pebbled area only, and pull quickly and sharply in a straight continuous movement
- The cannister will come off containing the needle which is safely secured in the cannister. Place in sharps box
- The cannula and looped line should be secured with a transparent dressing (Tegaderm) to allow for observation of the site and to prevent cannula movement
- Do NOT use the white clamp on the cannula, as these are only for use when cannula is used for intravenous delivery
- Record site of cannula insertion on the syringe pump prescription chart check list

8. COMMENCING THE INFUSION:

a) Starting the infusion - INITIAL SET UP (following manual priming and siting of cannula):

NB: The pump calculates and displays the deliverable volume, duration of infusion (24hrs) and rate of infusion (mls per hour). The display shows (for eg.

<table>
<thead>
<tr>
<th>Volume</th>
<th>16.0ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>24.00</td>
</tr>
<tr>
<td>Rate</td>
<td>0.66ml/h</td>
</tr>
<tr>
<td>Confirm,</td>
<td>Press YES</td>
</tr>
</tbody>
</table>

- Press ‘YES’ to confirm the infusion parameters are correct
- Pump screen prompts ‘Start Infusion?’ (the pump will alarm after 2 minutes if no confirmation is given)
• Check the line is connected to the pump
• Press ‘YES’ to confirm and commence infusion
• Lock keypad lock (see c below)

b) Starting the infusion- SYRINGE RENEWAL ONLY:
• Make up new syringe as described in step 5
• Unlock keypad lock (see c below)
• Switch off pump using the ‘ON/OFF’ button
• Remove spent syringe from pump (still connected to the extension line)
• Switch pump on and ensure ‘PRE-LOADING’ sequence occurs
• Check battery life by pressing ‘INFO’ key once and then press ‘YES’ to confirm
• Load new syringe using ‘FF/BACK’ keys if required
• Confirm syringe type and follow screen prompts
• Disconnect spent syringe and connect newly loaded new syringe to extension line
• Press ‘YES’ to confirm the infusion parameters are correct
• Pump screen prompts ‘Start Infusion?’
• Re-check the extension line is connected to the new syringe securely
• Check the connection to the patient remains patent
• Press ‘YES’ to confirm and commence infusion
• Lock keypad lock (see c below)

The syringe pump then commences a new 24 hour infusion period.

When the pump is running the screen display shows eg:

- Green LED indicator flashes every 32 seconds
- It takes 4-6 hours for medicines to reach therapeutic blood plasma levels via a syringe pump. Therefore, a stat dose of prn s.c medication as prescribed on the patient’s main medication chart, may be required when the syringe pump is set up if the patient has unrelieved symptoms
- **Never** take a syringe that is NOT empty off the pump, if it is still connected to the patient
- The syringe pump must be placed level with the infusion site as it is possible for the contents to siphon out
- **Do NOT** place the syringe pump in an area where it may become too warm (eg, under the bedclothes). This may result in a change in the solution temperature, thereby altering a medication’s pH and therefore its efficacy

**NB:** If the infusion has not been started and a button has not been pressed for more than two minutes, an alarm will sound and the message ‘Pump Paused Too Long Confirm’. Press ‘YES’ will show the LCD display. To stop the alarm press ‘YES’ and continue programming the infusion
c) Keypad lock:
The McKinley T34 pump allows the user to lock the operation of the keypad during infusion. This
function should be routinely used to prevent tampering of the device.

To activate the Keypad lock:

- With the pump infusing press and hold ‘INFO’ key until a display shows a “progress” bar
  moving from left to right. Hold the key until the bar has moved completely across the
  screen and a beep is heard to confirm the lock has been activated

NB: Although the keypad lock is on, the following buttons are still active: NO/STOP;
YES/START; INFO.

To de-activate the Keypad lock: (pump must be infusing):

- Repeat as for activating Keypad lock. The bar will now move from right (lock) to left
  (unlock) and a beep will be heard

d) Lock boxes:
Every T34 will be supplied with a lockbox.

