TRUST WIDE/DIVISIONAL DOCUMENT

	Standard Operating Procedure
DOCUMENT TITLE:	**Procedure for setting up and using an Ambulatory Syringe Pump 2nd Edition. For 3rd Edition Pumps please see separate document**
DOCUMENT NUMBER:	**SOP115V1.1**
DOCUMENT REPLACES Which Version	**None**
LEAD EXECUTIVE DIRECTOR DGM	**Deputy Chief Nurse**
AUTHOR(S): Note should not include names	**Syringe Pump Policy Task and Finish Group, chaired by Palliative Medicine Consultant**

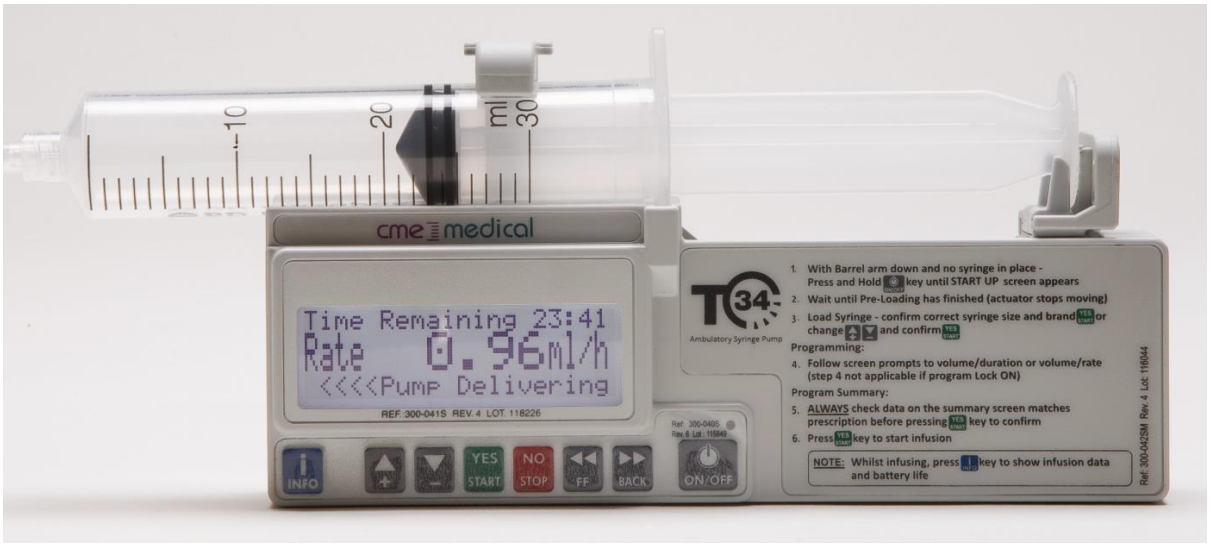
TARGET AUDIENCE:	All healthcare professionals in ELHT prescribing, setting up, administering or monitoring medicines being given by an Ambulatory Syringe Pump to adults.
DOCUMENT PURPOSE:	To provide a framework for safe practice and guidance for Registered Nurses on the setting up and use of the Syringe Pump. This is applicable to adult palliative patients in all ELHT settings.

To be read in conjunction with (identify which internal documents)	ELHT/CP22 Version 5.5 – Policy and Procedure for the Ambulatory Syringe Pump (Palliative Care) C064 Medicine Management Policy SOP for procedure for the administration of subcutaneous PRN medication using a prescribed range of doses for symptoms in the last days of life (awaiting verification)
SUPPORTING REFERENCES	Lancashire and South Cumbria Strategic Clinical Network "Palliative Care Clinical Practice Summary: guidance on consensus approaches to managing Palliative Care Symptoms" 2nd Edition November 2021 NICE Guideline NG31 "Care of dying adults in the last days of life" Dec 2015 The Royal Marsden Manual of Clinical Nursing Procedure, Accessed online 17/12/21 Chapter 15-17 medication, subcutaneous injections Nursing and Midwifery Council (NMC)The Code: standards of conduct, performance and ethics for nurses and midwives (updated Oct 2018)

