# McKinley T34 Syringe Driver Guidelines for Adult Supportive and Palliative Care

**Version: 3**

<table>
<thead>
<tr>
<th><strong>Summary:</strong></th>
<th>McKinley T34 Syringe driver guidelines for adult palliative care. Adapted, with kind permission from NHS Lanarkshire</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Keywords (minimum of 5):</strong></td>
<td>McKinley T34, McKinley, T34, syringe driver, syringe, palliative care.</td>
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<tr>
<td><strong>Target Audience:</strong></td>
<td>All clinical staff employed by Southern Health NHS Foundation Trust that use McKinley T34 Syringe Drivers.</td>
</tr>
<tr>
<td><strong>Next Review Date:</strong></td>
<td>March 2021</td>
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</table>
| **Approved and ratified by:** | End of Life Medicines Management and Prescribing Sub Group  
Medicines Management Committee |
| **Date of meeting:** | 21/3/18 |
| **Date issued:** | March 2018 |
| **Author:** | Steve Coopey, Marie Corner, NHS Lanarkshire. Updated by EOL Medicines Management & Prescribing Sub Group |
| **Sponsor:** | Medical Director |
# Version Control

## Change Record

<table>
<thead>
<tr>
<th>Date</th>
<th>Author</th>
<th>Version</th>
<th>Page</th>
<th>Reason for Change</th>
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<tbody>
<tr>
<td>July 2015</td>
<td>Steve Coopey, Marie Corner, Steve Mennear</td>
<td>2</td>
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<td>Guidelines review</td>
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<td>Steve Coopey</td>
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<td>Technical amendment to add 22G cannula as option as 24G not available</td>
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<td>Steve Coopey</td>
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</tr>
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<td>Update procedure for inserting cannula Clarification of step 9 use of monitoring chart and MAR</td>
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<td>Update wording of cannula procedure and practice points Update / reviewed working / clarification through out Update references Update trouble shooting renew battery if below 50%</td>
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<td>Tracy Hammond</td>
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<td>Technical Amendment to battery required, in response to MDA/2018/010 and related Field Safety Notices</td>
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## Reviewers/contributors

<table>
<thead>
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<th>Name</th>
<th>Position</th>
<th>Version Reviewed &amp; Date</th>
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<td>Chair Steve Mennear</td>
<td>Jan 2018</td>
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Section 1 Setting up the syringe driver

The McKinley T34 model is calibrated in ml per hour. All T34’s for palliative care are set up to deliver the syringe contents by continuous subcutaneous infusion over a 24hour period only.

Choice of Syringe

The McKinley T34 may be used with most brands of syringe. Dickman (2005) recommends a 20ml syringe as minimum for several reasons: a larger dilution will reduce both the risks of adverse site reactions and incompatibility and it also accommodates large doses of medications. It is therefore recommended that 20ml and 30ml syringes should be used and that they MUST have a luer lock (or equivalent) facility in order to avoid leakage or accidental disconnection.

N.B. The 50ml luer lock syringe is the largest syringe that will fit the McKinley T34 syringe driver. It allows medications to be diluted up to approximately 38mls volume for Terumo syringes. This reduces the need for a further device when giving larger volume medications, e.g. metoclopramide. A 50ml syringe is not recommended for routine use but may be used for specific problem infusions. (Note: the lockbox is unsuitable for use with a 50ml syringe).

Table 1: Recommended fill volume by syringe size

<table>
<thead>
<tr>
<th>Brand of Syringe / size</th>
<th>20 ml luer lock</th>
<th>30 ml luer lock</th>
<th>50 ml luer lock</th>
</tr>
</thead>
<tbody>
<tr>
<td>BD Plastipak</td>
<td>17ml</td>
<td>22ml</td>
<td>33ml</td>
</tr>
</tbody>
</table>