- After starting the infusion, place the pump in the supplied lockbox
- Universal key (each clinical area to keep a key on Controlled Drugs keyring)

NB: MEDICAL DEVICE ALERT issued by the Medicines and Healthcare Products Regulatory
Agency (MHRA 2016) CME Medical recommend the need for protection of the Mckinley
ambulatory syringe pumps when exposed to direct sunlight outside. This does not pertain to indoor
use. Pumps can be placed in a shoulder bag or in the CME Medical disposable pouches provided
via MEL or Palliative Care Team.

9. STOPPING THE INFUSION:
a) How to temporarily stop the infusion:
This is NOT normal practice and should only be used in exceptional circumstances. This should
not be used for priming a new line.

- Press and hold INFO key to disable the keypad lock, then press ‘STOP’. Next, press the
  ‘ON/OFF’ button
- Do NOT remove syringe from pump
- Document reason for stopping the infusion on syringe pump prescription chart

- Resuming the infusion:

- Check the prescription, syringe label and patient details match
- Reconnect line to the syringe on the pump if it has been disconnected
- Press and hold ‘ON’ button until a beep is heard. The screen will request confirmation of
  the syringe size and brand
- The Screen will display-

  Press YES to Resume,
  NO for New Program
- Press ‘YES’ to resume the previous program
- The screen will display ‘Remaining volume, duration and rate of infusion’. Press ‘YES’ to confirm. Screen then displays ‘Start Infusion’. Press ‘YES’ to confirm
- Activate keypad lock

**NB:** If ‘NO’ is pressed, the pump interprets this as a completely new 24 hour period and the remaining contents in the syringe will be delivered over the next 24 hours from confirming ‘Start Infusion’. If ‘NO’ is pressed in error, the syringe contents must be discarded and a new syringe prepared and set-up as otherwise the patient will not receive the prescribed dose.

**b) How to stop the infusion and prime a new extension line and/ or cannula after the infusion has started:**
- Press ‘STOP’ to pause the infusion
- Deactivate the keypad lock but do **NOT** switch the pump off
- Disconnect the existing extension line from the syringe. Remove line from the patient or, if cannula needs replacing, remove cannula along with attached extension line
- Remove the syringe from the pump. Attach and manually prime a new line (and new cannula, if applicable)
- Reposition the actuator and place the syringe in the pump
- Confirm the size and make of the syringe
- Attach the new extension line to the existing cannula/site new cannula
- Press ‘YES’ to resume the previous programme
- The screen will display- the **remaining volume, duration and rate of infusion**. Press ‘YES’ to confirm. Screen then displays ‘Start Infusion’. Press ‘YES’ to confirm
- Activate the keypad lock

**The time remaining for the infusion will decrease to compensate for the solution that was used to prime the replacement line. The flow rate will remain the same.**

**NB:** Record remaining volume (mls) on syringe pump prescription chart.

c) **How to change the battery when an infusion pump is running:**
- With the infusion still running remove the old battery from the pump and replace with a new one
- Switch the pump back on using the ‘ON/OFF’ button
- Confirm the size and make of the syringe
- Press ‘YES’ to resume the infusion
- The screen will display: **Remaining volume, duration and rate of infusion**. Press ‘YES’ to confirm. Screen then displays ‘Start Infusion’. Press ‘YES’ to confirm
d) Completion of current infusion (and renewal of syringe/ or change in prescription):

When the infusion is near completion, a warning will be shown on the LCD display 15 minutes before the end of the infusion. When the infusion is complete and the syringe empty, the pump will automatically stop and an alarm will sound.