CONSULTATION		
	Committee/Group	**Date**
Consultation	Syringe Pump Task and Finish Group, members available on request	23.09.21
Approval Committee	Syringe Pump Task and Finish Group, members available on request	Dec 2021
Ratification date at Policy Council:	**06.04.22.**	
NEXT REVIEW DATE:	**Jul 2025**	
AMENDMENTS:	No amendments made, this was previously within the syringe pump policy and has now been made a standalone document	

The Clinical Procedure

GUIDELINES FOR THE USE OF AMBULATORY SYRINGE PUMP 2nd EDITION FOR PALLIATIVE CARE PATIENTS



Materials and Equipment

- Dressing pack/blue tray.
- Ambulatory Syringe Pump with lock box and key.
- Alkaline battery 9V must be PP3 6LR61 (to mitigate risk of unintended shutdown).
- 18Gx1.5in Blunt Fill Needle with 5 micron filter – only to be used for drawing up medication.
- 18Gx1.5in Blunt Fill Needle.
- BD Saf-T Intima
- Luer-Lok Syringe 20mL/30mL, where possible use BD Plastipak.
- Closed Luer Access Device.
- Extension Line.
- Transparent adhesive film dressing.
- Sterile alcohol wipes.
- Medicines and diluents.
- Syringe Pump Label.
- Syringe Pump documentation.

- Patient Information Leaflet.

Syringes and Final Volume

- A Luer-Lok Syringe must always be used.
- No less than a 20mL Luer-Lok Syringe should be used.
- A 20mL or 30mL Luer-Lok Syringe can be used.
- The prescriber must prescribe the final volume.
- Whichever brand of syringe used
    - 20mL Syringes should be made up to a final volume of 17mL.
    - 30mL Syringes should be made to a final volume of 22mL

If the final volume exceeds these amounts seek advice from the Specialist Palliative Care Team/Pharmacy. The final volume includes all prescribed medicines and diluent.

Batteries

- Always use a new battery every time a Syringe Pump is commenced.
- A 9V PP3 6LR61 Duracell alkaline battery MUST be used. No other battery type should be used.
- The average battery life starting at 100% is approx. 3-4 days.
- Due to the short battery life, always ensure spares are readily available.
- Check battery life at each syringe change. Discard battery if life remaining is 40% (community) 10% (hospital).
- Used batteries must be discarded.

Procedure

- Please refer to aseptic non-touch technique policy.
- Two registered nurses, one of which could be a nursing associate must set up the Syringe Pump.
- All ampoules/vial bungs must be swabbed with sterile alcohol and left to dry before opening/piercing.
- Calculate how many millilitres of volume medicines require e.g.

Metoclopramide 30mg	3x10mg/2mL ampoules	= 6mL	
			Total = 7mL
Morphine 30mg	1x30mg/1mL ampoule	= 1mL	

20mL Syringe	7mL medicine	10mL diluent	= Total Volume 17mL
30mL Syringe	7mL medicine	15mL diluent	= Total Volume 22mL

- Draw up prescribed diluent using an 18G1.5in Blunt Fill Needle with 5 micron filter into a 20mL or 30mL Luer
- -Lok Syringe.
- Draw medicine one into separate syringe using 18G x 1.5in Blunt fill Needle with 5 micron filter wasting any excess, add to the administration syringe using an 18G x 1.5in Blunt Fill Needle. Repeat this step until all medicines are added to the syringe.
- Fit a blind hub to the administration syringe and invert several times to mix contents.
- Check the solution for cloudiness, crystallisation, if present destroy solution in usual way, discard syringe and check compatibilities. Re-prepare the syringe with prescribed medication and diluent.
- Complete syringe label with details of additives, date and time. Attach to the syringe. Ensure syringe calibration markings are not obscured. Ensure that the label does not interfere with the mechanisms of the Syringe Pump.
- Attach Extension Line to BD Saf-T-Intima.