Requirements

- McKinley T34 syringe driver
- Battery: 9v Duracell® 6LR61/R61/6F22/MN1604 (WPA148)
- 20ml or 30ml luer lock syringe.  
  Note: 50ml syringes should only be used for specific problem infusions.
- Needle-safe cannula BD Saf-T-Intima cannula 24G or 22G
- Codan microbore extension set 0.9mmx75cm
- Transparent adhesive dressing with semi permeable membrane
- Prescribed medications / diluents
- Syringe driver prescription / recording sheet / infusion label
- Patient’s own electric razor or scissors (for hair removal if necessary)
- Holster (order code 198201), lockbox and key
- Clinell (blue box) 2% Chlorhexidine and 70% Isopropyl Alcohol wipes
- Documentation

Practice point

- BD Plastipak syringes should be used where possible
Choosing an Appropriate Cannula Site

Choose a suitable subcutaneous site (see diagram). Where possible involve the patient in the choice of site.

Suitable Sites

1. Anterior chest wall
2. Anterior aspect of upper arms & thighs
3. Anterior abdominal wall
4. Scapula region

Areas which should not be used for cannula placement are:

- Lymphoedematous sites. The rate of absorption would be adversely affected. Furthermore the needle may cause infection in a site which is already susceptible
- Sites over bony prominences: the amount of subcutaneous tissue will be diminished, impairing the rate of drug absorption
- Previously irradiated skin. Skin perfusion may be reduced due to sclerosis of small blood vessels following radiotherapy
- Sites where there is cutaneous tumour.
- Sites near a joint.
- Abdomen, if ascites or enlarged liver is present.
- Near an inflamed, previously used site.
- Areas that a bed-bound patient will be lying on for a period of time.
- Areas with excessive hair

Caution should also be used in patients who are cachectic when using the subclavicular space as the insertion site. There maybe a small amount of tissue between the chest wall and underlying lung which creates a risk of pneumothorax. To decrease the risk pull the skin away from the chest wall and insert at a shallow angle or use an alternative site.
### Procedure for Insertion of Saf-T-Intima Cannula for Subcutaneous Use

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbally confirm the identity of the patient by asking for their full name and date of birth. If the patient is unable to confirm, check identity with family/carer</td>
<td>To avoid mistaken identity. Best practice is to use 3 forms of identification</td>
</tr>
<tr>
<td>Explain procedure to patient and gain informed consent (including consent for any other third party present)</td>
<td>To ensure the patient understands the procedure and relevant risks and the patient can make informed decisions</td>
</tr>
<tr>
<td>Establish patient’s allergy status, check in patient’s records and also ask patient/family of any known allergies</td>
<td>To reduce risk of allergic reaction and or anaphylaxis</td>
</tr>
<tr>
<td>Give clear explanation of procedure to be performed and the care that will follow</td>
<td>To gain patient co-operation and enable informed consent to the procedure</td>
</tr>
<tr>
<td>Decontaminate hands in accordance with the Infection, Prevention and Control Policy Appendix 6 Hand Hygiene Procedure</td>
<td>To reduce risk of transfer of micro-organisms from hands</td>
</tr>
<tr>
<td>Prepare equipment in accordance with Infection, Prevention and Control Policy Appendix 7 Aseptic and Clean Technique Procedure</td>
<td>To create a clean work area, promote asepsis and prevent contamination of key parts</td>
</tr>
<tr>
<td>Disinfect skin with a single-use Clinell skin wipe (blue box). Allow to dry for a minimum of 30 seconds</td>
<td>To reduce the risk of transfer of any transient micro-organisms and resident micro-organisms from skin to subcutaneous tissues</td>
</tr>
<tr>
<td>Put on single use non sterile gloves or if indicated single use disposable sterile gloves</td>
<td>To protect hands from contamination with organic matter and transfer of micro-organisms</td>
</tr>
<tr>
<td>Remove and dispose of clamp on the BD Saf-T-Intima cannula</td>
<td>To avoid accidental occlusion</td>
</tr>
<tr>
<td>Rotate white safety barrel</td>
<td>To loosen needle</td>
</tr>
<tr>
<td>Grasp ridged side wings of the cannula between thumb and index finger, Remove needle sheath from Saf-T-Intima cannula making sure the eye of the needle is facing upwards at the sharpest point to enter the skin</td>
<td>To ensure accuracy of placement</td>
</tr>
<tr>
<td>Pinch skin up into a fold between thumb and forefinger</td>
<td>To ensure subcutaneous tissue is identified</td>
</tr>
<tr>
<td>Insert cannula at a 30-45 degree angle</td>
<td></td>
</tr>
<tr>
<td>Cover the insertion site and wings with a transparent semipermeable dressing</td>
<td>To promote asepsis and prevent contamination of key parts</td>
</tr>
<tr>
<td>Hold the wings of the cannula firmly and remove the introducer by pulling back in a single smooth movement, This should leave an injectable bung in situ</td>
<td></td>
</tr>
<tr>
<td>Dispose of sharps directly into a sharps container</td>
<td>To reduce the risk of inoculation injury</td>
</tr>
</tbody>
</table>
Remove gloves and wash hands in accordance with the Infection Prevention and Control Policy: Appendix 6