- Press ‘YES’ to confirm end of infusion. Unlock keypad lock and switch off pump using the ‘ON/OFF’ button. Then follow instructions in 5, 6, 7, 8a or b (as applicable)

**NB:** It is not necessary to change the cannula and line if only the dose of medication is being changed.

e) Stopping completed infusion and removing the syringe pump:

- If the syringe pump is no longer required for the patient, press ‘YES’ to confirm the end of the infusion. Disable the keypad lock and press and hold the ‘ON/OFF’ button to switch off the pump

**NB:** If the infusion is to be stopped before the syringe is empty it should be disconnected at the syringe end from the patient for safety reasons before the syringe is taken off the pump. A syringe that is not empty must never be taken off the pump while connected to the patient due to the risk of siphonage

f) What to do if the patient dies when syringe pump is running:

- Stop the pump only after death has been formally verified
- Stop the infusion by pressing the ‘STOP’ button. Disconnect line from the Saf-T-Intima which must be left in situ as per West Suffolk Hospital guidelines. Switch off the pump by disabling the keypad lock and then press and hold the ‘ON/OFF’ button
- Record on the syringe pump prescription chart, the date, time and amount of solution remaining in the syringe (mls). Discard contents as per policy and sign

10. **MONITOR INFUSION:**

It is important that checks are carried out as per policy and documented on the checklist on the syringe pump prescription chart.

- Check pump and cannula site within **ONE HOUR** of set-up/renewal of syringe
- With **FOUR HOURLY** checks thereafter

**NB:** If there are any adverse incidents with the pump, the pump’s internal memory of all button presses can be accessed via the Event Log. In such cases, refer to an experienced user of the device and/or EBME. If in any doubt as to pump’s safe use, **STOP** the infusion and return device to EBME.

**Observation checks should include:**

- Date and time of check
- Check that the rate has not been altered
- Check the volume remaining in the syringe (VTBI) and volume infused (VI) by pressing ‘INFO’ once. The Keypad lock does **NOT** need to be disabled to access this information. Document the volume. This will assess if the pump is delivering medication at the desired rate
- Battery life is checked by pressing the ‘INFO’ key twice
- Check that the green LED light is flashing every 32 seconds. The bottom line of the LCD display must be alternating between ‘<><< Pump Delivering’ and make/size of syringe
- Observe syringe for precipitation, cloudiness, change in colour and crystalisation of the contents, which must be discarded if these occur
- Check that the line is securely attached to syringe and not leaking and line is not kinked or trapped
- Observe the cannula insertion site for redness, inflammation and leakage of fluid. Change site if these signs are present and record location and reason for change, on the syringe pump prescription check list
- At commencement and change of medication the prescription should be checked by 2 nurses - see drug administration policy

NB: There is no clear information on the optimum time to change the cannula and extension line but it is generally agreed that these can be changed weekly unless the patient reports discomfort or there are visible signs of inflammation or leakage at the site; or there is visible precipitation of medications in the syringe/line.

11. MONITOR SYMPTOMS:
- Every FOUR HOURS complete symptom control check list on back of pump prescription chart
- A change of medication in prescription means a new syringe, new extension set and cannula

12. CLEANING AND DECONTAMINATION OF SYRINGE PUMP ON WARD:
- Do not immerse pump in water
- Cleaning should be carried out with a soft disposable cloth using warm water and general-purpose detergent, or PDI detergent wipes for hard surfaces
- Do not use acetone/similar solvents or Cliniwipes (or similar) as this will cause damage to the components and labels
- Return pump to MEL when pump is no longer required by patient
- For patients with an infection control risk, additional cleaning with Chlorclean is required. Please seek advice from Infection Prevention Team if necessary

