Palliative Care (Adult): Ambulatory Syringe Pump Policy (BD McKinley T34 – version 2)

November 2021

DOCUMENT PROFILE	
Document Registration	HSS-PP-CG-0223-04
Document Purpose	Policy
Short Title	Palliative Care (Adult): Ambulatory Syringe Pump Policy
Authors	Adam Leversuch (Specialist Palliative Care Team, Pharmacist) Kim Hancock (Specialist Palliative Care Team, Team Leader)
Publication Date	November 2021
Target Audience	Jersey Health and Community Services (HCS), Family Nursing and Home Care (FNHC), Primary Care Body (PCB), Care Federation (CF) & Jersey Hospice Care (JHC)
Circulation List	All HCS, FNHC, PCB, CF & JHC areas
Description	A policy for the use of the BD McKinley Ambulatory Syringe Pump
Linked Policies	Anticipatory Prescribing Policy Medicines Policy Non-Medical Prescribing Policy Prescription Writing Standards Symptom Management Guidelines
Approval Route	HCS Medicines Governance Committee FNHC Policies & Procedures Group PCB Committee CF Committee JHC Senior Nurse Group
Review Date	November 2024
Contact Details	a.leversuch@health.gov.je KimHancock@jerseyhospicecare.com

CONTENTS LIST:

1. INTRODUCTION

1.1 Rationale

Palliative care is an area of clinical practice that requires specialist knowledge and skill sets to ensure the highest standards of practice and care are applied based upon the most up-to-date contemporary evidence. The use of ambulatory syringe pumps assists practitioners in delivering such care.

The BD McKinley T34 Ambulatory Syringe Pump addresses the rapid response report (National Patient Safety Agency [NPSA], 2010) concerning the use of syringe pumps that deliver medication in mm/24 hours. The T34 **only** delivers medication in **mL/hr**, consistent with best practice guidelines.

The T34 is a small, lightweight, battery powered ambulatory syringe pump used to deliver drugs at a predetermined rate over a 24 hour period in mL per hour. The use of such a device for delivery by continuous subcutaneous infusion (CSCI) of medications is a well-established technique in palliative care as it allows relatively constant levels of medication to be administered, avoiding peaks and troughs which can result in reduced symptom control and increased potential for side effects.

1.2 Scope

This policy is intended to be used by registered clinical professionals who manage adult palliative care patients within Jersey Health and Community Services (HCS), Family Nursing and Home Care (FNHC), Primary Care Body (PCB), Residential / Nursing Homes and Jersey Hospice Care (JHC).

This will include medical, nursing and pharmacy staff, as well as other allied health professionals.

This policy concentrates on the safe use of the McKinley T34 ambulatory syringe pump (**version 2**) in adult palliative care. It may be used to administer drugs in other circumstances but these, as well as the use by parenteral routes other than subcutaneous (SC), are outside the scope of this policy.

1.3 Principles

This policy was produced to assist professionals administering drugs via an ambulatory syringe pump, and to promote a procedural uniformity amongst those professionals working in the hospital, hospice or primary care settings.

2. POLICY PURPOSE

The aim of the policy is to promote consistency and sustain improved clinical practice and care standards to adult palliative care patients across Jersey, in the use of the McKinley T34 ambulatory syringe pump.

3. PROCEDURE

3.1 Training

All healthcare professionals registered in Jersey (nursing and medical) who use a syringe pump must be trained, competent and personally accountable in its operation.

Managers should ensure that relevant training takes place (e.g. at induction, new users and updates as per organisation policy) and maintain a record of staff who are trained and competent to use such devices. Competencies in the use of syringe pumps are available. The below training is recommended as best practice, although staff should be led by individual organisational requirements.

Initial training will be undertaken using an on-line tutorial in the use of the McKinley T34 syringe pump on the BD website, which should be available to staff of each organisation via their education / practice development teams.

Following the on-line training session staff are expected to set up a syringe pump under the supervision of a nurse deemed as competent, to ensure understanding. The next step will be for staff to complete a competency based assessment (appendix 1).

3.2 Indications for use

The syringe pump can be used for symptom management and end of life care when the patient is unable to absorb, tolerate or take oral medications for reasons including that they have:

- severe nausea and/or vomiting
- severe oral tumours, sores or infections
- dysphagia
- intestinal obstruction
- poor absorption of oral drugs (rare)
- weak, unconscious or sedated patient

Alternative routes of medicine administration may be effective for some symptoms.

Many patients and relatives associate the use of a syringe pump with ‘the end of life’. It is of vital importance to reassure them that it is purely an alternative means of delivering medication. A syringe pump patient information leaflet is available.

Advantages of using a syringe pump:

- maintains medication plasma concentrations at an optimum therapeutic level
- avoids peaks and troughs of episodic administration
- increases patient confidence, removing the fear and pain of regular injections
- allows delivery of drugs through a single site for days/weeks
- allows for combination of drugs via a single site
- portable and light weight device allows for patient independence and mobility
- accurate infusion timing
- multiple symptoms can be managed
- potential to increase the quality of life

Disadvantages of using a syringe pump:

- local site reactions from irritant drugs
- negative impact upon body image
- potential of technical problems
- dose titration not possible without renewing whole infusion
- potential for psychological dependence on device
- barrel clamp arm on pump vulnerable to damage with rough handling
- may cause fear and distress through association with end of life status
- potential difficulties in establishing a patent infusion site in certain patients (e.g. oedematous patients or cachectic patients)

3.3 Set-up procedure

Informed consent from the patient (where possible) must be gained prior to commencement of a syringe pump. Outcomes of discussions must be documented in the patient notes.

3.3.1 Prescription

Refer to the island wide adult palliative care symptom management guidelines for further information on anticipatory prescribing and the use of syringe pumps.

This includes which healthcare professionals are authorised to prescribe syringe pumps in both HCS sites and primary care settings.

The Specialist Palliative Care Team (SPCT) can be contacted for advice where needed.

HCS sites:

- syringe pumps must be prescribed by a staff grade doctor or above, **except** in situations as outlined in the symptom management guidelines
- use of syringe pumps must be authorised by HCS pharmacy
- only start a syringe pump outside pharmacy opening hours on SPCT advice or in exceptional circumstances
- the ‘Syringe pump’ prescription must be added to the Electronic prescribing and medicines administration (EPMA) system

All medicines administered via the syringe pump should be clearly and correctly prescribed according to the policies of each organisation. The following information must be included:

- patient demographic details
- date and time
- medication name (generic, preferably in capitals)
- dose over 24 hours
- diluent
- volume (circle desired volume on chart)
- prescriber signature, name, designation and contact details
- prescriber to initial in designated box if infusion to be continuous

3.3.2 Preparation

The person preparing the medication should check the following:

- prescription is completed correctly as per section 3.3.1
- compatibility of medications prescribed (appendix 2)
- diluent
- infusion volume required
- size of syringe required

3.3.3 Administration

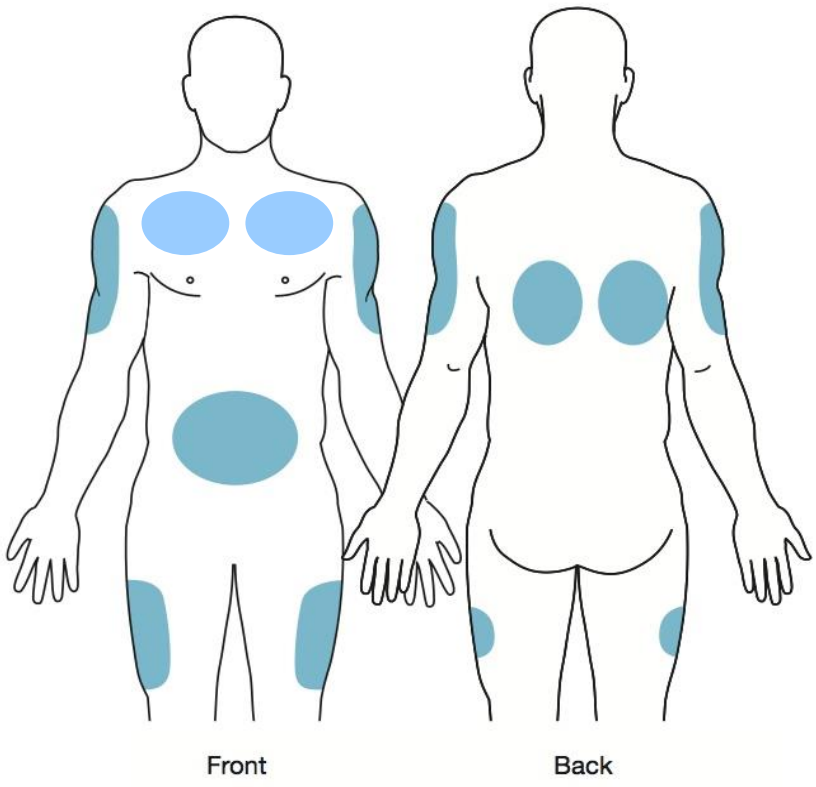
Practitioners administering a medication via the SC route should be aware that:

- absorption may be slower than the intramuscular (IM) route
- absorption will be severely limited in patients who are hypovolaemic or oedematous
- for breakthrough dose bolus injections the recommended maximum volume is 2mL

Where possible, involve the patient in the choice of a suitable infusion site. Both the outer arm and upper thigh are commonly used, but avoid the upper arm in bedbound patients who require frequent turning.

In other patients, the chest or abdomen may be more suitable. Avoid the chest wall in cachectic patients (danger of causing pneumothorax). The scapula may be considered for confused or delirious patients who may pull on the line.

Acceptable subcutaneous cannula insertion sites are shown below:



The following sites should be avoided:

Site	Reason
Oedematous areas (including lymphoedema affected arms)	Poor drug absorption and increased risk of infection / exacerbation of oedema
Bony prominences Broken skin	Poor absorption and discomfort
Irradiated sites	May have poor perfusion and hence poor drug absorption
Skin folds, sites near a joint / waistband area	Movement may displace infusion device and cause discomfort

3.3.4 Equipment required

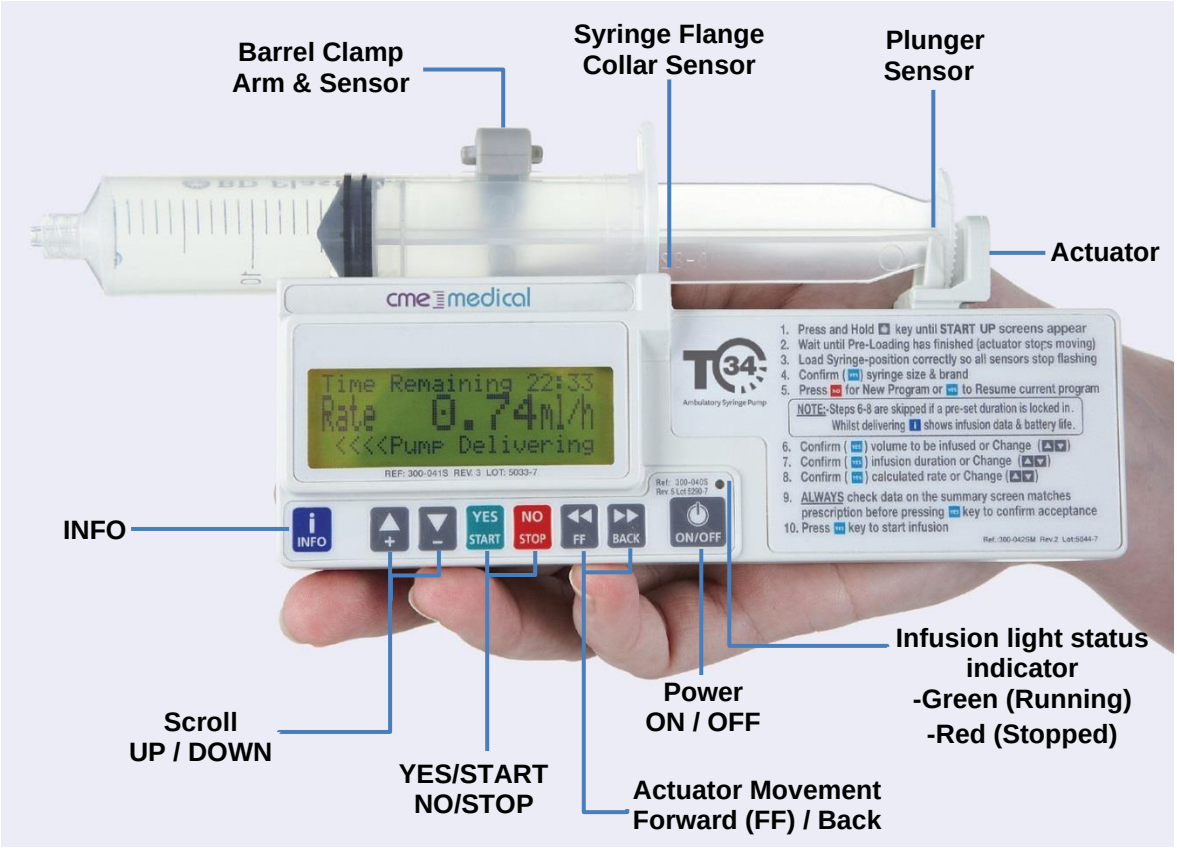
- T34 ambulatory syringe pump, plastic lockbox and key
- 9V alkaline battery (e.g. Duracell MN1604 or equivalent)
- Luer lock syringe 20mL or 30mL (BD Plastipak)
- cannula and subcutaneous infusion set (Saf-T-intima, or per practice of each organisation)
- transparent surgical dressing (e.g. IV 3000 or equivalent)
- syringes and (filter) needles to prepare medication
- prescribed medications and diluents
- sharps bin
- subcutaneous syringe pump prescription chart (appendix 3)
- medications additive label
- clean tray or surface for preparation

3.3.5 Labelling the syringe

Attach the label in such a way that it does not obscure the visual scales on the syringe or interfere with the sensors on the syringe pump. The below details are required on the label:

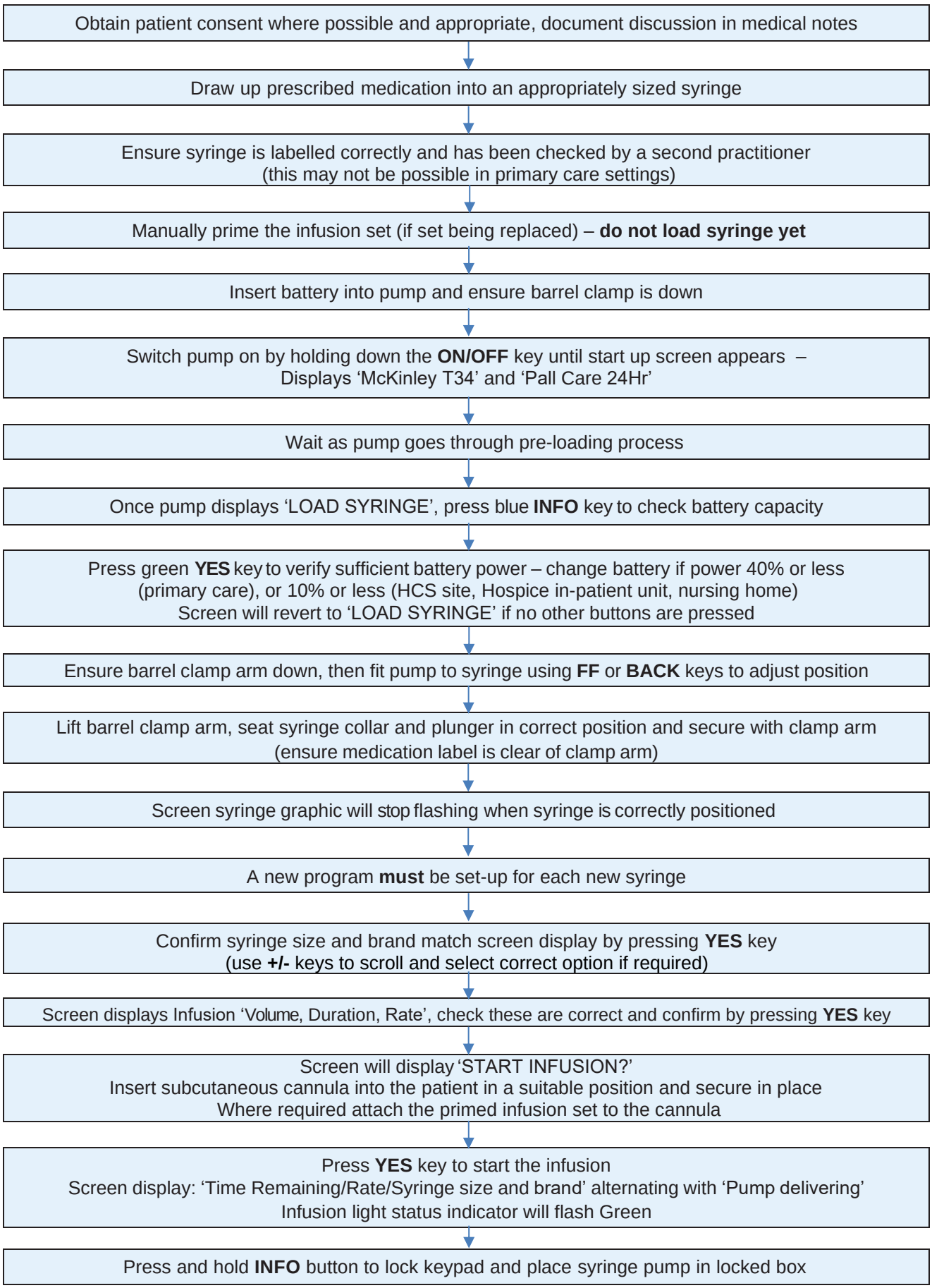
- patient name
- identity number
- medicine name(s)
- dose of each medicine
- diluent name
- total volume (in mL)
- date and time prepared
- initials of the individuals preparing the syringe

3.3.6 Component parts of the McKinley T34 syringe pump



3.4 Quick reference guide

The quick reference set up procedure below is for those practitioners competent in the use of the McKinley T34 syringe pump, alternatively refer to the quick user guide.
A comprehensive guide is available (appendix 4),



3.5 Monitoring the infusion

It is best practice in hospital, hospice in-patient unit and primary care settings that when a syringe pump is set-up, re-loaded or re-sited to observe it to ensure it is functioning correctly for at least 15 minutes. Further monitoring checks should be carried out:

- a minimum of 4 hourly (HCS sites, Hospice in-patient unit and nursing homes)
- each visit by a nurse in other primary care settings (e.g. patient own home)

Action	Rationale
Assess the patients symptoms, monitoring the effect of the medication and any side effects experienced.	To promote adequate symptom control. If symptoms are not controlled, breakthrough medication to be given and/or syringe pump prescription to be reviewed.
Check the skin site for erythema, leakage, hardness or swelling.	Change site as soon as this occurs and document appropriately. Medication absorption could be affected. Abscess formation can occur. Sites can be left intact if satisfactory for up to 7 days.
Observe the syringe and infusion set for kinks in the tubing, leakage, precipitation or discolouration of medication.	To check that the patient is receiving the prescribed medication. If discolouration/precipitation occur stop and discard infusion, check compatibility and mixing technique, re-site cannula and/or seek advice.
Check the syringe pump: Rate has not been altered. The green LED light is flashing every 32 seconds and the bottom line of the LCD display is alternating between "<<<< Pump Delivering" and make/size of syringe. Line securely attached to syringe and not leaking. **Press the "INFO" key to check:** Single press-VTBI (Volume to be Infused) and VI (Volume Infused), record.  Double press-battery life remaining, record.  Visually check fluid remaining in syringe at each check and compare with pump reading.	To assess that medication is being infused at correct rate.

Action	Rationale
Complete ambulatory syringe pump monitoring chart documentation (appendix 3).	As per HCS, FNHC, nursing home or JHC policy.
Action must be taken and documented in the event of: • site reaction • signs of incompatibility (i.e. precipitation) • significant discrepancies in the actual and expected infusion rate • damage to the syringe barrel or tip • blockage of infusion line	See Trouble shooting guide (appendix 5) Presence of large amounts of air may indicate cracked syringe – change syringe.

3.6 Safety and risk management

3.6.1 Unlicensed use of medications in palliative care

The use of medicines without a manufacturer licence or 'off-label' (outside their product licence) is common practice in palliative care (e.g. administration of medications via the SC route, or mixing several medications in a single syringe). However this carries additional responsibilities for prescribers, pharmacists and nurses.

Refer to use of off-label and unlicensed medication in each organisations Medicine Policy, or guidance from the healthcare professionals regulatory body. Alternatively contact the SPCT for advice.

3.6.2 Maintenance

Planned maintenance should be carried out annually, records should be kept per each organisations policies. It is the responsibility of the user to ensure that any devices have been serviced during the previous 12 months.

3.6.3 Infection prevention and control

When the syringe pump and lock box is no longer needed, it should be decontaminated.

1st step: Universal disinfectant wipe (Clinnell), **or**
Use sporicidal wipe if exposed to spores (e.g. Clostridioides difficile, norovirus)
2nd step: Alcohol wipe
3rd step: Attach 'I am clean' sticker (if required per organisational policy)

Refer to the MHRA safety alert for updated cleaning and maintenance advice.

3.6.4 Incident reporting

Examples of syringe pump incidents include:

- administration of incorrect medication, dose and/or diluent selection
- infusions running ahead of intended time / beyond intended time of completion (a tolerance of 5%, equivalent to 1 hour for a 24 hour infusion is allowed)
- device not alarming

Any device involved in an adverse incident should be quarantined, and sent to HCS engineering department or other designated person(s) per organisation policy for review.

4. DEVELOPMENT AND CONSULTATION PROCESS

4.1 Consultation Schedule

Name and Title of Individual	Date Consulted
Tim Hill (Practice Development Sister, HCS)	May 2021
Judy Le Marquand (Practice Development Sister, JHC)	May 2021
Gail Edwards (GSF Nurse Champion, JHC)	May 2021
Emily Churchill (Associate Clinical Nurse Specialist, JHC)	May 2021
Ellen Bourke (Staff Nurse, JHC)	May 2021
Jordan Black (Staff Nurse, JHC)	May 2021
Julie Robinson (Sister, FNHC)	May 2021
Audrey Connolly (Staff Nurse, FNHC)	May 2021

Name of Committee/Group	Date of Committee / Group meeting
CF Committee	November 2021
HCS Medicines Governance Committee	October 2021
PCB Committee	September 2021
FNHC Policies & Procedures Group	July 2021
JHC Senior Nurse Group	June 2021

5. REFERENCE DOCUMENTS

Dickman A, Schneider J (2016) The Syringe Driver: Continuous infusions in palliative care 4th Ed. Oxford: Oxford University Press.

Caesarea Medical Electronics. T34 Syringe Pump System Operator Manual (100-090SM Rev.02).

National Patient Safety Agency. (2010) Safer Ambulatory Syringe Driver. London: NPSA.

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Palliative Care Adult Network Guidelines (2021). Palliative Care Adult Network Guidelines. Available at: https://book.pallcare.info/index.php (Accessed 27th May 2021)

Scottish Palliative Care Guidelines (2021). Scottish Palliative Care Guidelines. Available at: https://www.palliativecareguidelines.scot.nhs.uk (Accessed 27th May 2021)

Wilcock A, Howard P, Charlesworth S. (2020). PCF 7: Palliative Care Formulary 7th Ed. London: Pharmaceutical Press.