Administration and monitoring of Ambulatory Syringe Pump

- Two registered nurses, one of which could be a nursing associate, are required to check medicines and set up a Syringe Pump (standard 8 NMC) and must be present for the whole procedure. If two registered nurses are not available a risk assessment must be made and an incident report completed.
- An Ambulatory Syringe Pump Administration and Monitoring Form is required for each Syringe Pump prescribed.
- Each Administration and Monitoring Form can be used for 24 hours and then a new form must be commenced.
- One registered nurse should return within 4 hours of initially starting a Syringe Pump to ensure good symptom control.
- In hospital the Syringe Pump must be checked a minimum of 4 hourly.
- In community the Syringe Pump must be checked a minimum of twice daily. Any variance to this must be documented in the patient's notes.

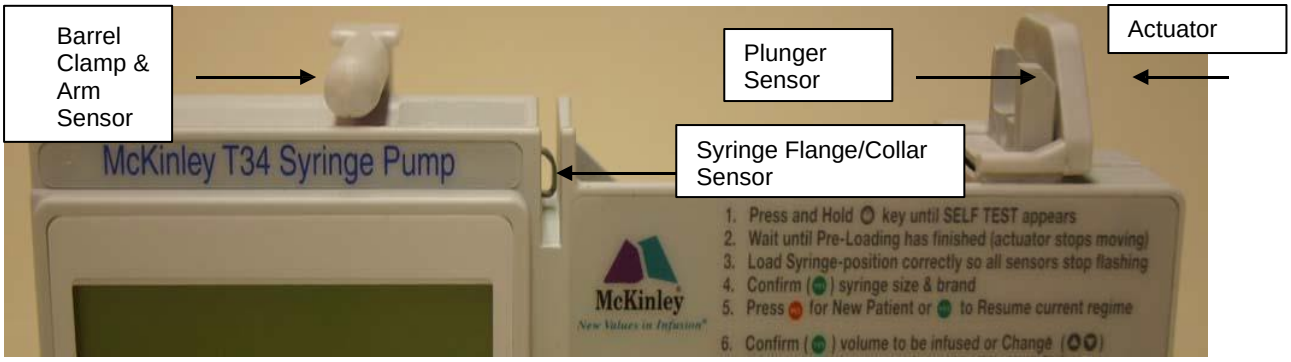
- It is the responsibility of the person completing the Administration and Monitoring Form to ensure the pump is working correctly and running to time.
- If the pump does not appear to be working or running correctly the person who identifies this must either replace the Syringe Pump or ask for advice.
- Serial number of Syringe Pump used must be documented on the Ambulatory Syringe Pump Administration and Monitoring Form.
- The Syringe must be changed every 24 hours because chemical stability of the medicines cannot be guaranteed after this time.
- When the patient's prescribed medicines are changed the changes should be commenced on the same day.
- It is considered good practice to change the giving set and use a fresh site when there is a change in prescribed medicines.
- Syringe Pumps must not be placed at a level higher than the infusion site to prevent siphoning of the syringe contents from the pump.
- Protect Syringe Pumps from direct sunlight, especially mixtures containing Levomepromazine. Levomepromazine can develop purple discolouration when exposed to light and should be discarded if this occurs.

Priming Lines

- The line should be primed prior to loading the syringe onto the device.
- When a site needs changing part way through a 24 hour infusion, unlock Syringe Pump panel press **NO/STOP** button do not switch off.
- Remove syringe, prime the new line and re-align the syringe using the **FF/BACK** button, replace syringe onto the pump.
- When changing the site part way through a 24 hour infusion it is only necessary to change the Saf-T Intima and not the extension line.
- Confirm the make of syringe, re-check prescription and attach line to the patient.
- The display will ask **YES/START TO RESUME**: do not press **NO** as this will re-set the 24 hour clock as for a new infusion.