13. SYRINGE PUMP PROBLEM SOLVING:
Common Problems/Problem solving:

<table>
<thead>
<tr>
<th>Fault</th>
<th>Possible Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Pump will not start.</td>
<td>1. No battery inserted.</td>
<td>1. Fit a battery.</td>
</tr>
<tr>
<td></td>
<td>2. Battery inserted incorrectly.</td>
<td>2. Re-align battery terminals.</td>
</tr>
<tr>
<td></td>
<td>3. Battery is depleted/very low.</td>
<td>3. Fit a new battery.</td>
</tr>
<tr>
<td></td>
<td>4. Pump is faulty.</td>
<td>4. Service required. Return to EBME.</td>
</tr>
</tbody>
</table>
| Infusion ended early-going too quickly (ie. running more than 1 hour ahead of expected time) | 1. Wrong syringe brand/size confirmed during set-up/incorrect volume measured by pump.  
2. Disconnection of line or cannula.  
3. Air is present in syringe (solution will siphon if barrel cracked).  
4. Pump has been placed above the height of the patient (siphonage could have occurred).  
5. Pump faulty or incorrectly calibrated | 1. Stop infusion and set up a fresh infusion.  
2. Check connections are secure.  
3. Stop infusion and discuss with Doctor. Set up of fresh infusion may be required. Document action on syringe pump prescription chart and patient’s medical notes.  
5. Return to EBME for servicing/recalibration. |
|---|---|---|
| Pump is running too slowly (ie.running more than 1 hour behind expected time) | 1. Battery is depleted/very low.  
2. Wrong syringe brand/size selected.  
3. Syringe pump may have been stopped and restarted.  
4. Is cannula insertion site red/sore/lumpy/hard?  
5. Do contents of syringe and line have signs of crystallisation? | 1. Check syringe pump light is GREEN and flashing. Check battery level. Fit a new battery.  
2. Stop infusion and discuss with Doctor. Set up a fresh infusion.  
3. Check syringe pump prescription chart/documentation for possible reason this occurred.  
4. Change cannula site, if necessary. Check compatibilities of medication combination (see Pink Book/check with Pharmacy/Palliative Care Team). Consider separating medications into 2 syringe pumps for greater dilution of medication.  
5. Check compatibilities of medication combination (see Pink Book/check with Pharmacy/palliative care team). Consider separating medications into 2 syringe pumps for greater dilution of medication. |
| The pump has stopped before emptying syringe | 1. Exhausted battery.  
2. Check cannula insertion site and contents of syringe for crystallisation  
3. Faulty pump? | 1. Fit new battery, turn pump on, confirm syringe size and brand. Select to resume infusion.  
2. See 4 & 5 in section above.  
3. Return to EBME for servicing. |
14. McKinley T34 Pump Alarm Conditions

When the pump detects a problem four 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

**Alarm conditions:**

<table>
<thead>
<tr>
<th>LCD Display</th>
<th>Alarm Type</th>
<th>Possible Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occlusion or syringe empty</td>
<td>Audible and visual alarm.</td>
<td>Patient cannula/line kinked. Occlusion. Infusion has finished. Pump will stop.</td>
<td>Remove occlusion and restart as per 9a or b. Change cannula and/or extension if needed.</td>
</tr>
<tr>
<td>Occlusion/ syringe Empty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check line &amp; Syringe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Press YES to confirm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Syringe Displaced</td>
<td>Audible and visual alarm-intermittent beep.</td>
<td>Syringe has been removed or displaced. Pump will stop.</td>
<td>Check and confirm syringe seated correctly and resume infusion. Syringe collar needs to be in vertical position at all times.</td>
</tr>
<tr>
<td>Syringe displaced,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check Syringe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Press YES to Confirm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump Paused Too Long</td>
<td>Audible and visual alarm-intermittent beep.</td>
<td>Pump left or no key presses detected for 2 minutes. Pump will stop.</td>
<td>Start infusion, continue programming or switch off.</td>
</tr>
<tr>
<td>Pump Paused Too Long</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirm, Press YES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near End</td>
<td>Audible and visual alarm-intermittent beep.</td>
<td>15 minutes from end of infusion. Pump still infusing.</td>
<td>Prepare to change syringe or switch off.</td>
</tr>
<tr>
<td>Near End</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End Program</td>
<td>Audible and visual alarm-intermittent beep.</td>
<td>Infusion complete. Pump will stop.</td>
<td>Pump will alarm. Press ‘YES’ to confirm end of program and press‘OFF’ to switch pump off.</td>
</tr>
<tr>
<td>End Program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Press YES to confirm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Battery</td>
<td>Visual and intermittent audible alarm.</td>
<td>Battery is almost depleted (30 minutes left). Pump still infusing.</td>
<td>Prepare to change battery and resume infusion.</td>
</tr>
<tr>
<td>Low Battery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End Battery</td>
<td>Visual and continuous audible alarm.</td>
<td>Battery is depleted. Pump will stop.</td>
<td>Change battery and resume infusion.</td>
</tr>
<tr>
<td>End Battery</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>
15. **PATIENTS BEING DISCHARGED FROM HOSPITAL INTO THE COMMUNITY**

