Palliative care: Syringe pump policy (CME T34 3rd ed. & BD Bodyguard T syringe pumps)

March 2023

DOCUMENT PROFILE	
Document Registration	HSS-PP-CG-0223-05
Document Purpose	Policy
Short Title	Palliative care: Syringe pump policy
Authors	Adam Leversuch (Specialist Palliative Care Team, Pharmacist) Dr James Grose (Palliative Care Consultant) Kim Hancock (Specialist Palliative Care Team, Team Leader)
Publication Date	March 2023
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 CME T34 3rd edition & BD Bodyguard T syringe pumps
Linked Policies	Anticipatory prescribing policy Medicines policy Non-medical prescribing policy Palliative care: Symptom management guidelines
Approval Route	HCS Medicines Governance Committee FNHC Policies & Procedures Group PCB Committee CF Committee JHC Clinical Governance Group
Review Date	March 2026
Contact Details	a.leversuch@health.gov.je j.grose@health.gov.je KimHancock@jerseyhospicecare.com

CONTENTS LIST:

1. Introduction **Page 3**
1.1 Rationale Page 3
1.2 Scope Page 3
1.3 Principles Page 3

2. Policy purpose **Page 4**

3. Procedure **Page 4**
3.1 Training Page 4
3.2 Prescribing Page 5
3.3 Set-up procedure Page 6
3.4 Monitoring the infusion Page 11
3.5 Safety and risk management Page 12

4. Development and consultation process **Page 13**
4.1 Consultation schedule Page 13
4.2 Ratification schedule Page 13

5. Reference documents **Page 14**

6. Bibliography **Page 14**

7. Glossary of terms **Page 15**

8. Implementation plan **Page 15**

9. Appendices **Page 16**

Appendix 1: Comparison of the CME T34 3rd edition and BD Bodyguard T syringe pumps Page 16

Appendix 2: Competency-based assessment tool Page 18

Appendix 3: Syringe pump drug compatibility tables Page 20

Appendix 4: Set-up procedure Page 24

Appendix 5: Trouble shooting guide Page 34

Appendix 6: Contact details Page 37

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.

Syringe pumps in use within Jersey

There are two syringe pumps currently recommended for use in Jersey:

- **CME T34 3rd edition** (HCS)
- **BD Bodyguard T** (FNHC, JHC and care homes)

For the purpose of this policy the term 'syringe pump' will be used to describe both the **CME T34 3rd edition** and **BD Bodyguard T** syringe pumps.

Refer to appendix 1 for a comparison of these two syringe pumps with the CME T34 2nd edition syringe pump, which is being removed from practice in Jersey.

These are small, lightweight, battery powered ambulatory syringe pumps 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. It allows relatively constant levels of medication to be administered, thus avoiding troughs and peaks 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 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 focuses on the safe use of the CME T34 3rd edition and BD Bodyguard T syringe pumps in palliative care, via the subcutaneous (SC) route.

It is recognised that these syringe pumps may be used to administer drugs in other circumstances, including via the intravenous route in paediatric palliative care patients. This is outside the scope of this policy, but where appropriate a separate policy / standard operating procedure can be developed to supplement this policy and support this practice.

1.3 Principles

This policy was produced to assist registered professionals (e.g. doctors, nurses and pharmacists) involved with prescribing, administering and monitoring drugs via an ambulatory syringe pump. It will also 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 palliative care patients across Jersey, in the use of the CME T34 3rd edition and BD Bodyguard T syringe pumps.

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.

Registered managers (care homes), ward managers and team leaders must 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 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 2).

The competency based assessment allows for this supervised training to be undertaken on up to three occasions. The number of times the assessment tool needs to be completed will depend on the individual practitioner's confidence and competence with the syringe pump. If after three attempts the practitioner is still not deemed to be competent by the supervising nurse, then a plan for supporting their development should be agreed with their line manager.

3.2 Prescribing

3.2.1 Indications for use

Syringe pumps 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)

3.2.2 Prescription

For information on anticipatory prescribing and the use of syringe pumps, refer to:

- Adults - Palliative care guidelines (Jersey)
- Children - Together for Short Lives

The adult guidelines include 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 outlined in the palliative care guidelines
- use of syringe pumps must be authorised by HCS pharmacy (see algorithm)
- 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, using the island wide syringe pump prescription chart. 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 required volume on chart)
- prescriber signature, name, designation and contact details

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 Preparation

The staff preparing the medications should check the following:

- prescription is completed correctly (per section 3.2.2)
- compatibility of medications prescribed (appendix 3)
- diluent
- infusion volume required
- size of syringe required