To prevent cross infection and environmental contamination

Document the date, time and place of cannula insertion in the patient's clinical record

To comply with the Syringe Driver Policy for Adult and Supportive Palliative Care and the Clinical Record Keeping Policy

**Note**

Check site 4 hourly (or daily in community setting) for pain, erythema or swelling. Document findings in the patient's clinical record.

If insertion is unsuccessful use another cannula. Do not reinsert.

If blood appears in the cannula, remove and insert a new cannula at another site.

Cannula can be left in for 5-7 days if patent and no redness/inflammation

**PROCEDURE FOR SETTING UP SYRINGE DRIVER**

**STEP 1 – Filling the Syringe**

1. Use a luer lock syringe of at least 20ml. It may not be possible to fill all sizes of syringe to full capacity (see table 1). Standard practice should be to fill a 20ml BD Plastipak syringe to 17mls.

2. Draw up the prescribed medication and diluents to the prescribed volume.

3. Complete the details on the drug additive label as per STEP 2

**Practice points**

- Medications should be prepared in accordance with NMC medicines management standards and Appendix 6 of Syringe Driver Policy for Adult and Supportive Palliative Care
- Check compatibility of medications in syringe (see section 5.3 of Syringe Driver Policy for Adult and Supportive Palliative Care
- Consider factors affecting choice of final volume (medication concentration and hence stability and irritation at site

**STEP 2 – Labelling**

1. All syringes containing medications must be clearly labelled to ensure all staff can identify the syringe content whilst in the lockbox.

2. If there is any doubt as to the contents of a syringe, the contents should be discarded and a new clearly labelled syringe prepared as soon as possible. This is particularly important for continuity of care, especially where patients transfer from one care setting to another.

3. Complete the label details in ink or other indelible print.

4. The label requires to state:

   - The name of the patient for whom it is intended with NHS number
   - The date and time of preparation
   - The initials of the person preparing the contents
   - The initials of the person checking the contents (if applicable)
   - The name and dose of all medications e.g. morphine 15mg, haloperidol 5mg, etc
• The name of the diluent e.g. water for injection
• The total volume of the contents
• The intended route of infusion

5. **Attach label to the syringe.**

6. Ensure the label does not:

   • Interfere with the mechanism of the infusion device
   • Obscure the graduations on the syringe

**Practice point**
• The medication must only be administered to the patient by the person who prepared the syringe

### STEP 3 - Prepare the McKinley T34 Syringe Driver

![Image of McKinley T34 Syringe Driver]

1. Barrel clamp arm (detects syringe size/width of barrel, secures)
2. Syringe ear/collar sensor (detects secure loading of syringe collar)
3. Plunger sensor (detects secure loading of syringe plunger)
Pre-Loading & Syringe Placement

- Install a **fully charged disposable battery**
- Before placing the syringe into the driver ensure the barrel clamp arm is down then press and hold the “ON/OFF” key
- The LCD display will show “PRE-LOADING” and the actuator will start to move. Wait until it stops moving and the syringe sensor detection screen (syringe graphic) appears.