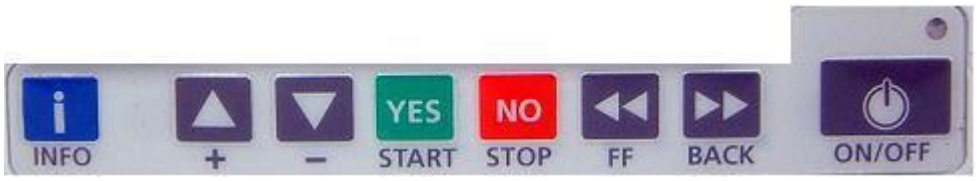
Preparing the Ambulatory Syringe Pump

Feature Recognition Syringe Loading



- Barrel clamp arm sensor – (detects syringe size/width of barrel, secures).
- Syringe ear/collar sensor (detects secure loading of syringe collar).
- Plunger sensor (detects secure loading of syringe plunger).
- Actuator.

Feature Recognition Keypad



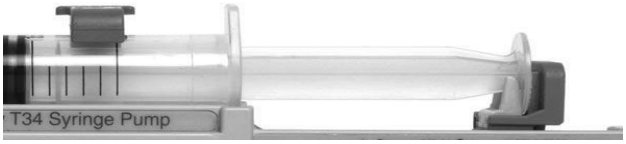
- **"INFO"** key – access event log/set up (code protected)/battery status.
- **"Up/Down"** arrow keys – increase/decrease parameters/scroll options.
- **"YES/START"** key – confirms selection/starts infusion.
- **"NO/STOP"** key – step back a screen/stops infusion.
- **"FF" (forward) key – moves actuator forward/purge facility.**
- **"BACK"** key – moves actuator back.
- **"ON/OFF"** key – power on/off.
- Install battery.

- Before placing the syringe onto the Ambulatory Syringe Pump ensure the barrel clamp arm is down, press and hold the "**ON/OFF**" key until the "**SELF TEST**" screen appears.
- 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 appears.

- During Pre-Loading the actuator always returns to the start position of the last infusion programmed.
- 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.
- Check the battery by pressing the "**INFO**" key repeatedly until the battery level appears on the screen and press "**YES** to confirm. Verify there is sufficient battery power. Discard the battery if there is less than 40% power remaining in community and 10% in hospital. Replace with a new battery to ensure the Syringe Pump will deliver for 24 hours.

- Ensure the giving set is not connected to the patient at this point as an accidental bolus of medication could be delivered.
- Wait for the screen to go back to load the syringe screen.

- Lift the barrel clamp arm.
- Seat the filled syringe collar/flange and plunger so the back of the collar/flange sits against the back of the central slot (ensure correct placement). The syringe collar/flange should be vertical.
- Lower the barrel clamp arm.



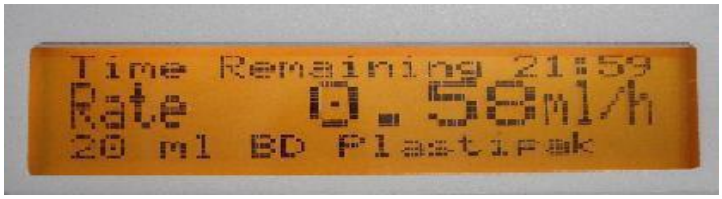
- Ensure the syringe label does not interfere with the mechanism of the infusion device e.g., if there is contact with the barrel clamp arm and sensor. The syringe graphic on the screen ceases to flash at each point as the syringe is correctly seated.
- Confirm that the syringe size and brand match the screen message. Press the "**YES**" key to confirm or scroll up (+) or down (-) keys to view the other syringe sizes, select correct syringe and size and press the "**YES**" key to confirm.