3.3.2 Administration

Subcutaneous (SC) medication administration

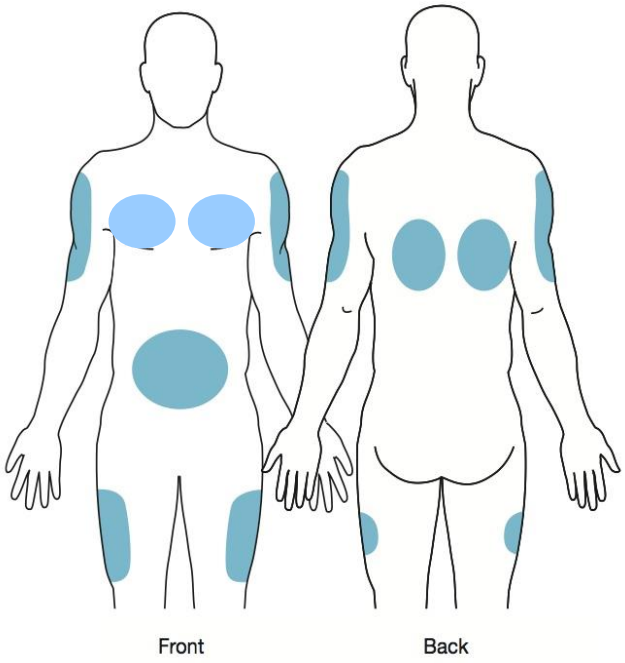
Practitioners administering a medication via the SC route should be aware that:

- absorption may be slower than the intramuscular (IM) route
- absorption will be severely limited in patients who are hypovolaemic or oedematous
- for 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:



Site to be avoided	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

3.3.3 Equipment required

- CME T34 3rd edition / BD Bodyguard T syringe pump
- 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)
- transparent surgical dressing (e.g. IV 3000 or equivalent)
- syringes and (filter) needles to prepare medication
- prescribed medications and diluents
- sharps bin
- palliative care syringe pump chart
- medications additive label
- clean tray or surface for preparation

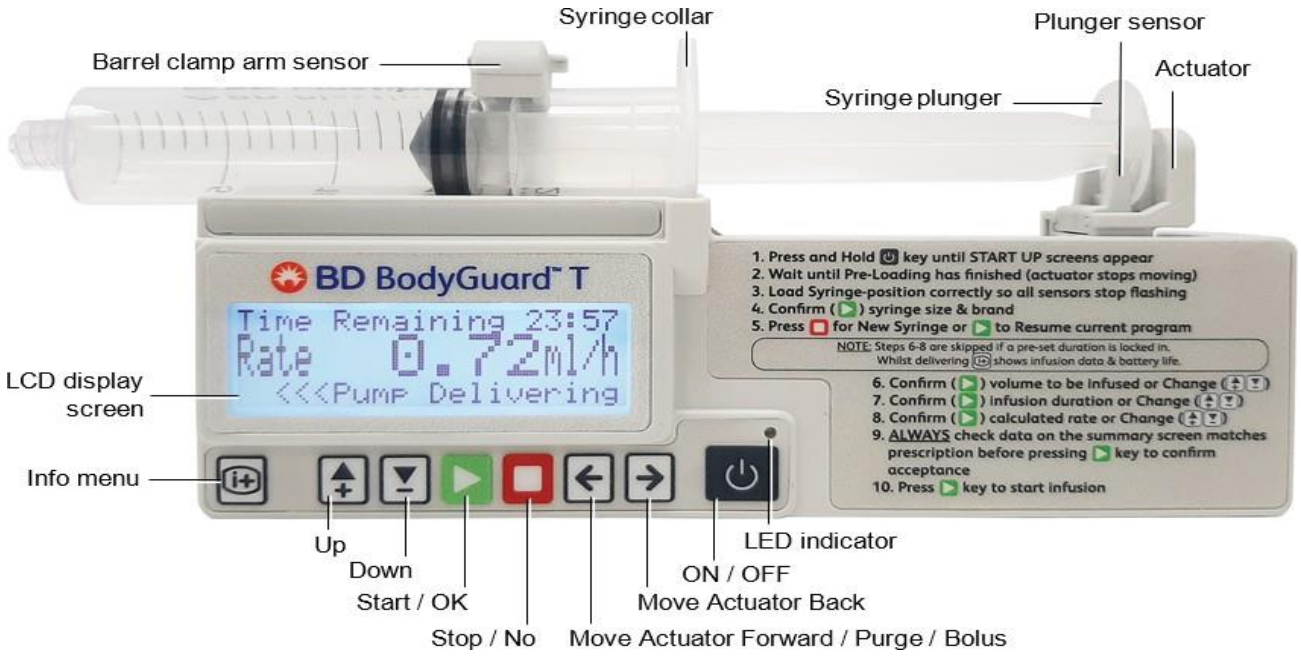
3.3.4 Labelling the syringe

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:

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

3.3.5 Component parts of CME T34 3rd edition & BD Bodyguard T syringe pumps

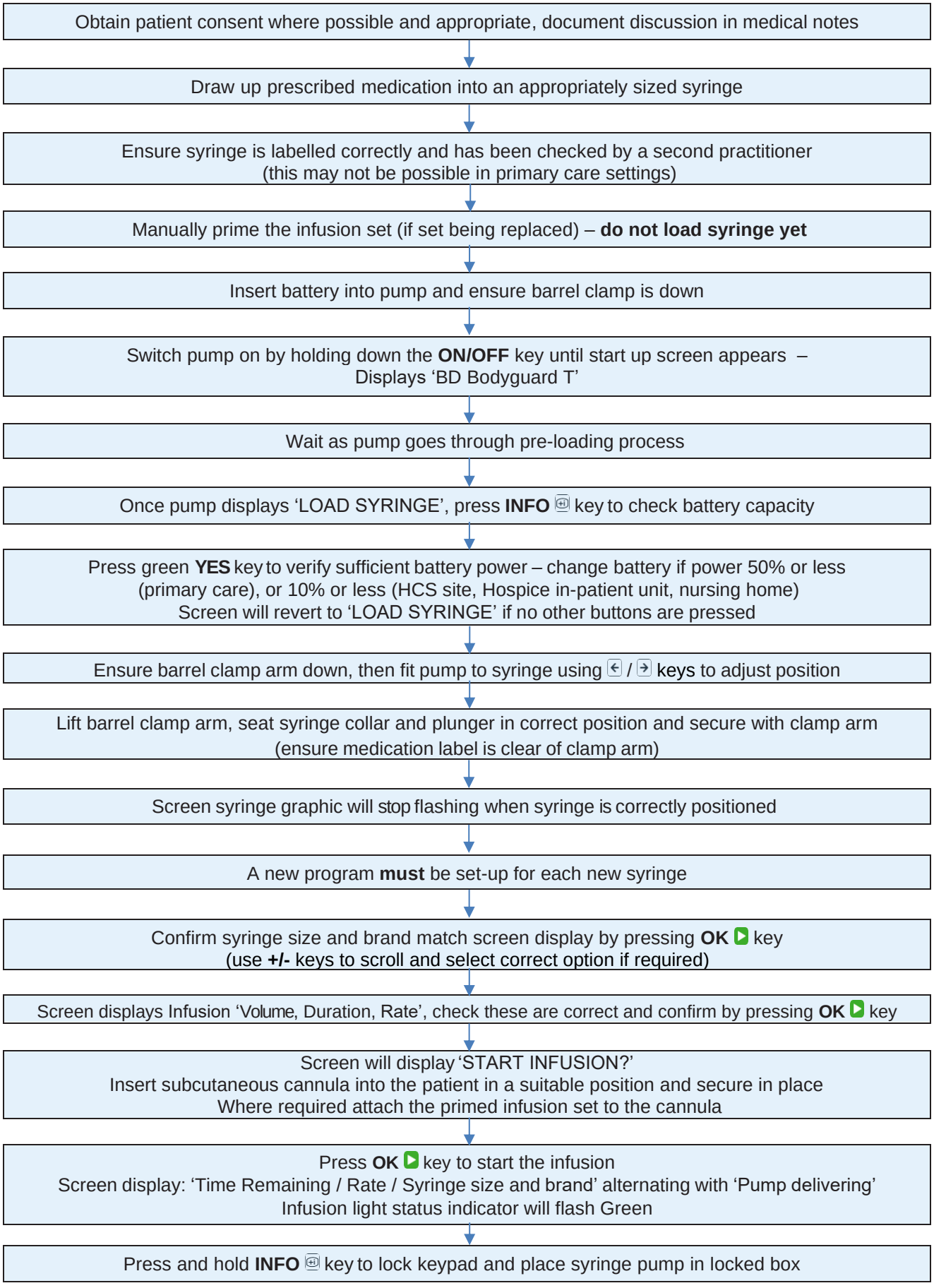
The BD Bodyguard T syringe pump is shown below. The CME T34 3rd edition syringe pump is almost identical, differences in the key pads are stated in Appendix 1.