This section applies to any patient being discharged from hospital with a continuous subcutaneous infusion via a McKinley T34 syringe pump to their own home, nursing home, another hospital or hospice. Forward planning is essential and if possible should be **organised the day before discharge** to avoid any delay.

The individual ward is responsible for contacting MEL (or porters out of hours, if essential) to inform them that a patient is being discharged from hospital with a McKinley T34 syringe pump and to request a Discharge Pack and give information regarding the discharge destination. A self-addressed padded envelope is provided for return of the pump to MEL as soon as possible from the discharge destination ie; nursing home or via the patient's district nursing team when the destination has exchanged the hospital pump for one of their own devices.

An indemnity form will be completed and kept by MEL, with a copy added to the patient's hospital notes, discharge pack. This is to aid a paper trail in the event that the pump is mislaid or lost.

Prior to the patient leaving the hospital, the plastic lockbox **MUST** be removed from the syringe pump. **Ensure that the keypad lock remains activated.**

The Discharge Pack is to include:

- A padded A4 envelope for pump return
- A copy of the Indemnity form
- A copy of the patient’s medical discharge summary (EPRO)
- The Discharge Pack Communication Sheet. This has instructions on how to stop the McKinley T34 at a destination unfamiliar with syringe pumps. Please include the ward telephone number on the sheet
- With a patient going home, a referral for daily reloading of the syringe pump must be sent to the District Nursing team (via Single Point of Access, if applicable). Details must include: when current syringe was commenced and when it is due for renewal; what medications are being administered and when cannula/extension line was sited. For other discharges, such as to another hospital, hospice or nursing home (or if the district nursing team are not part of Single Point of Access) complete a “Nursing Transfer Document for Discharge” form with the syringe pump details and send the white copy with the patient on discharge
- For patients’ being discharged home or to a nursing home for end of life care, a copy of the prescription guidance for ‘**Just in case prescribing guidance for G.P’s**’ should be included. This information can be found and printed from the End of Life Care section of the Pink Book

**Important points to remember**

- It is imperative that the patient’s hospital medical team contact the patient’s receiving medical team regarding the syringe pump prescription, as that it is documented on the patient’s discharge letter. For patients’ returning home or being transferred to a nursing home, the G.P is responsible for writing the community prescription so that the district nursing team/nursing home can continue to manage the patient’s symptoms in the community.
- It will be necessary for medications to be dispensed for the syringe pump to continue for some days following discharge until further medication can be obtained by the community teams. Medications dispensed for discharge (TTO’s) may also include prn medication for symptom management.
- It is the ward staff’s responsibility to ensure that a referral is sent (Single Point of Access, if applicable) for District Nurse input for daily re-loading of the syringe and **is followed up by**...
telephone to the relevant District Nursing Team to ensure this information has been received. For all other discharge destinations, ward staff must contact the receiving nursing teams with this information

- Communication with receiving medical/nursing teams must include discussion on their responsibility for the return of the syringe pump to the West Suffolk Hospital as soon as possible. With planned discharge, alternative arrangements may be made by discharge destination, for example, receiving team supplying a pump (and setting up if pump is not a McKinley T34) to WSH

NB: Nurse to load new syringe and new battery within 2 hours of expected discharge time. Remember to take the plastic lockbox off the pump prior to discharge and ensure the keypad lock on the syringe pump has been activated.