7. GLOSSARY OF TERMS

CF	Care Federation
CSCI	Continuous Subcutaneous Infusion
EPMA	Electronic Prescribing and Medicines Administration
FNHC	Family Nursing and Home Care
Frail	A progressive physiological process marked by decline in function and psychological reserves as well an increased vulnerability to morbidity and mortality (features include fatigue, weight loss, and slowed performance)
GSF	Gold Standards Framework
HCS	Health and Community Services
IM	Intramuscular
JHC	Jersey Hospice Care
LCD	Liquid Crystal Display
LED	Light Emitting Diode
NICE	National Institute for Health and Care Excellence
NPSA	National Patient Safety Agency, now transferred to the NHS Commissioning Board Special Health Authority
PCB	Primary Care Body
SC	Subcutaneous
SPCT	Specialist Palliative Care Team
VI	Volume infused
VTBI	Volume to be infused
WFI	Water for Injections

8. IMPLEMENTATION PLAN

A summary of how this document will be implemented.

Action	Responsible Officer	Timeframe
E-mail to all clinical staff	Communications Officer (HCS) PCB committee (PCB) / GP Champions Information Governance (FNHC) Specialist Palliative Care Team (JHC) CF Secretary / Care Home Managers (CF)	1 week prior to launch
Policy to be uploaded on each organisations intranet / internet	Information Governance (HCS) PCB Lead (PCB) Information Governance (FNHC) Governance Facilitator (JHC) CF Secretary (CF)	1 week prior to launch

9. APPENDICES

Appendix 1: Competency-based assessment tool (T34 McKinley syringe pump)

Scenario:
You are required to administer a drug infusion using a T34 syringe pump.
Access level: LOCK ON (prime and load).
For the purpose of training, the candidate used the following criteria.

Drug is to be delivered over a period of	hours (pump default setting)
Syringe size used	mL
Syringe make used	
Total fluid volume in the syringe is	mL
Priming volume of line is	mL

The candidate achieved these outcomes because they have:

Performance criteria achievement through candidate demonstration, facilitator observation and/or questioning	**Date**	**Date**	**Date**
1. START UP a. Ensured that all equipment is available and serviceable			
1.1 Checked that the device is clean and visually intact			
1.2 Checked that the device is appropriate for the intended use			
b. Correctly prime/prepare infusion equipment			
1.3 Checked that the syringe and extension set are appropriate and compatible for the device and the drug delivery			
1.4 Manually primed an infusion set			
c. Powered up the device			
1.5 Checked that a syringe is **not** loaded and the barrel clamp arm is down on the device			
1.6 Installed the appropriate battery			
1.7 Turned the device on and observed the completion of the pre-programmed start-up sequence (actuator movement)			
1.8 During pre-programming, checked the LCD display to confirm the default settings of the device			
1.9 On completion of the pre-programme sequence, checked the battery power available is sufficient to run the device for the prescribed duration			
d. Ensured syringe placement and detection			
1.10 Visually aligned the 3 syringe sensors to syringe and used the FF/back keys to adjust as necessary			
1.11 Correctly loaded the syringe: ensured the syringe is placed in the 3 detection areas fully and observed LCD screen to confirm correct placement			
1.12 Checked that the device had correctly identified the syringe brand and size and taken appropriate action if necessary if not identified correctly			
e. Verify set parameters			
1.13 Reviewed the summery screen: Checked LCD screen for correct duration of infusion (volume, duration & rate)			
1.14 Observed “start infusion?” screen: Checked that the administration set was connected to the patient access port and the clamp was released (if not already done so)			
1.15 Ensured infusion is running: observed the “running screen”, checked green light on			

2. MONITORING			
a. Correctly accessed/explained the **INFO KEYS** in relation to the current infusion			
2.1 Single press to view: volume infused & volume to be infused			
2.2 Double press to view: battery status			
2.3 Observed the screens reverting to the default running screen			
2.4 Activated/deactivated key-pad lock			
b. Demonstrated awareness/performed checks/or action to be taken in relation to audible / visual - **ALERT**			
2.5 Near end of infusion			
2.6 Low battery			
c. Demonstrated awareness/performed checks/or action to be taken in relation to audible / visual - **ALARMS**			
2.7 Occlusion			
2.8 End of infusion (end of programme / syringe)			
2.9 Syringe displaced			
2.10 Pump paused too long			
2.11 End battery			
3. CLOSE DOWN			
a. Correctly closed down and dismantled the device (assuming duration completed)			
3.1 Checked device / tubing disconnected from access device			
3.2 Removed syringe from device and returned barrel clamp to down position			
3.3 Turned the device off			
3.4 Demonstrated safe removal of disposables			
3.5 Correctly removed the batteries ready for storage			
3.6 Cleaned / decontaminated/stored the device as per local policy / manufacturer instructions			

Use this space to add any additional comments on the assessment Ensure that each comment relates clearly to a numbered performance criterion	
Performance criteria no.	Additional comments

Though not part of the assessment for starting up, monitoring and closing down of the device in the correct sequence, the user must be aware of other features that are available, the prompts that can appear and action to be taken in certain circumstances

PROMPT: "Resume" / "new programme" screen

If the pump was stopped and turned off before the last program reached "End program" the Resume prompt screen will appear (e.g. if, during an infusion, the pump was powered off to change the battery).
Press NO to continue programming the new regime.Press YES to resume current programme

ACTION TO: Silence the alert / alarm noise before trouble-shooting

Press YES key to silence the alert / alarm noise for 2 minutes (device is paused).
Observe screen to indicate the reason for the alert/alarm.

Assessment date	Candidate Name	Assessor Name	Assessor Signature

Appendix 2: Syringe pump drug compatibility tables

The below tables summarise the compatibility information available for 2 and 3-drug combinations in **Water for Injections (WFI)** used as a continuous subcutaneous infusion (CSCI) over a **24 hour period**.

The tables should be used to check that drug combinations are appropriate and stable at the doses prescribed.

Figures stated in the tables are NOT clinical doses to prescribe.

Compatibility of drugs in the syringe pump is **concentration dependent**, therefore do NOT assume that doses reported as stable for a 22mL volume also apply to a 17mL volume.

Stability data has been obtained from laboratory work and the clinical setting. Since a number of factors can affect drug stability and compatibility, conflicting reports can occur. If any problems occur (i.e. precipitation) with a drug combination reported as stable in the below tables contact the SPCT or Hospital pharmacy (appendix 6).

How to use the compatibility charts and tables:

Refer to the relevant Table (1 to 4), to confirm the maximum concentration of the drug combination which is physically stable, these are NOT recommended doses to prescribe.

For advice on the compatibility of drugs in the following situations contact the SPCT or Hospital pharmacy (for HCS staff):

- drug combinations not listed in the below tables (i.e. no opioid prescribed)
- doses exceed the stated maximum stable concentration in the below tables
- when there is a requirement to use **four drugs** in the same CSCI
- when there is a requirement to use diluents other than WFI (i.e. Sodium chloride 0.9%)

Compatibility tables for **TWO** drugs in **Water for Injections**

FIGURES STATED IN THE TABLES ARE NOT CLINICAL DOSES TO PRESCRIBE

Drug combinations	MAXIMUM CONCENTRATIONS of TWO drug combinations that are physically stable for 24 hours	
	17mL in 20mL syringe	22mL in 30mL syringe
Morphine Cyclizine	270mg 150mg	350mg 150mg
Morphine Glycopyrronium	170mg 1.2mg	220mg 1.2mg
Morphine Haloperidol	225mg 6mg	290mg 8mg
Morphine Hyoscine BUTYLbromide	170mg 90mg	220mg 120mg
Morphine Hyoscine HYDRObromide	370mg 1.2mg	480mg 1.2mg
Morphine Levomepromazine	230mg 50mg	300mg 65mg
Morphine Metoclopramide	120mg 50mg	160mg 70mg
Morphine Midazolam	85mg 40mg	110mg 55mg