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

3.3.6 Quick set-up guide

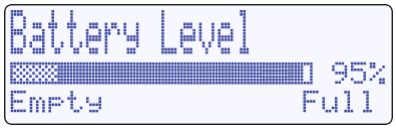
The below flow chart is for practitioners competent in the use of the syringe pumps, alternatively refer to the quick user guide. A more detailed guide is available (appendix 4).



3.4 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:

- **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, residential homes)

Action	Rationale
Assess the patient's 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 monitoring section of the palliative care syringe pump chart	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) • damage to the syringe barrel or tip • blockage of infusion line • significant discrepancies in the actual and expected infusion rate	See Trouble shooting guide (appendix 5) Presence of large amounts of air may indicate cracked syringe – change syringe.

3.5 Safety and risk management

3.5.1 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, nurses and pharmacists.

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

3.5.2 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.

3.5.3 Infection prevention and control

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

1st step: Universal disinfectant wipe (e.g. Clinell®), **or**
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)

3.5.4 Incident reporting

Examples of incidents which should be reported for syringe pumps 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.

If a registered healthcare professional is involved in an incident linked to the use of a syringe pump, their competency and any training requirements should be reviewed with their line manager.

4. DEVELOPMENT AND CONSULTATION PROCESS

4.1 Consultation schedule

Name and Title of Individual	Date Consulted
Dr James Grose (Palliative Care Consultant, HCS)	January 2023
Dr Nicola Bailhache (Palliative Care Associate Specialist, HCS)	January 2023
Dr Debbie Heathfield (Palliative Care Staff Grade, JHC)	January 2023
Hilary Hopkins (Director Palliative Care Services, JHC)	January 2023
Michelle Nelson (Deputy Director Palliative Care Services, JHC)	January 2023
Lorraine Dyer (SPCT Clinical Nurse Specialist, JHC)	January 2023
Julie Jones (SPCT Associate Clinical Nurse Specialist, JHC)	January 2023
Karen Eloury (Ward Manager In-Patient Unit, JHC)	January 2023
Jordan Black (Sister In-Patient Unit, JHC)	January 2023
Yasmin Butler (Senior Staff Nurse In-Patient Unit, JHC)	January 2023
Ellen Bourke (Senior Staff Nurse In-Patient Unit, JHC)	January 2023
Charmaine Dwyer (Senior Nurse Children & Young People's Team, JHC)	January 2023
Geoff Benning (Education Manager, JHC)	January 2023
Gail Edwards (Nurse Champion, JHC)	January 2023
Judy Le Marquand (Practice Development Nurse, JHC)	January 2023
Tia Hall (Operational Lead Adult Services, FNHC)	January 2023
Elspeth Snowie (Clinical Effectiveness Facilitator, FNHC)	January 2023
Clare Stewart (Operational/Clinical Lead Out of Hospital Services, FNHC)	January 2023
Claire White (Head of Quality, Governance and Care, FNHC)	January 2023
Polly Axford (Senior Nurse Children's Community Nursing Team, FNHC)	January 2023
Jessie Marshall (Associate Chief Nurse, HCS)	January 2023
Tim Hill (Practice Development Sister, HCS)	January 2023
Julie Le Long (Senior Staff Nurse, HCS)	January 2023
Sebastian McNeilly (Lead Pharmacist Medicines Governance & Safety, HCS)	January 2023
Cheryl Kenealy (Chair of Jersey Care Federation)	January 2023

4.2 Ratification schedule

Name of Committee / Group	Date of Committee / Group meeting
CF Committee	March 2023
HCS Medicines Governance Committee	March 2023
PCB Committee	March 2023
FNHC Policies & Procedures Group	February 2023
JHC Clinical Governance Group	March 2023

5. REFERENCE DOCUMENTS

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

BD BodyGuard™ T Syringe Pump: Directions for use. Ref: DFU999-103BDEN Rev.03

CME T34™ Syringe Pump (3rd Edition): Directions for use. Ref: DFU999-103EN Rev.04

6. BIBLIOGRAPHY

Gold Standards Framework [GSF] (2021). The Gold Standards Framework. Available at: https://www.goldstandardsframework.org.uk (Accessed 20th January 2023)

Medicines Complete (2023). British National Formulary. Available at: https://www.medicinescomplete.com (Accessed 20th January 2023)

National Institute for Health and Care Excellence. (2015) Clinical Guideline 31: Care of dying adults in the last days of life. London: NICE.