References


Medicines and Healthcare Products (March 2016) Ambulatory syringe pumps (T34 and T60) and syringe extension sets used with the T34 pimp, manufactured by Caesarea Medical Electronics (CME) Department of Health, Social Services and Public Safety


NHS Greater Glasgow and Clyde (Jan 2009) McKinley T34 syringe pump: guidelines for use in adult palliative care patients

Nursing and Midwifery Council (2008) The code: standards of conduct, performance and ethics for nurses and midwives


Torre M (2001) Subcutaneous infusion: non-metal vs metal butterfly needles British Journal of Community Nursing Vol 7 No 3 157-162


See ‘Education and Resource’ link in End of Life Care section of the Pink Book and the” Last Days of Life in Care of the Dying Guidelines”.

www.mckinleymed.co.uk/products/T34document Accessed 27.04.11


www.palliativedrugs.com

www.pallcare.info
Development of the guideline

Statement of clinical evidence

Administration of drugs by Continuous Subcutaneous Infusion (CSCI) using a portable battery powered syringe driver is common practice in palliative care in the UK (Twycross 2003). The move to the McKinley T34 syringe pump for administration of medications follows the Rapid Response Report NPSA/2010/RRR019: safer ambulatory syringe drivers. A literature review was carried out (see reference list) confirming that medication given via CSCI ensures constant symptom control when the oral route is contraindicated. The review confirms that the use of non-metal cannulae are superior to metal cannulae by maintaining the duration of the subcutaneous infusion and reducing risk of needlestick injury to staff and patients.

Contributors and peer review

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Dr Rosemary Wade   Consultant in Palliative Medicine.
Palliative Care Team
Rachel Spitzer            Marie Curie Discharge Liaison Nurse

Distribution list/dissemination method

To be distributed to all clinical areas, pharmacy, directorates and consultants within the West Suffolk Hospitals NHS Trust.

Document configuration information

<table>
<thead>
<tr>
<th>Author(s):</th>
<th>Sarah Ryan. Palliative Care Nurse Specialist</th>
</tr>
</thead>
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<tr>
<td>Other contributors:</td>
<td>Dr Rosemary Wade; Palliative Care Team; Rachel Spitzer, Marie Curie Discharge Liaison; Jill Cerny, Infection Prevention Team</td>
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<tr>
<td>Approvals and endorsements:</td>
<td>Medical Governance Committee. Drugs and Therapeutics Committee</td>
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<td>This document will be widely circulated within the Trust, including all heads of department and ward managers and will be made availability on the Trust’s Intranet and Internet sites. Relevant changes will be brought to the attention of employees during circulation. Comprehensive training programmes exist including mandatory training and relevant modules as detailed in the Trust’s training prospectus. Specialist training will also be targeted at those with responsibility for managing hazards with a high-risk rating.</td>
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<td>Additional Information:</td>
<td>Review February 2018</td>
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APPENDIX 1

McKinley T34 Syringe Pump
APPENDIX 2

SITES SUITABLE FOR CANNULA PLACEMENT

Anterior Aspect of Upper Arms
Anterior Chest Wall
Anterior Abdominal Wall
Anterior Aspect of Thighs

Scapula area can also be used, useful for patients who are at risk of pulling the cannula out eg: confusion or delirium

Sites to avoid see Section 7, page 6
APPENDIX 3

SUBCUTANEOUS SYRINGE PUMP PRESCRIPTION SHEET

WARD: ......................... CONSULTANT: .........................

INSTRUCTIONS FOR PRESCRIBING DRUGS VIA A SYRINGE PUMP

1. All drugs must be prescribed by generic name in BLOCK CAPITALS.
2. Prescribe a dose per 24 hours for each drug.
3. The prescription must be reviewed and rewritten every 72 hours or more frequently if clinically indicated.
4. Information on doses and compatibility of drugs may be obtained from the BNF, www.pallcare.info, the Palliative Care Team or the pharmacy department’s ‘Medicines Information’ service.
5. PRN doses for all drugs in the syringe pump should be prescribed on the standard drug chart.
6. If the syringe pump is to be stopped indicate this clearly on the chart, sign and date.
7. A reference to the use of a syringe pump should be clearly made on the standard drug chart.