- After the Syringe Confirmation Display the first screen that appears is displayed below.

- The Ambulatory Syringe Pump calculates and displays the deliverable volume, the duration of the infusion (24 hours) and the rate of the infusion (mL per hour). Press the "**YES**" key to confirm the details. The display screen prompts "**Start Infusion?**"

- Cleanse the area of the skin and allow to dry.
- Grasp skin firmly and insert infusion set at a 45º angle. Release the skin and lay the wings against the skin securing with a sterile transparent dressing.

- Start the infusion by pressing the "**YES**" key.
- When the Ambulatory Syringe Pump is running the screen displays:
    - Time remaining for current infusion
    - The infusion rate displayed in mL/hour
    - Alternates between syringe size and brand and also displays pump delivering **<< << <<"Pump Delivering**".
    - The light status indicator flashes green.



- The Ambulatory Syringe Pump 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 when the pump is 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.
- The "**STOP/NO**" and "**START/YES**" and "**INFO**" keys are still active.
- To turn off the lock, repeat the above procedure. The bar will now move from right (lock) to left (lock) and a beep will be heard.
- Complete all relevant documentation.
- The following should be observed at each visit:
    - Site viability
    - Volume in syringe reducing
    - Any crystallisation/precipitation present
    - Light is flashing (approximately every 30 seconds)

Discontinuing a Syringe Pump

- To avoid accidental bolus dose of medicines the infusion line must be disconnected from the syringe before it is removed from the Syringe Pump.

Temporary interruption of infusion

- Press "**STOP**" press and hold "**OFF**" button until a beep is heard. The screen will go blank.
- Do not remove syringe from the Syringe Pump.
- Disconnect the line from the syringe and cap the end of the line and syringe tip.
- Record on the monitoring chart, the length of time the infusion is stopped for.

Resuming the infusion

- Check that the prescription, syringe label and patient details match to ensure that this is the correct syringe for this patient.
- Remove the cap and reconnect the line to the syringe on the Syringe Pump.
- Press and hold the "**ON**" button until a beep is heard. The screen will request confirmation of syringe size and syringe brand.
- Press "**YES**" to resume. The screen will display "Remaining volume, duration and rate of infusion". Press "**YES**" to confirm.
- Do not press "**NO**" for new programme as this will reset the pump to deliver the existing syringe over the next 24 hours.

When a patient dies

- Press "**INFO**" and record the date, time and amount of solution remaining to be infused (in mLs).
- Stop the Syringe Pump and switch off.
- Do not remove the Syringe Pump until death has been verified.

Trouble Shooting

Syringe becomes dislodged

- The alarm will sound and the infusion light will turn **red**.
- "**Check Syringe Loaded Correctly**" window will be displayed.
- Replace syringe onto the Syringe Pump.

- The next screen will request confirmation of syringe size and syringe brand.
- Press "**YES**" if correct.
- The screen will display:
    - Press "**YES**" to resume previous programme.

WARNING: If you press "NO" the pump interprets this as a completely new 24 hour period and the remaining contents of the syringe would be delivered over the next 24 hours from confirming "**Start Infusion**". The patient would not therefore receive the prescribed dose. If "NO" has been pressed in error, discard the remainder of the syringe contents and prepare and set up a new syringe.

- The screen will display: "**Remaining volume, duration and rate of infusion**".
- Press "**YES**" to confirm if this is the correct prescription.
- Screen will display "**Start infusion**".
- Press "**YES**" to confirm.

Ambulatory Syringe Pump Alarm Conditions

When the Syringe 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 Infusion Light Status indicator turns **red**.