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

- **Check the battery**

Press “INFO” key until the battery level appears on the screen and then press “YES” to confirm.

Verify the battery is fully charged (Above 90%).

**STEP 4 - Connect Infusion Extension Set to the Syringe**

- Connect the extension set securely to the syringe.
- If it is a new extension set, gently depress the syringe plunger to manually prime the line. The line will take about 0.9ml to prime.
• If the actuator is not in the correct position to accommodate the syringe, leave the barrel clamp arm down and use the “FF” or “BACK” buttons on the keypad to move the actuator. Forward movement of the actuator is limited, for safety; therefore repeated presses of the “FF” key may be required when moving the actuator forward. Backwards movement is not restricted.

During pre-loading the actuator always returns to the start position of the last infusion programmed.

**STEP 5 - Fitting the Syringe to the Syringe Driver and Connecting the Infusion to the Patient**

<table>
<thead>
<tr>
<th>Practice point</th>
</tr>
</thead>
<tbody>
<tr>
<td>For safety reasons, the syringe must be attached to the driver <strong>before</strong> connecting to the patient to avoid an inadvertent bolus dose.</td>
</tr>
</tbody>
</table>

• Check the patient’s name (and wristband if used) against the prescription, according to section 10.4 of the Medication Policy SH CP 01.
• Lift the barrel clamp arm.
• Seat the filled syringe collar/ear and plunger so the back of the collar/ear sits against the back of the central slot (ensure correct placement). The syringe collar/ears should be vertical. Ensure that the scale on the syringe barrel is facing forward so that it can be easily read.
• Lower the barrel clamp arm.

![Syringe Image](Load_Syringe.png)

**NOTE:** The syringe graphic on the screen ceases to flash when the syringe is correctly seated at all 3 points.

![Syringe Image](Load_Syringe.png)
The syringe size and brand option will then be displayed as shown below.

![Image of displayed syringe size and brand]

Confirm that the syringe size and brand match the screen message. Press “YES” key to confirm or scroll with up + down - arrows to view other syringe manufacture choices, select, press YES to confirm.

- Connect the extension line to the Saf-T-Intima cannula (which has already been inserted into the patient). The Saf-T-Intima cannula will not be primed as it only has a dead space of 0.2ml, which will have minimal impact to the patient.

**Practice point**
If the patient has unrelieved symptoms when the syringe driver is set up, a breakthrough dose of medication should be administered.

**STEP 6a – Starting the Infusion (new syringe)**

After the syringe confirmation, an example of the first screen that appears is displayed below.

![Image of displayed screen]

**Practice point**
The driver is programmed for 24 hours. Despite this if a previous programme is resumed in error the duration may be different. Confirmation of the correct information is vital

The driver calculates and displays the deliverable volume, duration of infusion (24 hrs) and rate of infusion (mls per hour) – Press “YES” to confirm or “ON/OFF" to return to the syringe options (the nurse should be able to do the calculation independently to ensure the setting is correct)
• Driver screen prompts “START INFUSION”.

• Check the line is connected to the driver.

**STEP 6b - Start the Syringe Driver**

• Check the line connection to the driver and press “YES” to start infusion.
• When the driver is running the screen displays (example only):

![Example Screen Display](image)

• LED indicator flashes every 32 seconds.

**Practice Point**

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 “Driver Paused Too Long Confirm, Press YES” will show on the LCD display.

To stop the alarm, press “YES” and continue programming the infusion.

**STEP 7 - Keypad Lock**

The T34 allows all users to lock the operation of the keypad during infusion. This function should be routinely used to prevent tampering with the device.

**To Activate the Keypad Lock:**

![Keypad Lock Mode](image)
With the driver infusing press and hold the “INFO” key until a chart is displayed showing 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.