Palliative Care Adult Network Guidelines (2023). Palliative Care Adult Network Guidelines. Available at: https://book.pallcare.info/index.php (Accessed 20th January 2023)

Scottish Palliative Care Guidelines (2023). Scottish Palliative Care Guidelines. Available at: https://www.palliativecareguidelines.scot.nhs.uk (Accessed 20th January 2023)

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
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
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

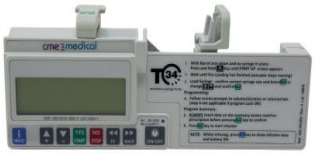
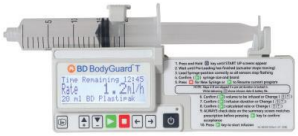
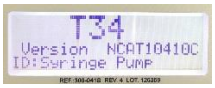
A summary of how this document will be implemented.

Action	Responsible Officer	Timeframe
E-mail to all clinical staff	Communications Officer (HCS) Primary Care Governance (HCS) Information Governance (FNHC) Specialist Palliative Care Team (JHC) CF Secretary / Care Home Managers (CF)	At time of policy launch
Policy to be uploaded on each organisations intranet / internet (as appropriate)	Information Governance (HCS) PCB Lead (PCB) Information Governance (FNHC) SPCT / Governance Facilitator (JHC) CF Chair/Secretary (CF)	At time of policy launch

9. APPENDICES

Appendix 1: Comparison of the CME T34 3rd edition and BD Bodyguard T syringe pumps

The below table compares the CME T34 2nd Edition syringe pump (previously used in Jersey), with the new CME T34 3rd Edition and BD BodyGuard T syringe pumps.

CME T34 2nd Edition (retired)	**CME T34 3rd Edition (active)**	**BD BodyGuard T (active)**
Removed from use in Jersey	Used by HCS	Used by FNHC, JHC and care homes
 Text to key pad  May have battery sticker and/or sunlight sticker on rear case	 Symbols to key pad. No change to key pad colours  Drainage hole	 Symbols to key pad. Change to key pad colours: black symbols on white background for info, +/- and ←/→ keys  Drainage hole
Splash/Home Screen 	Splash/Home Screen  Same funtionality as a BG T	Splash/Home screen 
Able to prime/load or load/prime	Prime/load only	Prime/load only
Able to purge	Able to purge	Able to purge
Should have sponge within battery housing	Update to battery housing Sponge no longer required	Update to battery housing Sponge no longer required
Battery 9V 6LR61 code	Battery 9V 6LR61 code	Battery 9V 6LR61 code
Battery life: 3-5 days	**Battery life**: 50hrs @1ml/h	**Battery life**: 50hrs @ 1ml/h
Internal 3V battery (replaceable)	Internal 3V battery (rechargeable)	Internal 3V battery (rechargeable)
No date and time update required by end user *	May need to update date and time via the prompt 'Date and Time incorrect' press **<** to reset	May need to update date and time via the prompt 'Date and Time incorrect' press **<** to reset
Single tone for key pad press. Alerts and Alarms	Enhancements made to key press tone, High and low priority alarms	Enhancements made to key press tone, High and low priority alarms
Key pad LED colours; red and green	Key pad LED colours; red, green and yellow	Key pad LED colours; red, green and yellow
Periodic screen message and an audible beep every 2-3 mins for alerts	Solid Yellow, low priority LED alarm for; pump paused, low battery and near end	Solid Yellow, low priority LED alarm for; pump paused, low battery and near end
Not applicable	New alarm if battery is removed when pump in operation	New alarm if battery is removed when pump in operation

CME T34 2nd Edition (retired)	**CME T34 3rd Edition (active)**	**BD BodyGuard T (active)**
Green LED infusion indicator: Flashes every 32 seconds Configurable	Green LED infusion indicator: Flashes every 32 seconds Not configurable	Green LED infusion indicator: Flashes every 32 seconds Not configurable
Could reprime a line if required and resume the infusion.	No longer able to do this as if the syringe is removed and the actuator is moved during an infusion there is now no option to resume and the pump will recalculate a new 24hr. program	No longer able to do this as if the syringe is removed and the actuator is moved during an infusion there is now no option to resume and the pump will recalculate a new 24hr. program
Near End of Infusion alert 15 minutes	Near End of Infusion alert 15 minutes	Near End of Infusion alert 15 minutes
Low battery alert Approx 30 minutes	Low battery alert Approx 30 minutes	Low battery alert Approx 30 minutes
Pump is sunlight sensitive cover if in bright sunshine	Sunlight sensitivity of pump resolved (be aware of drugs)	Sunlight sensitivity of pump resolved (be aware of drugs)
Weight: 210g	Weight: 230g	Weight: 230g

Appendix 2: Competency-based assessment tool for CME T34 3rd edition and BD Bodyguard T syringe pumps

Scenario:

You are required to administer a drug infusion using a 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 / 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 3: 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%)

Indicators of incompatibility

Incompatibility may be indicated by cloudiness, discolouration or visible crystals. Although a clear solution does not exclude incompatibility.