The pump will not start:

Problem	Solution
No battery present	Fit a battery
Battery inserted incorrectly	Re-align battery terminals
Battery is depleted/very low	Fit a new battery
Pump is faulty	Service required

Infusion Running Too Fast:

- If over-infusion occurs, stop infusion, check condition of patient and seek medical advice.
- Check rate setting for accuracy.
- Check for disconnection of line or needle.
- Check syringe securely attached to pump.
- Check box is locked and no tampering has occurred.
- Check no air present in syringe.
- If Syringe Pump could be faulty, return to Electronics and Biomedical Engineering Department (EBME).
- If safe to do so (following advice) begin process of setting up a new Syringe Pump using alternative site.
- Complete IR1.

Infusion Running Too Slow:

- Check patient, seek medical advice if required. Has symptom control been lost, does patient require PRN medication?
- Check the Syringe Pump light is **GREEN** and flashing.
- Check the battery level.
- Check the rate setting is correct.
- Check the correct syringe brand or size has been programmed.
- Check that the syringe is inserted correctly into Syringe Pump.
- Check if Syringe Pump has been stopped and re-started for any reason.
- Check contents of syringe/line is there any evidence of crystallisation/kinking of tubing?
- Check needle site if necessary.
- Consider further dilution of medicines to minimise irritation by setting up a fresh syringe.

- If Syringe Pump continues to run through too slowly, change entire pump and return to Electronics and Biomedical Engineering Department (EBME).
- Check rate of infusion at regular intervals.
- Complete IR1.

The Pump has stopped before emptying the syringe

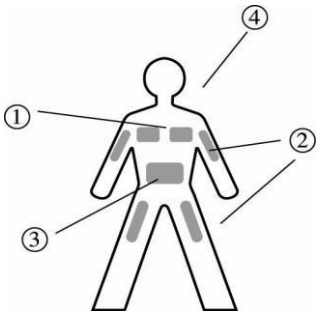
- Check battery has not exhausted. Fit a new battery, turn pump on, confirm syringe size and brand, select "**Resume**" to continue infusion.

WARNING – if you press "**NO**" the pump interprets this as a completely new 24 hour period and the remaining contents of the syringe would be delivered over the next 24 hours from confirming "**Start Infusion**". The patient would not therefore receive the prescribed dose. If "**NO**" has been pressed in error, discard the remainder of the syringe contents and prepare and set up a new syringe.

- Trapped/kinked infusion line. Free line or kink and resume infusion if appropriate.

Siting the infusion

If possible discuss with the patient the preferred infusion site.



Sites of choice include:

- Anterior aspect of upper arms and thighs (2).
- Anterior Abdominal Wall (3).
- Area over scapula (in confused or disorientated patients (4).
- Anterior Chest Wall (1).

Sites not to be used:

- Areas of inflammation.
- Areas of any broken skin.
- Bony prominences.
- Irradiated areas.
- Sites of tumour.
- Sites of infection.
- Skin folds or lymphoedema.

Avoid anterior chest wall in cachexic patients.

Guidelines for subcutaneous siting of the Saf-T Intima

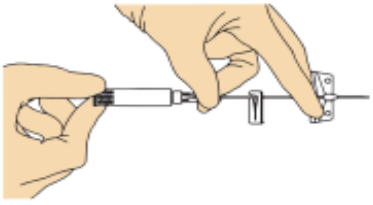
BD Saf-T-Intima™ Straight

For Subcutaneous infusion therapy

Points to practice

Before you start: Decontaminate hands and prep the skin of patient as per local hospital policy and guidelines.

Preparation



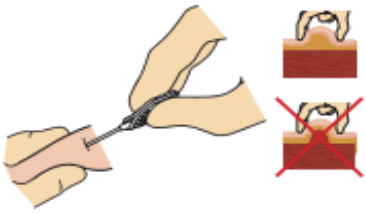
Hold as shown and rotate the safety shield to loosen the needle.

Check if the needle bevel is facing up and that the catheter is not over the bevel before insertion.

Insertion

Grasp the textured sides of wings and bring them together, pinching firmly.