**Practice Point**
Although the keypad lock is on, the following buttons are still active
- Stop/No
- Start/Yes
- Info

To Deactivate the Keypad Lock: (Driver must be infusing)
Repeat the above procedure. The bar will now move from right (lock) to left (unlock) and a beep will be heard.

**Practice Point**
Always fully turn off the T34 by removing the keypad lock and turning off between inserting new syringes and between patients to ensure that the syringe driver recalibrates

**STEP 8 - Lockboxes**
Every T34 will be supplied with a lockbox. After starting the infusion, place the driver in the supplied lockbox.

Note: if a 50ml syringe is being used the lockbox is unsuitable.

Universal keys will be supplied
With each syringe driver and should be kept in the syringe driver equipment box (community settings) and with the named key holder (in patient settings). Replacement keys if required are the responsibility of the individual teams. If a key is lost it must be reported using the incident reporting system.

**STEP 9 - Documentation and Monitoring**
Record the details of the preparation and commencement of the infusion on the medicines administration record and complete the syringe driver check list/ monitoring chart. Record must include:
- Date
- Time
- Syringe size
- Total volume (ml) of medication(s) and diluents
- Drug name(s) and batch number(s)
- Diluent name and batch number(s)
- Medical physics reference number on syringe driver
- Signature(s) of person(s) preparing and checking
- Site used and appearance
- Battery change / level indicated
- Screen check and time remaining
The operation of the driver should be checked:
Within one hour of set-up (e.g. in community, just before leaving the patient’s house) and then

- At 4 hourly intervals in hospital and hospice settings
- At each visit by a nurse in primary care settings.

(The frequency of this will depend on factors such as other nursing needs of patient, willingness or ability of patient/ carer to assist in monitoring, risk of instability of drug mixture).

**Practice Point**
In the community, the patient and/or carer must be instructed on what to do, and who to contact, if a problem arises.

At each check verify:

- Rate has not been altered.
- Volume remaining in the syringe. Calculate the volume infused to assess whether driver is delivering medication at approximately the desired rate.
- Solution in the syringe and the line for cloudiness, precipitation or colour change, and presence of large air bubbles (tiny ones not significant).
- Green LED light is flashing every 32 seconds and that the bottom line of the LCD display is alternating between “<><driver delivering” and make/size of syringe.
- Line is securely attached to syringe and cannula and not leaking, and line not kinked or trapped.
- Infusion site for redness, swelling, discomfort/pain, leakage of fluid.

The result of these checks should be documented on the monitoring chart (appendix 12 of Syringe Driver Policy), and signed by the person checking. If any checks are not carried out, e.g. site check to prevent disturbing patient when asleep, the reason should be documented in the patient notes.

**Practice Point**
If any checks indicate a problem, e.g. the infusion is not running at the expected rate, you must take appropriate action. (*Refer to section on problem solving*)

Assess patient for efficacy and side-effects of the medication, and seek advice from the appropriate team member if needed.

If an infusion is discontinued before it is complete e.g. because of a change in dose or medication, document the amount remaining and destroyed (ml). Destroy as per Medicines Management Policy (Section 5).

**Action points after monitoring checks**

Action must be taken, and documented, in the event of:

- Significant discrepancies in the actual and expected infusion rate
- Signs of incompatibility
- Blockage of infusion line
- Damage to the syringe barrel or tip, or presence of large amount of air (may indicate cracked syringe barrel)
- Site reaction
STEP 10 – Pausing the Infusion (Same Patient)

Temporary interruption of infusion e.g. bathing

1. Press “STOP”.
2. Press and hold “OFF” button until a beep is heard; the screen will go blank.
3. **Do not remove syringe from driver.**
4. Disconnect the line from the cannula and follow infection control guidelines cap the end of the line and cannula with a universal bung.