Other features include:

- Site reactions – can be direct reaction to a medication, or a feature of incompatibility
- Unexpected worsening of symptoms – for example a new drug is added for a second symptom, and the initial (previously well controlled) symptom unexpectantly recurs
- Pump ‘line occlusion’ alarm repeatedly sounding

If incompatibility is suspected:

- Stop the infusion
- Contact the prescriber
- Consider switching medications used, or splitting combination into two separate syringe pumps (if the previous combination was stable, take out the drug most recently added)
- Consider whether medications with a longer half-life (e.g. Haloperidol, Dexamethasone, Levomepromazine) could be given as separate once / twice daily SC injection
- If needed advice can be sought from SPCT or hospital pharmacy
- Complete an incident report

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

FIGURES STATED IN THE TABLES ARE NOT CLINICAL DOSES TO PRESCRIBE

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
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 2. Compatibility table for OXYCODONE: 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

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

FIGURES STATED IN THE TABLES ARE NOT CLINICAL DOSES TO PRESCRIBE

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

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

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

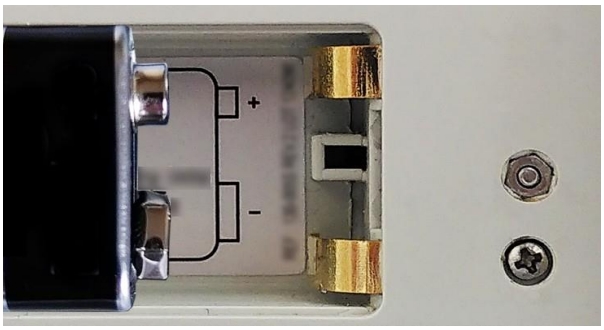
FIGURES STATED IN THE TABLES ARE NOT CLINICAL DOSES TO PRESCRIBE

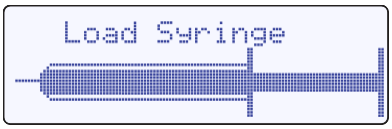
Table 4. Compatibility table for OXYCODONE: THREE drugs in water for injections

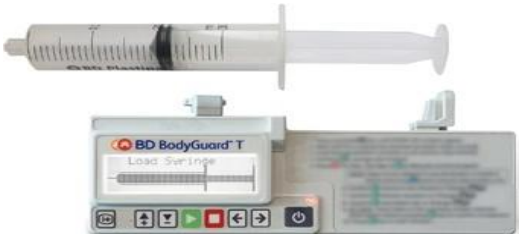
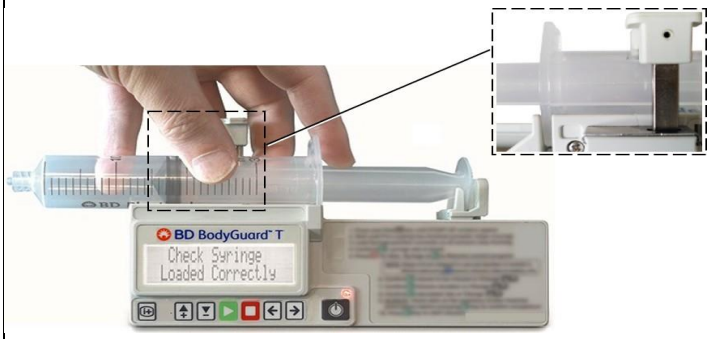
Drug combinations	MAXIMUM CONCENTRATIONS of THREE drug combinations that are physically stable for 24 hours	
	17mL in 20mL syringe	22mL in 30mL syringe
Oxycodone Cyclizine Glycopyrronium	90mg 150mg 900 micrograms	120 mg 150 mg 1.2mg
Oxycodone Cyclizine Haloperidol	100mg 150mg 8mg	130 mg 150 mg 10 mg
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