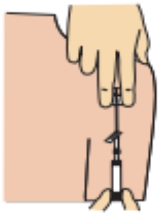
Insertion



Using thumb and index finger gently pinch the skin around selected site to identify the subcutaneous tissue.

Insert the full length of the catheter and needle through the skin, angle dependent on patient's skin structure.

Needle Removal



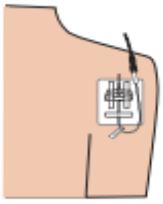
Make sure the cannula end is sitting well within the subcutaneous layer.

Lay the wings flat on the skin surface and hold firmly in place. Then pull the safety shield in a straight, continuous motion until the safety shield fully separates and activates the safety system.

Disposal

Discard the needle immediately in a sharps container.

Stabilisation



Secure the catheter and apply a sterile dressing per hospital policy. Attach needle free device as per hospital policy. Connect infusion line as needed.

BD

If site irritation occurs

- Change site using a new infusion set at least 3cm away from original site.
- Review medication in syringe (Cyclizine and Levomepromazine commonest causes).
- Use a larger syringe therefore increasing volume of diluent.
- For problematic site reactions, contact Specialist Palliative Care Team for advice.
- Sites may need to be changed every 3-4 days. Frequency of re-siting will in many cases be dictated by the onset of site reactions.
- To detect problems with the infusion site it should be checked a minimum of twice daily, any variance to this practice must be recorded in the patient's records.

LCD DISPLAY	ALERT/ALARM/ TYPE	POSSIBLE CAUSE	ACTION
Occlusion/Syringe Empty Check Line & Syringe Press **YES** to confirm	Alarm Audible and visual alarm	Occlusion Precipitation Line kinked Actuator has reached minimum travel position	New syringe & line required New syringe & line required Unkink consider renewing End of programme, turn pump OFF
Press **YES** to Resume **NO** for New Syringe	Alarm Audible and visual alarm Intermittent bleep	Something has occurred which has interrupted the current programme (e.g., syringe displaced/power failure) so the device is prompting the user to their attention	Pressing **YES** will continue current interrupted infusion Check/confirm infusion summary screens and press YES to resume the current infusion Pressing NO will programme a new infusion e.g., new syringe and/or new patient. The pump will calculate the volume of the syringe and based on duration required will start a new programme
Pump paused too long Confirm, press **YES**	Audible and visual alarm Intermittent bleep	Pump left in stop mode (on hold) for 2 minutes	Either start infusion, continue programming or switch off
Syringe nearly empty	Alert Audible and visual alarm Intermittent bleep	15 minutes from end of infusion	Prepare to change syringe or switch off
End Programme Press **YES** to confirm	Alert Audible and visual alarm Intermittent bleep	Infusion complete	Pump will alarm. Press **YES** to confirm end of programme and OFF to switch pump off.
Low Battery	Alert Visual alarm	Battery is almost depleted (15 minutes left)	Prepare to change battery and resume infusion
Battery End	Alert Visual alarm	Battery is depleted	Change battery and resume infusion
System Error. Press & hold **INFO** for details. If problem persists send pump for service	Alarm System error	Error has occurred	Pressing **INFO** key will display the reason for the alarm & give advice for correction, if applicable: If correction not possible: Remove pump from use & turn power off Return to Pharmacy who will send to Medical Physics for pump interrogation Complete medical equipment "Work Request Form"

Maintenance

- Syringe Pumps should be cleaned after each patient using a disposable cloth dampened with mild detergent. Do **NOT** use alcohol wipes.
- Syringe Pumps must be calibrated every 12 months by each service's engineering department.
- A recording system must be in place which clearly identifies the date, Syringe Pump number and person who calibrated the pump.
- Sticking labels to the actual pump is not recommended as this can cause problems with cleaning. Only maintenance labels are acceptable which clearly identify when last serviced.
- Ensure Syringe Pump is sent back to the appropriate department following use.