Resuming the Infusion

1. Check that the prescription, syringe label and patient details match, to ensure that this is the correct syringe for this patient.
2. Reconnect the line to the syringe on the driver.
3. Press and hold the “ON” button until a beep is heard. The screen will request confirmation of syringe size and syringe brand.
4. Press “YES” to confirm. If the syringe size and brand do not match, scroll with up and down arrows until the correct selection appears, then press “YES” to confirm.
5. The screen will display:

   ![Press YES to Resume, NO for New Program]

   Press “YES” to Resume” the previous program

6. The screen will display “Remaining volume, duration and rate of infusion”
7. Press “YES” to confirm. Screen will display “Start Infusion”
8. Press “YES” to confirm.

**Practice Point**

If you press “NO” the driver interprets this as a completely new 24hour period and the remaining contents of the syringe will be delivered over the next 24 hours from confirming “Start Infusion”.

Ensure the patient and the carer(s) know that the syringe driver must NOT be placed at a level higher than the infusion site. (It is possible for the contents to siphon out).

- **Never take a syringe that is not empty off the driver if it is still connected to the patient.**

STEP 11 - Stopping the Infusion and Removing the Syringe Driver

**Practice Point**

Removal of the cannula and/or discontinuation of infusion must be carried out only by appropriately trained personnel and in accordance with local policy and procedures.
When the infusion is complete and the syringe is empty, it will stop automatically and the alarm will sound. If the syringe driver is no longer required for the patient, press “OFF” and then remove the battery from the syringe driver.

- If the infusion is to be stopped before the syringe is empty, it should also be disconnected at the syringe end from the patient for safety reasons before the syringe is taken off the driver. A syringe that is not empty must never be taken off the driver while connected to the patient.
- Wipe the machine casing with a sanitising wipe (e.g. Clinell) before issuing to another service user (do not immerse driver in water).
- Dry and replace in packaging if no longer required for use
- Dispose of any remaining medication as per step 9
- Dispose of syringe and tubing as single use items
- Document the following information in the patient notes:
  - Time/reason
  - Whether cannula has been removed
  - Condition of the infusion site

**STEP 12 - What to do if the patient dies when the Syringe Driver is running:**

1. Stop the driver.
2. Press the “INFO” button and record the date, time and amount of solution remaining to be infused in the syringe (ml). If there are doubts about the circumstances of the death, leave the driver in place and contact your line manager for advice. In a straightforward situation, remove the syringe from the driver, destroy the contents and record the signature(s) of person(s) destroying the remaining solution
3. Remove the battery from the syringe driver
4. Remove cannula as soon as possible.
Section 2 Syringe Driver Problem Solving

<table>
<thead>
<tr>
<th>Fault</th>
<th>Possible Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>The driver will not start</td>
<td>No battery present.</td>
<td>Fit a battery.</td>
</tr>
<tr>
<td></td>
<td>Battery inserted incorrectly.</td>
<td>Re-align battery terminals.</td>
</tr>
<tr>
<td></td>
<td>Battery is depleted/very low.</td>
<td>Fit a new battery.</td>
</tr>
<tr>
<td></td>
<td>Driver is faulty.</td>
<td>Service required. Contact BCAS Biomed. Complete incident form</td>
</tr>
<tr>
<td>Infusion ended early/going too quickly</td>
<td>Incorrect rate set.</td>
<td>Amend if necessary</td>
</tr>
<tr>
<td></td>
<td>Wrong syringe brand confirmed during set up.</td>
<td>Ensure correct understanding of user/educate. Amend syringe driver setting</td>
</tr>
<tr>
<td></td>
<td>Driver faulty or Incorrectly calibrated.</td>
<td>Service/calibration Required. Complete incident form</td>
</tr>
<tr>
<td>The driver has stopped before emptying syringe</td>
<td>Exhausted battery.</td>
<td>Fit new battery, turn driver on, confirm syringe size and brand select to resume infusion.</td>
</tr>
<tr>
<td></td>
<td>Faulty driver.</td>
<td>Return for service. Complete incident form</td>
</tr>
</tbody>
</table>

Clinical Scenarios/Problem Solving

**With driver running, site reaction experienced, line and cannula require changing**

Stop driver using red STOP button (do not use the ON/OFF button), disconnect from patient. Document volume remaining before and after this is done on monitoring chart and change of cannula and extension line in nursing notes. Discard extension line and cannula. Using aseptic technique, replace cannula and attach new extension line to syringe. Remove syringe from driver and manually prime line. Reload syringe onto driver and resume infusion. As line volume is now lost, remaining infusion time will be reduced. DO NOT adjust rate but be aware that infusion will finish earlier than expected.