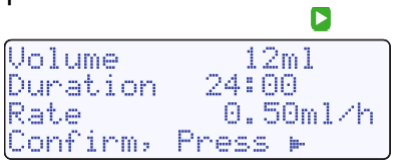
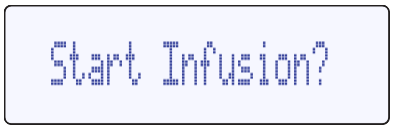
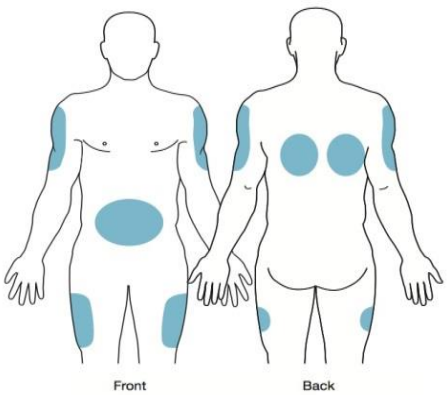
Appendix 4: Set-up procedure

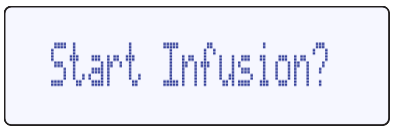
	Action	Rationale
1	Discuss the use of the syringe pump and explain the procedure to the patient, and if appropriate the family. Document the outcome of this discussion in patient notes. Breakthrough medication will be required to control symptoms in addition to the syringe pump medications, and until 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** 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, e.g. when giving very large drug doses and thus medication volumes. BD recommend a **maximum volume** of (for BD Plastipak syringes): • 20mL syringe - fill to 17.9mL • 30mL syringe - fill to 23.1mL 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 (for HCS staff). In the instance of a change in prescribed medication, ensure a new cannula and subcutaneous infusion device is used.

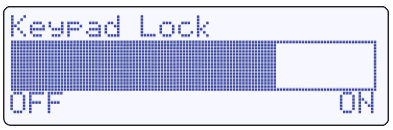
	Action	Rationale
7	Attach a completed syringe pump additive label to the Luer lock syringe, taking care not to obscure the numbering on the syringe or interfere with the mechanism of the infusion device (i.e. barrel clamp arm).	The scale on the Luer lock syringe needs to be visible during the infusion process, so that the volume in the syringe can be checked and recorded accurately.
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	**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, and the need to check pumps before each use due to risk of under-infusion and no alarm. **All care settings using syringe pumps**: Staff should ensure that there are suitable batteries with sufficient charge available at all times. **Community settings**: Staff should transport batteries in a suitable container, out of direct sunlight.

	Action	Rationale
10	Turning on the pump and performing pre-loading. When you turn on the pump with the barrel arm clamp down, the pump performs a pre-loading sequence and automatically moves the actuator. With no syringe in place and the barrel arm clamp down, press and hold the ⏻ key to turn the pump on. The screen displays the following: **Pump identification**  **Advisory notice**  **Pump current settings**  **Pre-loading complete** 	Pre-loading is a simultaneous sequence of information that appears on the display screen and automatic actuator movements. During pre-loading: • the syringe performs a self-test • the display screen displays important information • the actuator moves forwards / backwards automatically Pre-loading deletes any program in the pump memory, and at the end of the pre-loading sequence the actuator returns to the start position of the last infusion.
11	**Check the battery:** Press ⓘ key and the info menu appears and battery level is selected. Press ▶ to display battery level, then press ▶ twice to exit the info menu or wait a few seconds.	Replace the battery if: • less than 50% life remaining in the patient own home/residential home • less than 10% life remaining in a HCS, hospice in-patient or nursing home setting Average battery life starting at 100% is approximately 50 hours at 1mL/hr.

	Action	Rationale
12	To load the syringe ensure the barrel arm clamp is down. Place the prepared syringe above the pump to visually align the syringe collar to the collar sensor. Use the ← and → keys to move the actuator if required to the correct position for placing the syringe collar and the syringe plunger into the matching sensor areas of the pump.  	Forward movement of the actuator is limited for safety, so repeated presses may be required. Backwards movement is not restricted.
	Lift the barrel arm clamp fully and turn 90 degrees (either way). **Ensure the line is not connected to the patient.**  	To prevent inadvertent medication bolus dose being given.
	Load the syringe, it should click into position. Turn and lower the barrel clamp arm onto the syringe.  	The syringe graphic on the screen ceases to flash when the syringe is correctly seated on all three points.
13	Confirm the syringe size and brand match the screen message. Press ▶ to confirm or scroll with up and down arrows to view other sizes of syringe, press ▶ to confirm.	

	Action	Rationale
14	**Setting the infusion parameters (new patient):** The pump calculates and displays the deliverable volume, duration of infusion (24 hours), and infusion rate (mL/hour) check it is correct then press ▶ to confirm.  Pump screen prompts “START INFUSION”.  Check line is connected to the syringe on pump.	All syringe pumps used by HCS, FNHC and JHC are configured to infuse over 24 hours.
15	**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 ■ FOR NEW PROGRAMME.	
16	**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 (danger of causing pneumothorax). . 	To promote comfort and concordance. Adequate subcutaneous tissue is required for absorption of prescribed medication. Medication absorption will be affected.

	Action	Rationale
17	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.
18	**Start the syringe pump:** Pump screen prompts “START INFUSION?”  Check the line connection to the pump and press ▶ 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 intermittently.	

	Action	Rationale
19	**Lock keypad:** With the pump infusing press and hold the 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 key, the bar will move from right (lock) to left (unlock) and a beep will be heard. 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 and . It can take 4-6 hours for drugs to reach therapeutic blood plasma.
20	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 manager. To protect medication from light
21	**Complete documentation:** • syringe pump 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
22	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.

	Action	Rationale
23	**Assess and address the education needs of patient / family / carer.** Advise 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 getting the syringe pump wet • the 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. It is recommended that clinical teams hold pre-printed hard copies of this leaflet, so that it will be available to be given to patient / family / carers as required.
24	**How to stop the infusion and prime a new line after the infusion has started:** • press ■ 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 ▶ to resume previous programme; the screen will display the volume, duration and rate • press ▶ to confirm and the screen will display "START INFUSION" • press ▶ 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.
25	**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 ⏻ button • confirm size and make of syringe • press ▶ to resume infusion; the screen will display the volume, duration and rate • press ▶ to confirm and the screen will display "START INFUSION" • press ▶ to confirm	

	Action	Rationale
26	**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 ▶ to confirm the end of the infusion, disable the keypad lock and press and hold the ⏻ 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:	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.
	HCS - destroy the medication in the presence of a witness. The destruction should be recorded in the relevant section of the Syringe pump chart.	As per Medicines policy (HCS).
	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 chart.	As per Medicines policy (FNHC & JHC).
	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 3.5.3. Dry syringe pump and replace in box if no longer required for use.	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
27	**How to temporarily stop the infusion:** Press ■, disable the keypad lock and press and hold the ⏻ 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 ⏻ button until a beep is heard. The screen will request confirmation of syringe size and syringe brand. Press ▶ to confirm. The screen will display: "Remaining volume, duration and rate of infusion". Press ▶ to confirm. The screen will display:  Press ▶ to confirm. The screen will display "START INFUSION". Press ▶ to confirm.	This should not be used for priming a second line. If you press ■ 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 ■ has been pressed in error, discard the remainder of the syringe contents then prepare and set up a new syringe.
28	**What to do if the patient dies when the syringe pump is running:** Stop the pump. Press the ⊕ 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. If there are no concerns about the circumstances of the patient death, remove the syringe from the pump, destroy the contents. Record the signature of person(s) destroying the remaining solution, on the relevant section of the syringe pump chart. Remove the battery from the syringe pump. Remove cannula as soon as possible.	

Appendix 5: Trouble shooting guide

CME T34 3rd edition and BD Bodyguard T syringe pumps 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)

Actions:

- 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)
- check that the pump has not been placed above the height of the patient (siphonage could have occurred)
- change the entire syringe pump for a new one and send original for servicing

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

Actions:

- 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
- report as a medication incident

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
- seek advice from SPCT, or hospital pharmacy (for HCS staff) as appropriate
- report as a medication incident

Alarm conditions

The alarms will sound for the following reasons:

Problem	Alarm type	Possible cause	Action
Occlusion or Syringe empty	**High**-priority alarm requires immediate user response[1]	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	**High**-priority alarm requires immediate user response[1]	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.
End battery	**High**-priority alarm requires immediate user response[1]	Battery depleted; infusion stops	Change battery and resume infusion
End of infusion	**High**-priority alarm requires immediate user response[1]	Infusion complete	Pump will alarm. Press ▶ to confirm end of program and ⏻ to switch pump off
Pump paused too long	**Low** priority alarm requires user awareness[2]	Pump left or no key presses detected for 2 minutes (in stopped/ programme mode)	Start infusion, continue programming or switch off
Near end	**Low** priority alarm requires user awareness[2]	15 minutes from end of infusion	Prepare to change syringe or switch off
Low battery	**Low** priority alarm requires user awareness[2]	Battery almost depleted (30 minutes left)	Prepare to change battery

[1] **High priority** 5 tones, red flashing visual operation LED (flashes red)

[2] **Low priority** 3 tones, yellow solid visual operation LED (solid yellow, **not** flashing)

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 doctors (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.