Table 1. Compatibility table for MORPHINE: TWO drugs in water for injections

Drug combinations	MAXIMUM CONCENTRATIONS of TWO drug combinations that are physically stable for 24 hours	
	17mL in 20mL syringe	22mL in 30mL syringe
Oxycodone Cyclizine	100mg 150mg	130mg 150mg
Oxycodone Glycopyrronium	380mg 900 micrograms	500mg 1.2mg
Oxycodone Haloperidol	640mg 10mg	840mg 10mg
Oxycodone Hyoscine BUTYLbromide	640mg 75mg	840mg 100mg
Oxycodone Hyoscine HYDRObromide	525mg 900 micrograms	680mg 1.2mg
Oxycodone Levomepromazine	470mg 75mg	610mg 100mg
Oxycodone Metoclopramide	270mg 50mg	360mg 70mg
Oxycodone Midazolam	270mg 50mg	360mg 70mg

Table 2. Compatibility table for OXYCODONE: TWO drugs in water for injections

Compatibility tables for **THREE** drugs in **Water for Injections**

FIGURES STATED IN THE TABLES ARE NOT CLINICAL DOSES TO PRESCRIBE

Drug combinations	MAXIMUM CONCENTRATIONS of THREE drug combinations that are physically stable for 24 hours	
	17mL in 20mL syringe	22mL in 30mL syringe
Morphine Cyclizine Haloperidol	210mg 150mg 6mg	275mg 150mg 8mg
Morphine Cyclizine Midazolam	150mg 150mg 20mg	200mg 150mg 30mg
Morphine Glycopyrronium Midazolam	150mg 900 micrograms 35mg	200mg 1.2mg 45mg
Morphine Haloperidol Hyoscine BUTYLbromide	50mg 4mg 90mg	65mg 5mg 120mg
Morphine Haloperidol Midazolam	110mg 6mg 40mg	140mg 8mg 55mg
Morphine Hyoscine BUTYLbromide Levomepromazine	100mg 90mg 12mg	130mg 120mg 15mg
Morphine Hyoscine BUTYLbromide Midazolam	110mg 90mg 15mg	140mg 120mg 20mg
Morphine Levomepromazine Midazolam	120mg 45mg 50mg	160mg 60mg 70mg
Morphine Metoclopramide Midazolam	80mg 60mg 40mg	100mg 80mg 50mg

Table 3. Compatibility table for MORPHINE: THREE drugs in water for injections

Compatibility tables for **THREE** drugs in **Water for Injections**

FIGURES STATED IN THE TABLES ARE NOT CLINICAL DOSES TO PRESCRIBE

Drug combinations	MAXIMUM CONCENTRATIONS of THREE drug combinations that are physically stable for 24 hours	
	17mL in 20mL syringe	22mL in 30mL syringe
Oxycodone Cyclizine Glycopyrronium	90mg 150mg 900 micrograms	120 mg 150 mg 1.2mg
Oxycodone Cyclizine Haloperidol	100mg 150mg 8mg	130 mg 150 mg 10 mg
Oxycodone Cyclizine Midazolam	40 mg 150 mg 20 mg	55 mg 150 mg 30 mg
Oxycodone Glycopyrronium Levomepromazine	70 mg 750 micrograms 10 mg	90 mg 1mg 15 mg
Oxycodone Glycopyrronium Metoclopramide	40 mg 450 micrograms 20 mg	50 mg 600 micrograms 30 mg
Oxycodone Glycopyrronium Midazolam	50 mg 900 micrograms 15 mg	65 mg 1.2mg 20 mg
Oxycodone Haloperidol Hyoscine BUTYLbromide	80 mg 4 mg 100 mg	100 mg 5 mg 120 mg
Oxycodone Haloperidol Hyoscine HYDRObromide	80 mg 4 mg 1mg	100 mg 5 mg 1.2mg
Oxycodone Haloperidol Midazolam	80 mg 4 mg 15 mg	100 mg 5 mg 20 mg
Oxycodone Hyoscine BUTYLbromide Levomepromazine	80 mg 100 mg 20 mg	100 mg 120 mg 25 mg
Oxycodone Hyoscine BUTYLbromide Midazolam	80 mg 100 mg 15 mg	100 mg 120 mg 20 mg
Oxycodone Levomepromazine Midazolam	40 mg 40 mg 25 mg	50 mg 50 mg 30 mg
Oxycodone Metoclopramide Midazolam	40 mg 25 mg 25 mg	50 mg 30 mg 30 mg

Table 4. Compatibility table for OXYCODONE: THREE drugs in water for injections

Appendix 3: Ambulatory subcutaneous syringe pump prescription / monitoring chart

AMBULATORY SUBCUTANEOUS SYRINGE PUMP PRESCRIPTION CHART (HSSD)

HOSPITAL: _____	URN: _____
WARD: _____	SURNAME: _____
CONSULTANT: _____	FIRST NAMES: _____
NO. OF SYRINGE PUMPS ..... OF	ADDRESS: _____
	DATE OF BIRTH: _____

ADDRESSOGRAPH

INFUSIONS TO BE ADMINISTERED ONCE ONLY, UNLESS PRESCRIBER SPECIFIES TO RUN FOR 3 DAYS*

DILUENT	1. Generally use Water for Injections as the diluent. 2. On some occasions the diluent will need to be Sodium Chloride 0.9%. This information is available in the Ambulatory Syringe Pump Policy. 3. Use diluent to make up TOTAL VOLUME to 17ml (in a 20ml syringe) OR 22ml (in a 30ml syringe). BD Plastipak luer lock syringes are to be used.
SYRINGE PUMP DRUG COMPATIBILITY CHARTS	Refer to the Ambulatory Syringe Pump Policy for stability information when mixing TWO or THREE drug combinations.

If prescribing FOUR DRUGS in a single syringe pump there is a high risk of incompatibility. The Specialist Palliative Care Team and / or pharmacy should be contacted for advice.

Prescription

DATE & TIME	TOTAL VOLUME	DURATION	MEDICINE ADDED TO SYRINGE PUMP (draw a line through unused rows)	
/ / :	17ml or 22ml (CIRCLE)	24 HOURS	APPROVED DRUG NAME	DOSE
ROUTE	DILUENT	PHARMACY		
SC				

PRESCRIBER'S SIGNATURE		*Prescriber to initial if 3 day Rx ➡		PRESCRIBER TO TICK REASON FOR PUMP
PRINT NAME			End of Life Care	
DESIGNATION / BLEEP NO.			Symptom Management	

To discontinue draw diagonal line through prescription and remainder of administration section	STOP DATE _____ STOP TIME _____ PRESCRIBER'S SIGNATURE _____ PRINT NAME _____ DESIGNATION / BLEEP NO. _____

Preparation and Administration

DATE & TIME START	SITE POSITION	SYRINGE PUMP ID NO.	BATTERY LEVEL (%)	START RATE (ml/hr)	START VOLUME (ml)	GIVEN BY	CHECKED BY	DATE & TIME STOP
/ / :								/ / :
/ / :								/ / :
/ / :								/ / :

AMBULATORY SUBCUTANEOUS SYRINGE PUMP MONITORING CHART

PATIENT'S NAME: _____ **URN:** _____ **DATE OF BIRTH:** _____

Monitoring Checks - complete every 4 hours (HSSD Sites / Hospice In-Patient Unit / Nursing Homes) or each visit (Community) per Ambulatory Syringe Pump Policy

Date	Time	Pump delivering (Yes/No)	Rate (ml/hr)	Volume to be infused (ml)	Volume infused (ml)	Battery Level (%)	Lock on (Yes/No)	Solution checked (Yes/No)	Line checked (Yes/No)	Site Checked (Yes/No)	Dressing in place & date visible (Yes/No)	Specific problems (see codes*, or enter None)	Action taken / comments	Signature

Where contents are discarded, please complete the following section

Date	Time	Amount discarded (ml)	Reason	Discarded by (Signature)	Witnessed by (Signature)

***Codes for specific problems:**

BL = Bleeding
BR = Bruising
C = Crystallisation
CC = Colour Change
L = Leakage
O = Other (specify)
P = Pain
R = Redness
SW = Swelling

AMBULATORY SUBCUTANEOUS SYRINGE PUMP PRESCRIPTION CHART
(HOSPICE IN-PATIENT UNIT AND COMMUNITY)

GP: _____	URN: _____
GP SURGERY: _____	JHC INDEX NO: _____
GP TEL NO: _____	SURNAME: _____
NO. OF SYRINGE PUMPS ..... OF	FIRST NAMES: _____
	ADDRESS: _____
	DATE OF BIRTH: _____

ADDRESSOGRAPH

DILUENT	1. Generally use Water for Injections as the diluent. 2. On some occasions the diluent will need to be Sodium Chloride 0.9%. This information is available in the Ambulatory Syringe Pump Policy. 3. Use diluent to make up TOTAL VOLUME to 17ml (in a 20ml syringe) OR 22ml (in a 30ml syringe). BD Plastipak luer lock syringes are to be used.
SYRINGE PUMP DRUG COMPATIBILITY CHARTS	Refer to the Ambulatory Syringe Pump Policy for stability information when mixing TWO or THREE drug combinations.

If prescribing FOUR DRUGS in a single syringe pump there is a high risk of incompatibility. The Specialist Palliative Care Team should be contacted for advice.

Prescription

DATE & TIME	TOTAL VOLUME		MEDICINE ADDED TO SYRINGE PUMP (draw a line through unused rows)	
			APPROVED DRUG NAME	DOSE
/ / :	17ml or 22ml (CIRCLE)			
DILUENT	ROUTE	DURATION		
	SC	24 HOURS		

Administration

DATE ADMINISTERED			
DOSE ADMINISTERED			

PRESCRIBER'S SIGNATURE		**PRESCRIBER TO TICK REASON FOR SYRINGE PUMP**	
PRINT NAME		**End of Life Care**	
DESIGNATION / CONTACT NO.		**Symptom Management**	

To discontinue draw diagonal line through prescription and remainder of administration section	**STOP DATE** _____ **STOP TIME** _____ **PRESCRIBER'S SIGNATURE** _____ **PRINT NAME** _____ **DESIGNATION / CONTACT NO.** _____

Preparation and Administration

DATE & TIME START	SITE POSITION	SYRINGE PUMP ID NO.	BATTERY LEVEL (%)	START RATE (ml/hr)	START VOLUME (ml)	GIVEN BY	CHECKED BY	DATE & TIME STOP
/ / :								/ / :
/ / :								/ / :
/ / :								/ / :
/ / :								/ / :

AMBULATORY SUBCUTANEOUS SYRINGE PUMP MONITORING CHART

PATIENT'S NAME: _____ **URN:** _____ **DATE OF BIRTH:** _____

Monitoring Checks - complete every 4 hours (HSSD Sites / Hospice In-Patient Unit / Nursing Home) or each visit (Community) per Ambulatory Syringe Pump Policy

Date	Time	Pump delivering (Yes/No)	Rate (ml/hr)	Volume to be infused (ml)	Volume infused (ml)	Battery Level (%)	Lock on (Yes/No)	Solution checked (Yes/No)	Line checked (Yes/No)	Site Checked (Yes/No)	Dressing in place & date visible (Yes/No)	Specific problems (see codes*, or enter None)	Action taken / comments	Signature

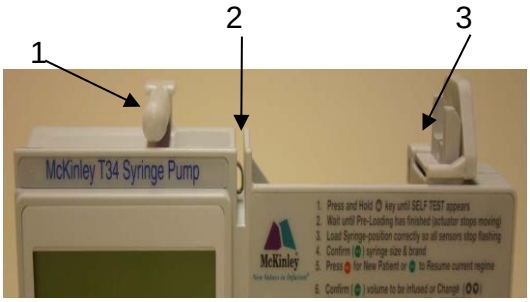
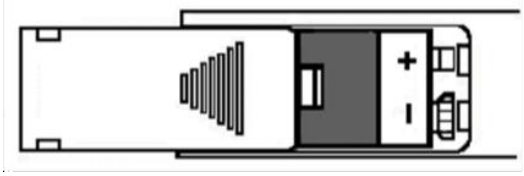
Where contents are discarded, please complete the following section					
Date	**Time**	**Amount discarded (ml)**	**Reason**	**Discarded by (Signature)**	**Witnessed by (Signature)**

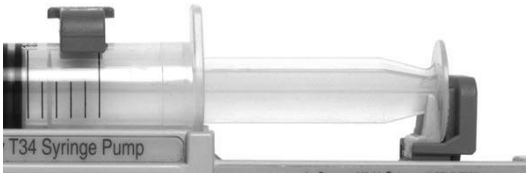
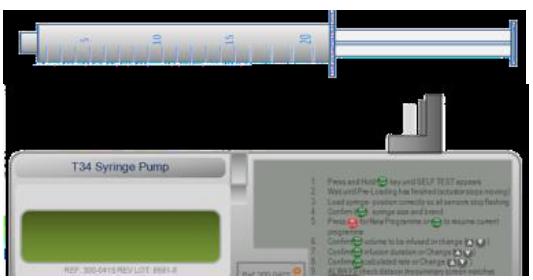
***Codes for specific problems:**

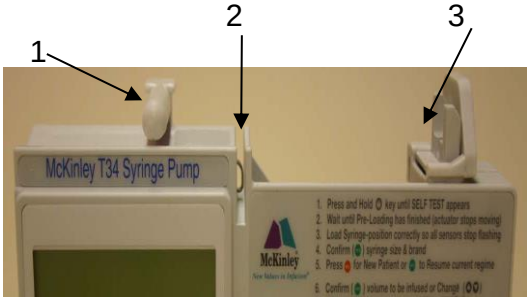
BL = Bleeding
BR = Bruising
C = Crystallisation
CC = Colour Change
L = Leakage
O = Other (specify)
P = Pain
R = Redness
SW = Swelling

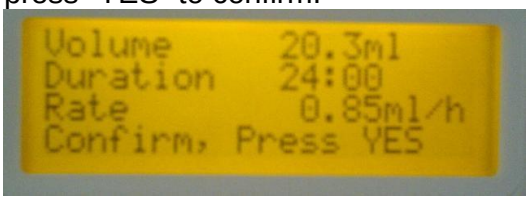
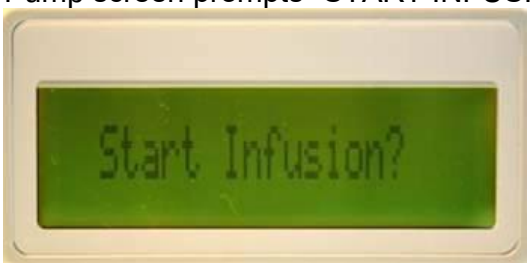
Appendix 4: Set-up procedure

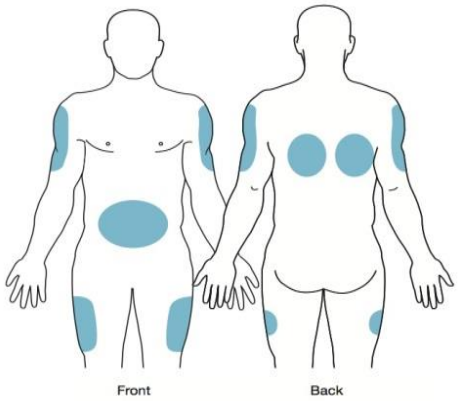
	Action	Rationale
1	Discuss the use of the syringe pump and explain the procedure to the patient, and if appropriate the family. Document the outcome of this discussion in patient notes. Breakthrough medication will be required to control symptoms in addition to the syringe pump medications, and until the infusion takes effect.	To obtain informed consent and care concordance. A syringe pump patient information leaflet is available. Due to the slow rate of infusion there can be up to a 4 to 6 hour lag period until optimal levels of medication are reached.
2	Decontaminate hands per hygiene policy.	To reduce the risk of transfer of transient micro-organisms from the healthcare worker's hands.
3	Put on single use disposable gloves.	To reduce the risk of transfer of transient microbial contamination and prevent the spread of infection.
4	Assemble equipment. Check all packaging before opening and prepare the equipment on a clinically clean receptacle or surface.	To reduce the transmission of micro-organisms and to ensure that no equipment is damaged.
5	**To fill syringe:** (using filter needle) Draw up opioid first (if prescribed) then add the second and third drugs where required, before adding diluent to give total volume. **Recommended volumes are:** **20mL syringe - fill to 17mL** **30mL syringe - fill to 22mL** McKinley recommend a maximum volume of 18mL (20mL syringe) and 23.5mL (30mL syringe) respectively. Only Luer lock syringes should be used. Ensure the correct dosage is withdrawn from medication ampoules, certain ampoules contain an 'overage' which can lead to the incorrect dosage being given.	 To reduce the risk of precipitation and particulate siphonage. Diluting the mixture reduces risk of adverse site reactions and incompatibility. In exceptional situations larger volumes may be needed than those usually recommended (17mL or 22mL), e.g. when giving very large drug doses and thus medication volumes. Contact the SPCT and/or Hospital Pharmacy. To prevent syringe becoming dislodged from line. The needle syringe set only needs 0.2mL to prime so does not need to be taken into account when filling the syringe. To ensure correct medication dosages are used as per prescription.
6	Invert the syringe to mix medications observing for cloudiness or crystallisation.	This could indicate incompatibility of medications and/or solution. Discard if this occurs. Contact the prescriber, SPCT and/or Hospital Pharmacy. In the instance of a change in prescribed medication, ensure a new cannula and subcutaneous infusion device is used.
7	Attach a completed syringe pump additive label to the Luer lock syringe, taking care not to obscure the numbering on the syringe or interfere with the mechanism of the infusion device (i.e. barrel clamp arm).	The scale on the Luer lock syringe needs to be visible during the infusion process, so that the volume in the syringe can be checked and recorded accurately.

	Action	Rationale
8	If a new infusion set is being used, connect the syringe to the infusion set and prime the line manually.	Syringes should be prepared immediately prior to use. The medications within the syringe are stable for 24 hours.
9	**T34 Feature recognition syringe loading:** 	1. Barrel clamp arm detects syringe size/width of barrel and secures the syringe. 2. Syringe collar/ear sensor detects secure loading of plunger. 3. Plunger sensor detects secure loading of syringe plunger.
10	**T34 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** - Step back a screen/stops infusion. **FF (Forward)** - Moves actuator forward. **Back** - Moves actuator back. **On/Off** - Switches pump on/off.
11	**Install the battery:** To fit or change a battery – remove battery cover and insert a new 9V alkaline battery into the pump (e.g. Duracell MN1604 or equivalent), note some brands can be slightly larger or smaller and may not fit the device properly. Ensure that the +ve/-ve contacts are aligned correctly.  Replace battery cover and switch on pump. 	To ensure the pump has a correctly fitted battery. Refer to the MHRA safety alert concerning battery connection issues. Refer to the MHRA safety alert regarding the need to check pumps before each use due to risk of under-infusion and no alarm.

	Action	Rationale
11 cont	Before placing the syringe into the pump 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. 	During pre-loading the actuator always returns to the start position of the last infused programme.
12	**Check the battery:** Press “INFO” key repeatedly until the battery level appears on screen, and then press “YES” to confirm. 	Replace the battery if less than 40% life remaining in the patient own home or residential home, and less than 10% life remaining in a HCS, hospice in-patient or nursing home setting. Average battery life starting at 100% is approximately 3-4 days depending on use.
13	If the actuator is not in the correct position to accommodate the syringe leave the barrel clamp arm down and press the “FF” or “BACK” buttons on the key pad to move the actuator. 	Forward movement of the actuator is limited for safety – so repeated presses of the “FF” key may be required. Backwards movement is not restricted.

	Action	Rationale
14	**Fit the syringe to the syringe pump**: T34 feature recognition syringe loading.  Lift the barrel clamp arm. **Ensure the line is not connected to the patient.**  Seat the filled syringe collar/ear and plunger so the back of the collar/ear sits against the back to the central slot (ensure correct placement).  Lower barrel clamp arm.	1. Barrel clamp arm. 2. Syringe collar/ear sensor. 3. Plunger sensor. To prevent inadvertent medication bolus dose being given. . The syringe collar/ear should be vertical. The syringe graphic on the screen ceases to flash when the syringe is correctly seated on all three points.
15	Confirm the syringe size and brand match the screen message. Press “YES” to confirm or scroll with up and down arrows to view other sizes of syringe, press “YES” to confirm.  	The McKinley T34 pump is configured to only use BD Plastipak syringes.

	Action	Rationale
16	**Setting the infusion parameters (New patient):** After syringe confirmation the first screen displayed is as indicated in the picture below;  The pump calculates and displays infusion rate, check it is correct then press “YES” to confirm.  The pump calculates and displays the deliverable volume, duration of infusion (24 hours), and infusion rate (mL/hour) check it is correct then press “YES” to confirm.  Pump screen prompts “START INFUSION”.  Check the line is connected to the syringe on the pump.	All McKinley T34 pumps used by HCS, FNHC and JHC are configured to infuse over 24 hours.
17	**Syringe when line is not being primed.** After the syringe confirmation, the first screen that appears is as indicated in the picture below;  As this is a new infusion press “NO FOR NEW PROGRAMME”. Connect line to syringe on the pump.	

	Action	Rationale
18	**Site selection should consider patient preference and care needs:** • chest wall (anterior, lateral to breast and below the breast in females) • abdominal wall, medial lateral, lower lateral, and ileal crest • anterior lateral aspects of the thigh • anteromedial aspects of the thigh • anterior aspects of upper arm Avoid broken/irradiated skin, oedema, bony prominences, and chest wall in cachectic patients.  	To promote comfort and concordance. Adequate subcutaneous tissue is required for absorption of prescribed medication. Medication absorption will be affected. Danger of causing pneumothorax.
19	Insert the needle of the infusion set bevel facing down at an angle of 30-45 degrees into a pinched skin fold and following the natural curves of the skin. (BD Saf-T-Intima points to practice) Use a transparent dressing to secure the line in place (e.g. Smith & Nephew IV3000 1-Hand). The cannula device should not usually remain in situ for any longer than 7 days. More frequent changes may be indicated following clinical assessment.	To prevent accidental dislodging of the line and allow the fluid to flow into the subcutaneous tissue. To allow visualisation of the infusion site and prevent the introduction of infection. To ensure that the cannula device does not exceed its maximum time of use and is changed prior to this if required.
20	**Start the Syringe pump:** Pump screen prompts “START INFUSION?”  Check the line connection to the pump and press “YES” to start infusion. When the pump is running the screen displays: **Top line**- Infusion duration time remaining. **Main line**- Infusion rate in mL/hour. **Bottom line**- Alternates between syringe size/brand and the message “<<<<pump delivering”. Green LED indicator flashes.	

	Action	Rationale
21	**Lock keypad:** With the pump 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.  **Unlock keypad:** Press and hold the “INFO” key, the bar will move from right (lock) to left (unlock) and a beep will be heard. The pump will still be displaying “START INFUSION”, press “YES”. Pump will display the following screen which will remain throughout the infusion. The Green LED indicator also flashes.  A breakthrough dose of medication may be required during this initial period.	To prevent tampering with the device. When keypad is locked the following buttons are still active “STOP/NO” “START/YES” and “INFO”. It can take 4-6 hours for drugs to reach therapeutic blood plasma.
22	Place pump in locked box.  Place in appropriate carrying pouch. 	Each area has been supplied with universal keys. Replacement keys if required are the responsibility of individual teams and staff should contact their line managers. To protect medication from light

	Action	Rationale
23	**Complete documentation:** • prescription and monitoring chart • Controlled Drug register (in-patient / care home settings) or medication stock sheets (patient own home) • date and time of administration • name and dosage of medications • record location of infusion site when the syringe is set up and when line is changed	As per HCS, FNHC, nursing home and JHC policies for the administration of medications. Reduces discomfort to patient when monitoring
24	Do not place the syringe pump more than 75cm above the infusion site.	Siphonage of medication could occur. This is good practice, but the infusion device does have an anti-siphonage device.
25	**Assess and address the education needs of patient/family/carer.** Advise about: • inform them about the name of syringe pump • how the syringe pump works • not putting pump 75cm above the infusion site • checking the pump whilst in use • checking the site and reporting if it becomes red/painful • reporting effect of medications/using medication for breakthrough symptoms • not to get syringe pump wet • syringe pump battery life, and action required if it is low	Provide the patient/family/carer with a syringe pump patient information leaflet to improve their understanding and likely concordance.
26	**How to stop the infusion and prime a new line after the infusion has started:** • press “STOP” and disable the keypad lock • disconnect existing line from syringe and remove line from patient • remove syringe from the pump. Attach and manually prime new line • resize the actuator and place the syringe in the pump • confirm size and make of syringe • insert new line/cannula to new site • press “YES” to resume previous programme; the screen will display the volume, duration and rate • press “YES” to confirm and the screen will display “START INFUSION” • press “YES” to confirm	**DO NOT SWITCH THE PUMP OFF** The time remaining for the infusion will decrease to compensate for the solution that was used to prime the second line. The flow rate will remain the same.

	Action	Rationale
27	**How to change the battery when an infusion is running:** • with the infusion still running, remove old battery from the pump and replace with a new one • switch the pump back on using the "ON/OFF" button • confirm size and make of syringe • press "YES" to resume infusion; the screen will display the volume, duration and rate • press "YES" to confirm and the screen will display "START INFUSION" • press "YES" to confirm	
28	**Stopping the infusion and removing the syringe pump:** When the infusion is nearing 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 is empty, the pump will stop automatically and an alarm will sound. 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. If the infusion is to be stopped before the syringe is empty, disconnect the pump from the patient before removing the syringe from the pump. If the syringe contains Controlled Drugs: **HCS** - destroy the medication in the presence of a qualified witness (e.g. nurse, pharmacist). The destruction should be recorded in the relevant section of the Syringe pump prescription chart. **FNHC & JHC** - follow local policy for the destruction of medication/controlled drugs. The destruction should be recorded in the relevant section of the Syringe Pump prescription chart. In all care settings a suitably absorbent material (e.g. swabs) should be placed in the Sharps Bin and the medication disposed of onto this. Alternatively a Drug Denaturing Kit (e.g. 'DOOP' – Destruction of old pharmaceuticals') can be used if available. Decontaminate the pump per section 3.6.3. Dry and replace in box if no longer required for use.	A syringe that is not empty should **never** be taken off the pump while connected to the patient, due to the risk of siphonage of the medication. As per Medicines Policy (HCS). As per Medicines Policy (FNHC & JHC). It is acknowledged that in some primary care settings (e.g. patient homes) often only one registered nurse will be present to dispose of the medications. However where a second healthcare professional is present (e.g. Healthcare Assistant) it is permissible for them to act as a witness for the disposal.

	Action	Rationale
29	**How to temporarily stop the infusion:** Press "STOP", disable the keypad lock and press and hold the "ON/OFF" button. Do NOT remove the syringe from pump. **Resuming the Infusion:** Check that the prescription, syringe label and patient details match, to ensure that this is the correct syringe for the patient. Reconnect the line to the syringe on the pump if it has been disconnected. 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 confirm. The screen will display: "Remaining volume, duration and rate of infusion". Press "YES" to confirm. The screen will display:  Press "YES" to confirm. The screen will display "START INFUSION". Press "YES" to confirm.	This should not be used for priming a second line. If you press "NO" the pump interprets this as a completely new 24 hour period, and the remaining contents of the syringe will 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 then prepare and set up a new syringe.
30	**What to do if the patient dies when the Syringe pump is running:** Stop the pump. 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 pump in place and contact your line manager for advice. In a straightforward situation, remove the syringe from the pump, destroy the contents. Record the signature(s) of person(s) destroying the remaining solution, on the relevant section of the syringe pump prescription chart. Remove the battery from the syringe pump. Remove cannula as soon as possible.	

Appendix 5: Trouble shooting guide

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

Common problems:

Fault	Possible Cause	Action
The pump will not start	1. No battery present 2. Battery inserted incorrectly 3. Battery is depleted or very low 4. Pump is faulty	1. Fit a battery 2. Re-align battery terminals 3. Fit a new battery 4. Service required
Cannula sites require frequent changes	1. Irritation from prescribed medication 2. Cannula insertion technique	1. Use a larger syringe and more dilute drug solution. Seek specialist advice on diluent and potential alternatives for prescribing. 2. User error, seek appropriate training
The pump has stopped before emptying syringe	1. Exhausted battery 2. Faulty pump	1. Fit new battery, turn pump on, confirm syringe size and brand; then resume infusion 2. Return pump for service

Other Problems

Syringe pump running fast (i.e. running more than 1 hour ahead of expected time):

- if major over-infusion, stop infusion, check patient condition, seek medical advice
- report as a medication incident
- check for disconnection of line or cannula
- check the correct syringe brand or size has been selected
- check syringe securely attached to pump
- check no air present in syringe (solution could siphon in if the barrel is cracked)
- change the entire syringe pump for a new one and send original for servicing
- check that the pump has not been placed above the height of the patient (siphonage could have occurred)

Syringe pump running slow (i.e. running more than 1 hour behind expected time):

- check the syringe pump light is GREEN and flashing
- check the battery level
- check the correct (Luer lock) syringe brand or size has been selected
- check syringe is inserted correctly into syringe pump (actuator is still against plunger)
- ascertain if syringe pump has been stopped and restarted for any reason
- check contents of syringe and line: is there any evidence of crystallisation or kinking of tubing?
- check cannula site: is this red, hard, lumpy or 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
- if syringe pump continues to run slowly, change entire pump and send for servicing
- check rate of infusion at regular intervals

Precipitation, cloudiness or colour change in syringe contents or line:

Stop infusion and inform prescriber. Issues to check and discuss with prescriber include:

- compatibility information
- diluent (seek specialist advice when Sodium Chloride 0.9% may be appropriate)
- dilute to a larger volume
- consider separating into two syringe pumps, or give one drug as a subcutaneous bolus injection
- keep away from sunlight and heat
- advise patient on keeping syringe pump away from hot pack/heat pad, or hot water bottle
- commence new infusion at a different site with new cannula and line

Alarm conditions

The alarms will sound for the following reasons:

Problem	Alarm type	Possible cause	Action
Occlusion or Syringe empty	Audible and visual alarm	1. Patient cannula/line blocked, kinked 2. Occlusion 3. Infusion has finished	1. Remove occlusion and restart 2. Change cannula 3. End of program, switch pump off
Syringe displaced	Audible and visual alarm (Intermittent beep)	Syringe has been removed/displaced	Check and confirm syringe seated correctly and resume infusion. Syringe flanges need to be in the vertical position at all times.
Pump paused too long	Audible and visual alarm (Intermittent beep)	Pump left or no key presses detected for 2 minutes (in stopped/ programme mode)	Start infusion, continue programming or switch off
Near end	Audible and visual alarm (Intermittent beep)	15 minutes from end of infusion	Prepare to change syringe or switch off
End program	Audible and visual alarm (Intermittent beep)	Infusion complete	Pump will alarm. Press “YES" to confirm end of program and “OFF” to switch pump off
Low battery	Visual alarm	Battery almost depleted (30 minutes left)	Prepare to change battery
End battery	Visual alarm	Battery depleted, infusion stops	Change battery and resume infusion

You can also refer to the quick user guide for further information.

Appendix 6: Contact details

In the first instance contact the prescriber and if you need any further information contact one of the following:

Clinical Team	Contact details
Specialist Palliative Care Team (SPCT)	Tel: 01534 876555 Fax: 01534 720292
On-call Palliative Care Consultant (University Hospital Southampton)	**HCS*** Tel: 01534 442000
	Primary care (via SPCT) Tel: 01534 876555
HCS Medicines Information	Tel: 01534 442628
HCS ward pharmacist	Via bleep

* Hospital Drs (Clinical Fellow or above) can contact an on-call Palliative Care Consultant off island, outside standard work hours (Mon-Fri 09.00-17.00) via HCS switchboard.