**With driver running, occlusion alarm (occlusion may take more than 2 hours to alarm) Driver will stop automatically and alarm will sound.**

Press ‘YES’ to silence alarm. Identify cause of blockage and clear it. DO NOT remove syringe from driver. Restart infusion.

**Syringe renewal (end of 24 hr infusion)-cannula and line intact**

Switch off driver using the ON/OFF button and remove old syringe. Prepare new syringe and load driver as described previously in steps 1 to 6 without priming extension line as it is still intact.
Change of prescription, requires flushing of cannula and change of extension line

Switch off driver using the ON/OFF button, disconnect extension line from cannula, remove syringe from driver and discard remaining volume, documenting amount on SC infusion chart. Flush Saf-T Intima with at least 0.2ml WFI. Prepare new syringe and load driver as detailed in steps 1 to 6 using a new extension line. Dispose of any remaining medication as outlined in step 9.

Troubleshooting

If Fast (running more than 1 hour ahead of expected time)

Practice Point
If major over-infusion, stop infusion, check condition of patient and seek medical advice. Report as a medication incident, quarantine the driver and send for examination.

• Check the rate setting and calculations.
• Check the correct syringe brand or size has been selected.
• Change the entire syringe driver for a new one and send original for servicing.
• Check that the syringe driver is not positioned higher than the infusion site

If Slow (running more than 1 hour behind expected time).

• Check the rate setting is correct.
• Check the syringe driver light is GREEN and flashing.
• Check the battery level and renew if below 50%
• Check the correct (luer lock) syringe brand or size has been selected.
• Check that syringe is inserted correctly into syringe driver
• Check if syringe driver has been stopped and restarted for any reason.
• Check contents of syringe and line - is there any evidence of crystallisation/ kinking of tubing?
• Check cannula site - is this red/hard/lumpy/sore?
  Change cannula site if necessary.
  Consider further dilution of drugs to minimise irritation by setting up a fresh syringe.
  Consider metal allergy if using nickel needle- recommended practice is to use a Saf-T-Intima.
• If syringe driver continues to run slowly, change syringe driver and send for servicing.
  Complete incident form.
• Check rate of infusion at regular intervals.

Site Irritation

• Change site (use a new extension line when changing site).
• Discuss possible change of medication with doctor (cyclizine and levomepromazine commonly cause site reactions).
• Dilute medications to a larger volume in new syringe.
• Consider separating into 2 syringe drivers.
• Consider infection.
• Consider an alternative route of administration of medication(s).
• For severe site reactions that persist despite usual measures such as increased dilution of medication(s), consult palliative care specialist for advice on treatment options.
Precipitation, cloudiness or colour change in syringe contents or line

- Stop infusion and inform prescriber.
- Seek advice from pharmacy if possible.
- Issues to check and discuss with prescriber include:
  - Compatibility information
  - Diluent (seek advice from a pharmacist)
  - Dilute to a larger volume
  - Separating into 2 syringe drivers or give one medication as a SC bolus
- Keep away from sunlight and heat.
- Advise patient on keeping syringe driver away from hot pack/heat pad or hot water bottle.
- Commence new infusion at a different site with new cannula and extension line.

Breakthrough Symptoms

Separate subcutaneous injections should be prescribed for breakthrough symptoms. Regular use of breakthrough medication indicates a need for reassessment of patient.

Care during Infusion

- Explain care of the driver to carer(s) e.g. avoid spillage of liquids or dropping the driver and to report if light stops flashing or if an alarm should sound.
- Check battery daily when set up and prior to leaving the patient.
- Avoid using a mobile telephone nearer than 1 metre to the syringe driver. (McKinley Medical UK Ltd). Although there are no confirmed reports of mobile phones interfering with the operation of the syringe driver, following this advice will help reduce any risk.
- Disconnect when taking a bath or shower and cap the end of the line and the cannula with a universal bung. Record on monitoring chart the length of time the infusion has been interrupted.
- When the patient is mobile, ensure syringe driver is well supported i.e. placed in a pocket or holster.

McKinley T34 Driver Alarm Conditions

When the driver 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.

The alarm will sound for the following reasons:

<table>
<thead>
<tr>
<th>LCD Display / Syringe Empty</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 blocked, kinked. Occlusion. Actuator has reached minimum travel position</td>
<td>Remove occlusion and restart as per step 10 resuming infusion. Flush/change cannula as per local policy.</td>
</tr>
</tbody>
</table>
### Syringe Displaced

<table>
<thead>
<tr>
<th>Alarm Type</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audible and visual alarm</td>
<td>Syringe has been removed or displaced</td>
</tr>
<tr>
<td>Intermittent beep</td>
<td>Check and confirm syringe seated correctly and resume infusion. Syringe flanges need to be in the vertical position at all times.</td>
</tr>
</tbody>
</table>

### Driver Paused Too Long

<table>
<thead>
<tr>
<th>Alarm Type</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audible and visual alarm</td>
<td>Driver left or no key presses detected for 2 minutes</td>
</tr>
<tr>
<td>Intermittent beep</td>
<td>Start infusion, continue programming or switch off</td>
</tr>
</tbody>
</table>

### Near End

<table>
<thead>
<tr>
<th>Alarm Type</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audible and visual alarm</td>
<td>15 minutes from end of infusion</td>
</tr>
<tr>
<td>Intermittent beep</td>
<td>Prepare to change syringe or switch off</td>
</tr>
</tbody>
</table>

### End Program

<table>
<thead>
<tr>
<th>Alarm Type</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audible and visual alarm</td>
<td>Infusion complete</td>
</tr>
<tr>
<td>Intermittent beep</td>
<td>Driver will alarm. Press Yes to confirm end of program and change syringe or switch off.</td>
</tr>
</tbody>
</table>

### Low Battery

<table>
<thead>
<tr>
<th>Alarm Type</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audible and visual alarm</td>
<td>Battery is almost depleted (30 minutes left)</td>
</tr>
<tr>
<td>Intermittent beep</td>
<td>Prepare to change battery</td>
</tr>
</tbody>
</table>

### End Battery

<table>
<thead>
<tr>
<th>Alarm Type</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audible and visual alarm</td>
<td>Battery is depleted</td>
</tr>
<tr>
<td>Intermittent beep</td>
<td>Change battery</td>
</tr>
</tbody>
</table>

### Servicing/Maintenance

It is the responsibility of all nursing staff to ensure that their locally available syringe drivers are maintained and serviced regularly.

Each syringe driver must be serviced:

- After the purchase/gifted and before initial use (so it can be added to the inventory and commissioned)
- If the machine is not working satisfactorily
- If the machine has been dropped onto a hard surface or immersed in water
- Every twelve months. The date the next service is due is marked on the syringe driver by BCAS Biomed

### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Gauge</td>
</tr>
<tr>
<td>INFO</td>
<td>Information</td>
</tr>
<tr>
<td>LCD</td>
<td>Liquid Crystal Display</td>
</tr>
<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
</tr>
<tr>
<td>NMC</td>
<td>Nursing and Midwifery Council</td>
</tr>
<tr>
<td>SC</td>
<td>Subcutaneous</td>
</tr>
<tr>
<td>WFI</td>
<td>Water for Injection</td>
</tr>
</tbody>
</table>
REFERENCES


Scottish Office Home and Health Department (May 1995) The Management of Infusion Systems

SIGN Guideline 41064 June 2008 - Control of Pain in Patients with Cancer.


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