INSTRUCTIONS FOR SETTING UP A SYRINGE PUMP

1. Draw up medication and add diluent to make total syringe volume to 17mls using a 20ml Leur Lock syringe (if volume greater than 17mls, consider a second pump or refer to Palliative Care team and/or pharmacy for advice).
2. Use the appropriate diluent:
   Water for Injection for the majority of drugs.
   Sodium chloride 0.9% for ketamine, octreotide and ondansetron.
3. The pump calculates and displays the deliverable volume, duration of infusion (24hrs) and rate of infusion (mls per hour). See McKinley T34 guidelines for set up instructions.

Carry out pump checks and patient checks, initially after 1 hour then every 4 hours thereafter. Record overleaf.
**PATIENT NAME:** ____________________________  **HOSPITAL NUMBER:** ____________________________

<table>
<thead>
<tr>
<th>MEDICATION (INCLUDING DOSE)</th>
<th>DATE:</th>
<th>DATE:</th>
<th>DATE:</th>
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<tr>
<td>Drug 1: ______________________ Dose: __________</td>
<td>Set up by:</td>
<td>Set Up By:</td>
<td>Set Up By:</td>
</tr>
<tr>
<td>Drug 2: ______________________ Dose: __________</td>
<td>Checked By:</td>
<td>Checked By:</td>
<td>Checked By:</td>
</tr>
<tr>
<td>Drug 3: ______________________ Dose: __________</td>
<td>Pump no:</td>
<td>Pump no:</td>
<td>Pump no:</td>
</tr>
<tr>
<td>Route: SC  Total Quantity: 17mls</td>
<td>Time Set Up</td>
<td>Rate at set up:</td>
<td>Time Set Up</td>
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<tr>
<td>Duration: 24 hours</td>
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<tr>
<td>Diluent: Water for Injection / Sodium Chloride 0.9%  (delete as appropriate)</td>
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<tr>
<td>Signature: ___________________ Date:</td>
<td>Pharmacy:</td>
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**MEDICATION (INCLUDING DOSE)**

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<tr>
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<tr>
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<td>Checked By:</td>
<td>Checked By:</td>
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<tr>
<td>Drug 3: ______________________ Dose: __________</td>
<td>Pump no:</td>
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<td>Route: SC  Total Quantity: 17mls</td>
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<td>Set Up By:</td>
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<tr>
<td>Drug 2: ______________________ Dose: __________</td>
<td>Checked By:</td>
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<tr>
<td>Drug 3: ______________________ Dose: __________</td>
<td>Pump no:</td>
<td>Pump no:</td>
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<tr>
<td>Route: SC  Total Quantity: 17mls</td>
<td>Time Set Up</td>
<td>Rate at set up:</td>
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<td>Duration: 24 hours</td>
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<td>Diluent: Water for Injection / Sodium Chloride 0.9%  (delete as appropriate)</td>
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<td>Signature: ___________________ Date:</td>
<td>Pharmacy:</td>
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</table>
### SYRINGE PUMP CHECKLIST (INITIALLY AFTER 1 HOUR then EVERY FOUR HOURS)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Rate (mls per hour)</th>
<th>Starting Volume (mls)</th>
<th>Volume Remaining At Check (mls)</th>
<th>Drug Solution 1. Clear 2. Cloudy 3. Crystallised</th>
<th>Write battery percentage</th>
<th>Cannula Position</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
# SYMPTOM CONTROL CHECKLIST: PATIENTS ON SYRINGE PUMP

**(EVERY FOUR HOURS)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Pain Score (0 - 10)</th>
<th>Nausea Score (0 - 2)</th>
<th>Agitation Present? Yes/No</th>
<th>Respiratory Secretions? Yes/No</th>
<th>Cannula Site Condition</th>
<th>Actioned as Appropriate (tick)</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

### Symptom Scores

- **Pain Score**
  - 0 = no pain
  - 5 = moderate pain
  - 10 = severe pain

- **Nausea Score**
  - 0 = no nausea
  - 1 = nausea controlled
  - 2 = uncontrolled nausea

- **Needle Site**
  - 0 = satisfactory
  - 1 = slightly pink
  - 2 = inflamed – change site

Source: Palliative Care Team  
Status: Approved  
Issue Date: February 2016  
Review Date: February 2018  
Doc Ref: PP(16)287
Appendix 4: McKinley T34 Syringe Pump Quick Set up Guide.

<table>
<thead>
<tr>
<th>Draw up prescribed medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manually prime extension line and Saf-T-Intima -do not load syringe</td>
</tr>
<tr>
<td>Switch pump on- Displays 'T34 and ID:WSH-asset number'</td>
</tr>
<tr>
<td>Pump goes through pre-loading process (actuator moves backwards and returns to previous start position). Once pump displays 'Load Syringe', press 'INFO' key.</td>
</tr>
<tr>
<td>Select battery level</td>
</tr>
<tr>
<td>Press 'YES' to verify sufficient battery power- change if 30% or less. Screen will revert to 'Load Syringe' if no other buttons are pressed.</td>
</tr>
<tr>
<td>Ensure barrel clamp arm down. Fit pump to syringe using 'FF' or 'BACK' keys to adjust position.</td>
</tr>
<tr>
<td>Lift barrel clamp arm, seat syringe collar and plunger in correct position and secure with barrel clamp arm (ensure medication label is clear of barrel clamp).</td>
</tr>
<tr>
<td>Screen syringe graphic will cease to flash when syringe correctly positioned.</td>
</tr>
<tr>
<td>Confirm syringe size and brand match screen display by pressing 'YES'</td>
</tr>
<tr>
<td>Now displays 'Volume, Duration, Rate'. Check and confirm 'YES'</td>
</tr>
<tr>
<td>Displays 'Start Infusion?'</td>
</tr>
<tr>
<td>Connect syringe to extension line and Saf-T-Intima (if replacing syringe only); or site and secure newly primed extension set and Saf-T-Intima.</td>
</tr>
<tr>
<td>Press 'YES' to start. Running screen displays: 'Time Remaining/Rate/Syringe size and brand' alternating with 'Pump delivering'; green LED indicator flashes.</td>
</tr>
<tr>
<td>Press and hold 'INFO' button to lock keypad and place syringe pump in locked box.</td>
</tr>
<tr>
<td>Checks during infusion: Press 'INFO' key once- displays volume to be infused and volume infused</td>
</tr>
</tbody>
</table>
Process for Subcutaneous Infusion by McKinley T34

Infusion Discontinued

Call MEL. Do not use pump for another patient

Return / Discharge / Request

Discharge

Ward to contact Medical Equipment Library (MEL). Give patient name, hospital number, ward and discharge destination

MEL delivers Discharge Pack and records syringe pump on indemnity form. Remember to photocopy (see Policy)

Nurse to ensure Discharge Pack (with communication sheet) contains padded A4 envelope for return of pump; medical discharge summary (EPRO) and nursing discharge summary detailing when infusion commenced, due to finish when cannula and extension line changed and a copy of the indemnity form.

Nurse to load new syringe and new battery within 2 hours of expected discharge time

Nurse ensures TTOs are ready, including all medications and diluents for syringe pump. For patients discharged for end of life care, ensure End of Life medications dispensed and info for GP prescribing. Ward to check transport

Nurse to give patient/relatives information in Discharge Pack and ensure they have ward contact details if there are any problems

Discharge Patient. Remove lockbox from hospital syringe pump on leaving. Ensure key pad lock activated

MEL collects pump

Call MEL. Do not use pump for another patient

Pump Required for Ward Use

Call MEL or Porters out of hours. Give patient name, hospital number and ward

Pump Delivered

Nurse records syringe pump number on prescription chart

When syringe pump is no longer required, contact MEL to collect

MEL delivers Discharge Pack and records syringe pump on indemnity form.

Remember to photocopy (see Policy)

APPENDIX 5: