Adult Palliative and Supportive Care: Ambulatory Syringe Pump Policy including Symptom Management Guidelines

[CME McKinley T34 (ml/hour)]

March 2016

HSS-PP-CG-0223-02

DOCUMENT PROFILE

Document Registration	HSS-PP-CG-0223-02
Document Purpose	Policy (including Guideline)
Short Title	Adult Palliative and Supportive Care: Ambulatory Syringe Pump Policy (including Symptom Management Guidelines)
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Circulation List	All HSSD, FNHC, PCB & JHC areas
Description	A policy and procedural guideline for the use of the McKinley Ambulatory Syringe Pump
Linked Policies	Consent Policy Guidelines Disposal of Sharps Policy Health and Safety Policy Incident Accident and Near Miss Reporting and Management Policy Incident Accident and Near Miss Reporting and Management Procedure Infection Prevention and Control Policies Medical Devices and Equipment Management Policy Medical Devices Procedure Medicines Policy Mental Capacity Policy Policy for Management of Serious or Untoward Incidents Safe Handling Policy
Approval Route	HSSD Medicines Governance FNHC Operational Governance PCB Governance Group JHC Clinical Effectiveness
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1. INTRODUCTION

1.1 Rationale

Palliative and Supportive Care is defined as:

"an approach that improves the quality of life of patients and their families facing the problems associated with life-threatening illness, through the prevention and relief of suffering by means of early identification, an impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual."
(World Health Organisation 2002).

Adult Palliative and Supportive Care is an important area of clinical practice that requires specialist knowledge and skill sets to ensure the highest standards of practice are applied and best practice principles, based upon the most up-to-date contemporary evidence. The use of Ambulatory Syringe Pumps assists practitioners in delivering such care. The CME 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 (Dickman et al 2005) as it allows relatively constant levels of medication to be administered, avoiding peaks and troughs which can result in reduced symptom control (Hunt 2002).

1.2 Scope

This policy is intended to be used by registered clinical professionals who manage adult palliative and supportive care patients within Jersey Health and Social Services Department (HSSD), Family Nursing and Home Care (FNHC), Primary Care Body (PCB), Jersey Hospice Care (JHC) and Nursing Homes (where adopted). This will include medical, nursing and pharmacy staff.

These areas have been identified as it must be acknowledged that differing ambulatory syringe pumps and policies/guidelines are in use in other care settings within Jersey. This guideline concentrates on the safe use of the McKinley T34 ambulatory syringe pump 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 (s/c), 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 community setting.

2. PURPOSE

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

3. ROLES AND RESPONSIBILITIES

Divisional Managers, Departmental Managers, Ward Managers, Clinical Consultants and any others identified within each organisation as involved with the management of staff are responsible for the implementation and compliance with this policy within their clinical teams.

4. TRAINING

4.1 Prior to the launch of the revised syringe pump policy, training related to the new documentation (e.g. prescription/monitoring charts) and clinical guidelines (e.g. medication algorithms for symptom management in end of life care) will be provided locally in line with the implementation plan (see section 14).

4.2 All healthcare professionals registered in Jersey (nursing and medical) who use a syringe pump must be trained, competent and personally accountable in the operation of such devices. 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 (Scottish Executive Health Department, 1995). Competencies in the use of syringe pumps are available. The below training is recommended as best practice.

4.3 Initial training will be undertaken using an on-line tutorial in the use of the McKinley T34 syringe pump on the McKinley website, which will be available to staff of each organisation via their intranet.

4.4 Following the on-line training session staff are expected to set up a syringe pump under the supervision of a ‘Super user’ or nurse deemed as competent, to ensure understanding.

4.5 The next step will be for staff to complete a Competency Based Assessment (Appendix 1).

4.6 Staff trained as a ‘Super user’ by McKinley will support the staff training, and any updates to their individual teams. A list of staff trained as ‘Super users’ should be kept by each individual organisation.

4.7 Training records should be maintained in each clinical area for all staff that may use the ambulatory syringe pumps.

4.8 As with all medical devices, operation of the syringe pump should only be undertaken by, or under the supervision of, appropriately trained personnel.

5. INDICATIONS FOR USE

5.1 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:

- Are too weak to swallow oral drugs.
- Have a decreased level of consciousness.
- Are vomiting and/or have persistent nausea.
- Have dysphagia.
- Have poor alimentary absorption (rare).
- Have bowel obstruction.

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

5.2 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 patient information leaflet on the syringe pump is available (Appendix 2).

5.3 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.

5.4 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).

6. SET-UP PROCEDURE

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

6.1 Prescription

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.

Prescribers can refer to Appendices 3 and 4 for advice on prescribing of medications using the syringe pump.

6.2 Preparation

The person preparing the medication should check the following:

- Prescription is completed correctly as per section 6.1.
- Compatibility of medications prescribed (Appendix 5).
- Diluent.
- Infusion volume required.
- Size of syringe required.

6.3 Administration

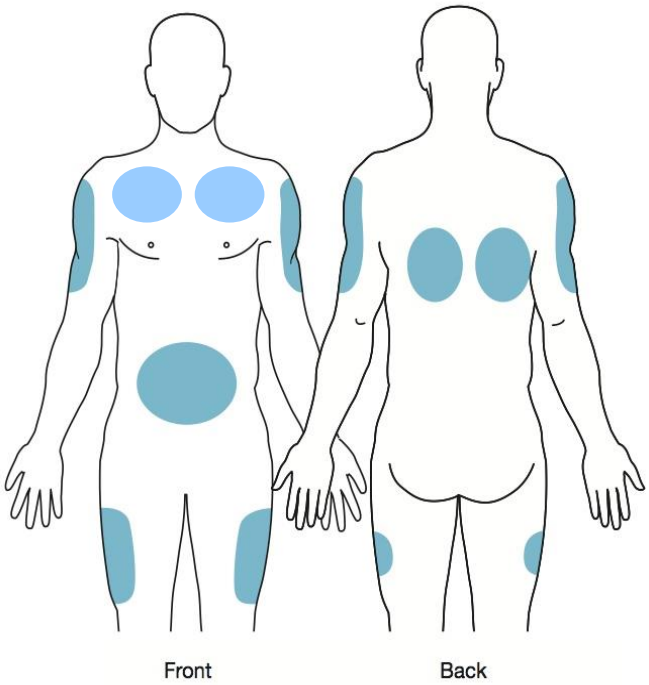
Practitioners administering a medication via the s/c route should be aware that:

- 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 (Greater Glasgow NHS Primary Palliative Care Team, 2008).

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:

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

6.4 Equipment required

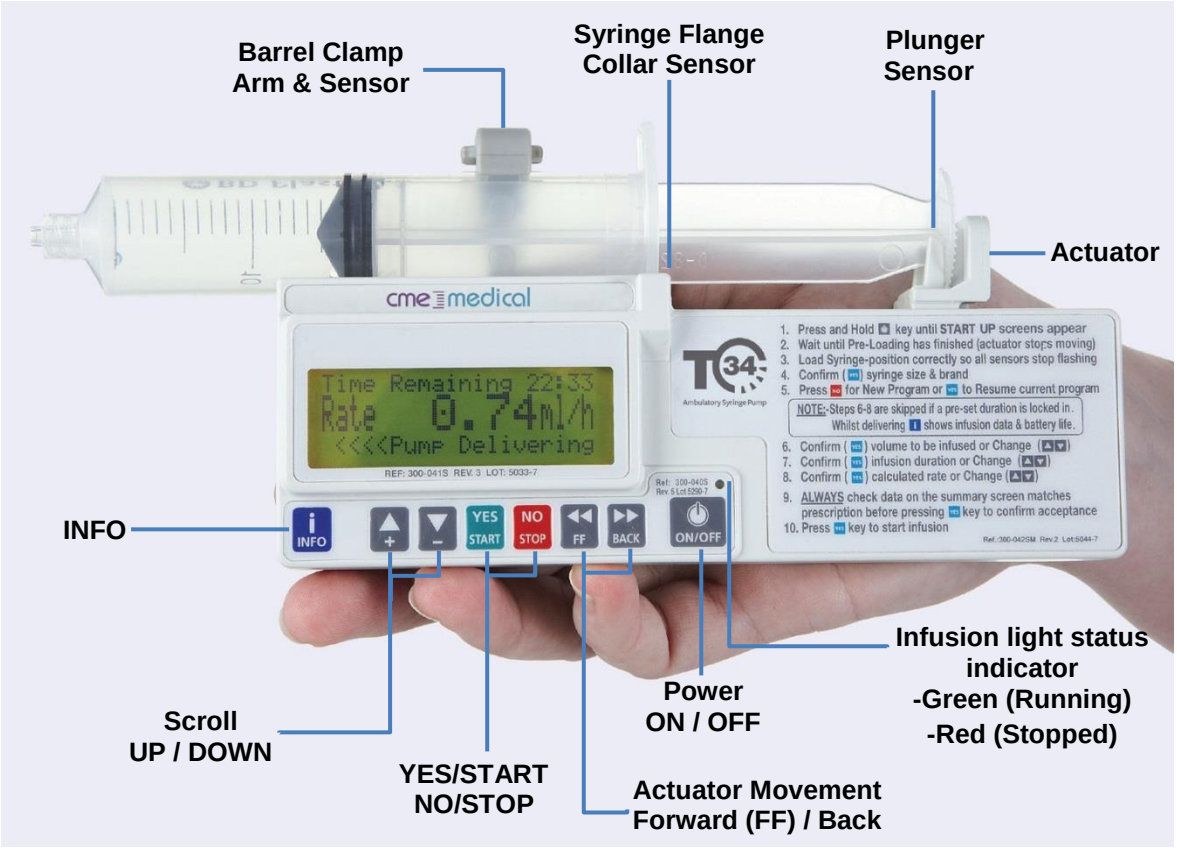
- T34 ambulatory syringe pump, plastic lockbox and key.
- 9V alkaline battery (e.g. Duracell MN1604 or equivalent).
- Luer lock syringe 20 or 30ml (recommended BD Plastipak).
- Cannula and subcutaneous infusion set (per practice of each organisation).
- Transparent surgical dressing (e.g. IV 3000 or equivalent).
- Syringes and (filter) needles to prepare medication.
- Prescribed medications and diluents.
- Sharps bin.
- Subcutaneous Syringe Pump Prescription Chart (Appendix 6).
- Medications additive label.
- Clean tray or surface for preparation.

6.5 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 following details are required on the label:

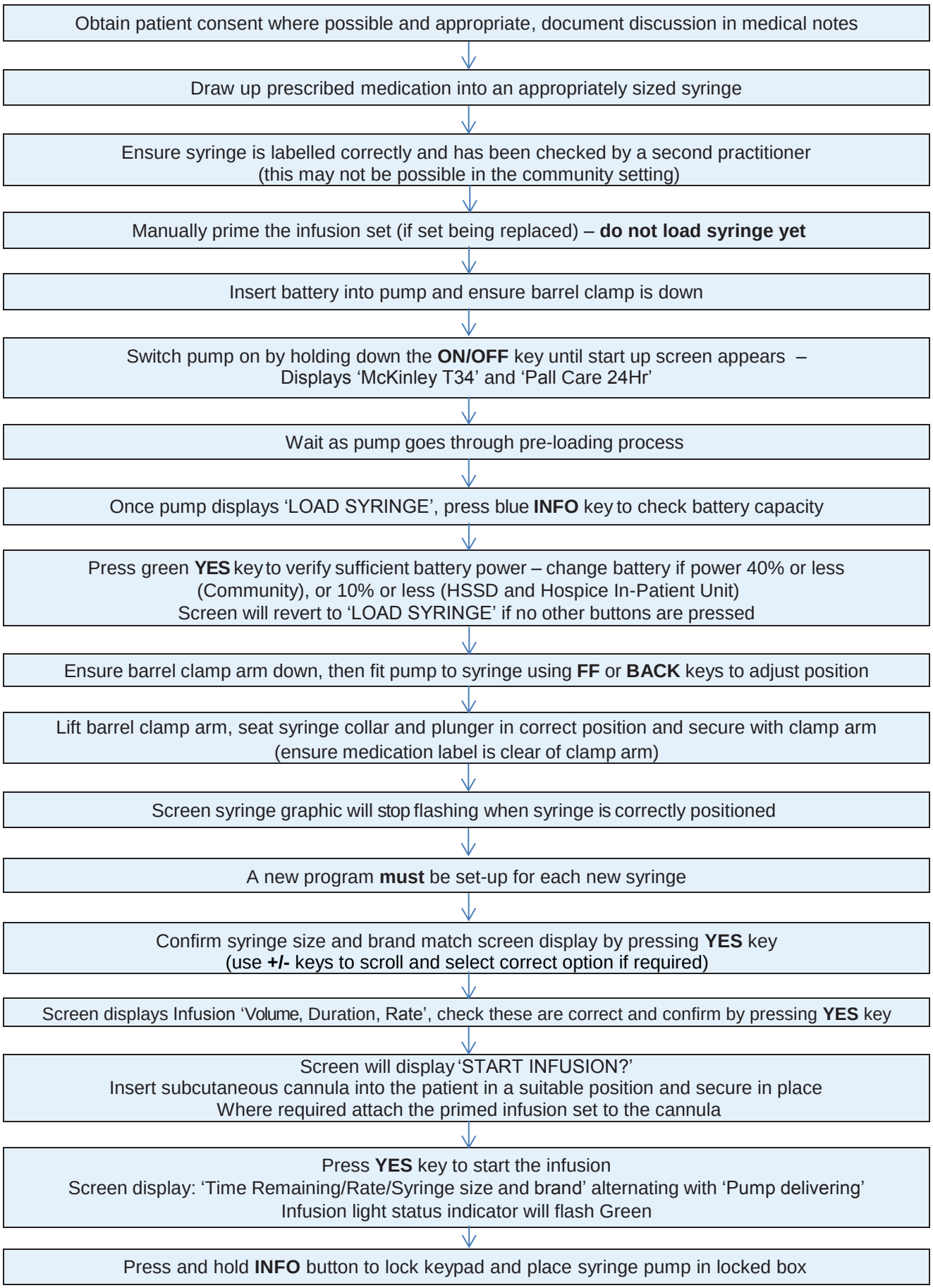
- Patient name.
- Identity number.
- Medicine name(s).
- Dose of each medicine.
- Diluent name.
- Total volume (in ml).
- Date and time prepared.
- Initials of the individuals preparing the syringe.

6.6 Component parts of the McKinley T34 syringe pump



7. PROCEDURE

The quick reference set up procedure below is for those practitioners competent in the use of the McKinley T34 syringe pump. A comprehensive guide is available (Appendix 7).



8. MONITORING THE INFUSION

It is best practice in the hospital, hospice and community settings that when a syringe pump is set-up, re-loaded or re-sited to observe it to ensure it is functioning correctly. Further monitoring checks should be carried out:

- A minimum of 4 hourly (HSSD, Hospice In-patient unit and Nursing Homes).
- Each visit by a nurse in the community setting.

	Action	Rationale
1	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 infusion prescription to be reviewed.
2	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.
3	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.
4	**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
5	Complete ambulatory syringe pump monitoring chart documentation (Appendix 6).	As per NMC Record Keeping Guidance (2009), and HSSD, FNHC and JHC policy.
6	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 8) Presence of large amounts of air may indicate cracked syringe – change syringe.

9. SAFETY AND RISK MANAGEMENT

9.1 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 s/c route or mixing several medications in a single syringe), but carries the additional responsibilities for prescribers, pharmacists and nurses. Please refer to the use of unlicensed medication in each organisations Medicine Policy, or guidance from the healthcare professionals regulatory body (if not stated in organisational policy). Alternatively contact the Specialist Palliative Care team for advice.

9.2 Maintenance and Infection control

Cleansing of the syringe pump should be carried out with a damp disposable cloth (use warm water and general purpose detergent), dry thoroughly. If any additional cleansing is needed (e.g. the threads of the screws the actuator moves along) contact the HSSD infection control team for advice. The pump must not be submerged in water. If it is accidentally dropped in water, it must be withdrawn from use immediately and sent to HSSD Engineering or designated person(s) for FNHC and JHC.

Do not use chemicals such as Xylene, Acetone (or similar solvents) or Cliniwipes (or similar) as these will cause damage to components and labels. Lockboxes should not be cleaned with alcohol-based products as this causes it to become more brittle.

Washable pouches are available for use with the syringe pump. These must be laundered between each patient use at 30 degrees Centigrade.

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.

9.3 Incident Reporting

An incident is any unexpected or untoward event that has a short or long-term detrimental effect on patients, clients, visitors, staff and the organisation.

Medication incidents usually fall into one of the following categories; prescribing, preparation of medicines/dispensing in pharmacy, administration/supply of medicine from a clinical area, monitoring or follow up of medicine use, or advice.

Examples of incidents include:

- Administration of incorrect medication, dose and/or diluent selection.
- Infusions completing ahead of intended time, or carrying on beyond intended time of completion (a tolerance of 5%, equivalent to 1 hour for a 24 hour infusion should be allowed).
- Device not alarming.
- Any other incident or near miss which may compromise patient safety.

Any device involved in an adverse incident should be "quarantined", and sent to HSSD engineering department or other designated person(s) for FNHC and JHC.

Any member of staff who is involved in, or witnesses an incident, accident or near miss should report it in line with their respective organisational policies.

9.4 Hazard Warning Notification

HSSD, FNHC and JHC operate a cascade system for hazard warning notifications. Individuals with responsibility for managing areas where syringe pumps are in use must ensure relevant notices are acted and reported upon.

9.5 Concordance

HSSD, FNHC and JHC should monitor concordance with this policy document as per local audit plans. It is expected that in the community setting FNHC and JHC will liaise to co-ordinate their audits. An Audit Tool has been provided in Appendix 9.

9.6 Review Period

This policy will be reviewed by the multi-agency working party at a frequency of not less than a one year interval, but no more than every three years after its implementation.

10. DEVELOPMENT AND CONSULTATION PROCESS

10.1 Consultation Schedule

Name of Committee / Group	Date of Committee / Group meeting / Consultation	
	Original Policy	Revised Policy
HSSD Palliative and Supportive Care Group	December 2011	
HSSD Medicines Governance Committee	April, May 2012	April 2014 April, August 2015
HSSD Care Quality Group	February 2012	
HSSD Primary Care Quality Group	March 2012	
HSSD Documentation Group	March 2012	
HSSD Patient Information Group		March 2015
HSSD Clinical Audit and Effectiveness Team		December 2014 March 2015
HSSD, FNHC & JHC Syringe Pump and Anticipatory Prescribing Group		April, October, December 2014 January 2015
PCB GP Champions for Palliative Care		January, March, June 2015
PCB Governance Group		June 2015
FNHC Operational Governance	April 2012	May, July 2015
JHC Clinical Effectiveness		May 2015

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13. GLOSSARY

CSCI	Continuous Subcutaneous Infusion
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)
HSSD	Health and Social Services Department
IM	Intramuscular
JHC	Jersey Hospice Care
LCD	Liquid Crystal Display
LED	Light Emitting Diode
NICE	National Institute for Health and Care Excellence
NMC	Nursing and Midwifery Council
NPSA	National Patient Safety Agency, now transferred to the NHS Commissioning Board Special Health Authority
PCB	Primary Care Body
S/C	Subcutaneous
SEHD	Scottish Executive Health Department
SPCT	Specialist Palliative Care Team
WFI	Water for Injections

14. IMPLEMENTATION PLAN

A variety of dissemination methods will be put into place to ensure that all staff are made aware of the revised policy. Due to the number of different healthcare organisations involved it will not be possible for all aspects of the policy to be used immediately.

The policy will be deemed as ratified and ready for launch when the relevant Clinical Governance committees of all four organisations (HSSD, PCB, FNHC and JHC) have approved it.

Action	Responsible Person	Planned Timeline
E-mail to all clinical staff	Communications Officer (HSSD) PCB Lead (PCB) Information Governance (FNHC) Governance Facilitator (JHC)	Within 2 weeks following ratification
Information to highlight revised policy to staff on the intranet for each organisation	Communications Officer (HSSD) PCB Lead (PCB) Governance Facilitator (JHC)	Within 2 weeks following ratification
Policy and patient information leaflet to be placed on each organisations intranet/internet under the relevant section	Communications Officer (HSSD) PCB Lead (PCB) Information Governance (FNHC) Governance Facilitator (JHC)	Within 2 weeks following ratification
Staff training days/sessions regarding the revised policy	Specialist Palliative Care Team Practice Development Team and Education Department (HSSD) PCB Lead (PCB) Education and Development Co-ordinator (FNHC) Governance Facilitator (JHC)	Commence 6 weeks prior to launch
Revised syringe pump prescription/monitoring charts to be available from the procurement/stores teams for each organisation	Specialist Palliative Care Team Central Stores (HSSD)	Available 2 weeks prior to launch
Complete audit to ensure concordance with revised policy	Specialist Palliative Care Team, and designated staff from each organisation	Determined by each organisation, should aim to be within 12 months of launch

15. APPENDICES

APPENDIX ONE: Competency Assessment Tool

T34 COMPETENCY-BASED ASSESSMENT

Access level: LOCK ON (Prime and load)

SCENARIO:
You are required to administer a drug infusion using a T34 syringe pump.
For the purpose of training, the candidate used the following criteria:

The 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*

	PERFORMANCE CRITERIA ACHIEVEMENT THROUGH CANDIDATE DEMONSTRATION, FACILITATOR OBSERVATION AND/OR QUESTIONING *The candidate achieved these outcomes because she/he has:*	✓ achieved X not achieved
1.0	**START UP** Ensured that all equipment is available and serviceable, checked that:	
1.1	Checked that the device is clean and visually intact.	
1.2	Checked that the device is appropriate for the intended use.	
2.0	Correctly prime/prepare infusion equipment:	
2.1	Checked that the syringe and extension set are appropriate and compatible for the device and the drug delivery.	
2.2	Manually primed an infusion set.	
3.0	Powered up the device:	
3.1	Checked that a syringe is **not** loaded and the barrel clamp arm is down on the device.	
3.2	Installed the appropriate battery.	
3.3	Turned the device on and observed the completion of the pre-programmed start-up sequence (actuator movement).	
3.4	During pre-programming, checked the LCD display to confirm the default settings of the device.	
3.5	On completion of the pre-programme sequence, checked the battery power available is sufficient to run the device for the prescribed duration.	
4.0	Ensured syringe placement and detection:	
4.1	Visually aligned the 3 syringe sensors to syringe and used the FF/back keys to adjust as necessary.	
4.2	Correctly loaded the syringe: ensured the syringe is placed in the 3 detection areas fully and observed LCD screen to confirm correct placement.	
4.3	Checked that the device had correctly identified the syringe brand and size and taken appropriate action if necessary if not identified correctly.	
5.0	Verify set parameters:	
5.1	Reviewed the summery screen: Checked LCD screen for correct duration of infusion (volume, duration & rate).	
5.2	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).	
5.3	Ensured infusion is running: observed the “running screen”, checked green light on.	

6.0	**MONITORING** Correctly accessed/explained the **INFO KEYS** in relation to the current infusion:	
6.1	Single press to view: volume infused & volume to be infused.	
6.2	Double press to view: battery status.	
6.3	Observed the screens reverting to the default running screen.	
6.4	Activated/deactivated key pad lock.	
7.0	Demonstrated awareness/performed checks/or action to be taken in relation to audible/visual **ALERT**:	
7.1	Near end of infusion.	
7.2	Low battery.	
8.0	Demonstrated awareness/performed checks/or action to be taken in relation to audible/visual **ALARMS**:	
8.1	Occlusion.	
8.2	End of infusion (end of programme/syringe).	
8.3	Syringe displaced.	
8.4	Pump paused too long.	
8.5	End battery.	
9.0	**CLOSE DOWN** Correctly closed down and dismantled the device (assuming duration completed):	
9.1	Checked device/tubing disconnected from access device.	
9.2	Removed syringe from device and returned barrel clamp to down position.	
9.3	Turned the device off.	
9.4	Demonstrated safe removal of disposables.	
9.5	Correctly removed the batteries ready for storage.	
9.6	Cleaned/decontaminated/stored the device as per local policy/manufacturer instructions.	

Use this space to add any additional comments on the assessment. Please ensure that each comment relates clearly to a numbered performance criterion.	
No.	

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 troubleshooting 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.

Date completed: …… Candidate name: ……..…

Attach this completed sheet to your learning portfolio

Completion of the T34 assessment only demonstrates that the individual practitioner is competent at the time of assessment, ongoing accountability to ensure continued competency rests with the individual.

APPENDIX TWO: Patient Information Leaflet

Family Nursing & Home Care

States of Jersey
The States of Jersey Department for Health & Social Services

Jersey Hospice Care

PRIMARY CARE BODY

Patient Information

Syringe Pumps

This leaflet gives you an overview of the reasons you may be given a McKinley T34 Syringe Pump in Palliative Care.

Specialist Palliative Care Team

Please do not:

- Interfere with the line or pump.
- Press the buttons on the pump control panel.
- Get the syringe pump wet.
- Drop the syringe pump.
- Leave the syringe pump in an area which is hot or in bright sunlight.

Please contact a nurse if any of the following happen:

- You are worried that the syringe pump is not working or is damaged.
- The colour of the medicines has changed or is cloudy.
- The skin around the infusion site is red, swollen or painful.
- The alarm sounds.
- You have any other worries.

Contact .....

(For patients in a community setting)

If you have any concerns before you are started on a Syringe Pump, speak to a member of your medical or nursing team.

Family Nursing & Home Care

Jersey Hospice Care

States of Jersey

PRIMARY CARE BODY

HSS-LFT-0351-1 **April 2016**

What is a McKinley T34 syringe pump?

This is a small, portable pump which is battery powered. It allows medicines to be given continuously just under the skin over a 24 hour period.

Why do I need one?

The syringe pump is a different way of giving medicines to control your symptoms, and will reduce the number of injections you need. This may be for pain, controlling sickness or to help you relax. You may need it if:

- You are having difficulty swallowing medicines.
- You are being sick.
- Your symptoms need better control.

The reason will be explained to you by your doctor or nurse. A syringe pump may be used at any stage of your illness and may be stopped if it is no longer needed.

How does it work?

A small needle will be inserted just under your skin, either on your tummy, chest or on the top of your arm or leg (this is the 'infusion site').

The needle will be connected by a thin tube to a syringe containing your medicine which is attached to the syringe pump. This set usually only needs changing every few days, but if it gets sore it may be changed sooner. The tube will be held in place by a small, clear dressing, so the area can be checked.

The syringe pump gives the medicines over 24 hours. Each day a nurse will come and fill a new syringe for you.

How do I know the syringe pump is working fine?

Before setting up the syringe pump, the nurse will check it to see if it is working.

When running a small light above the 'ON/OFF' button will flash green regularly. If it turns red, there is a problem with the pump and you should contact your nurse as soon as possible.

Who will look after it?

Your nurse will regularly check that the pump is working correctly, that you are getting the medication prescribed and the infusion site is comfortable.

What to do if the pump beeps or an alarm sounds?

Do not worry if the syringe pump beeps or an alarm sounds. Please inform your nurse as soon as possible. They will be able to deal with it for you on the ward, or advise on what to do if you are at home.

Some useful lifestyle advice:

- If you are walking around, you may find it helpful to carry the syringe pump in a small bag or pouch.
- When you are in bed or resting in a chair, the syringe pump can be put on a flat surface next to you.
- Your nurse will advise on what to do if you want a bath or shower.

APPENDIX THREE: Prescribing advice for Ambulatory Syringe Pumps in Palliative and Supportive Care in Adults

Indications

Syringe pumps are used to deliver drugs subcutaneously when the oral route is no longer appropriate because the patient:

- Is too weak to swallow oral drugs.
- Has a decreased level of consciousness.
- Is vomiting and/or has persistent nausea.
- Has dysphagia.
- Has poor alimentary absorption (rare).
- Has bowel obstruction.

Please refer to the Medication Algorithms in End of Life Care (Appendix 4), for extra guidance on when it is appropriate to commence a syringe pump. In some cases it will be appropriate to use only breakthrough (prn) doses, and a syringe pump will not be needed.

When starting a syringe pump it is normally necessary to give a stat dose of most prescribed drugs beforehand, as it takes about 4 hours to achieve a steady state.

How to calculate the opioid dose

Patients who are already taking oral opioids should have their 24 hour dose of oral Morphine calculated and then:

- To convert oral Morphine to subcutaneous Diamorphine divide by 3
  - e.g. a patient taking 30 mg of MST (Morphine sulfate modified release) bd would take 60 mg of oral Morphine in 24 hours, this is equivalent to 20 mg of Diamorphine s/c over 24 hours.

- To convert oral Morphine to subcutaneous Morphine divide by 2
  - e.g. a patient taking 30 mg of MST bd would take 60 mg of oral Morphine in 24 hours, this is equivalent to 30 mg of Morphine s/c over 24 hours.

How to calculate the breakthrough (prn) dose

To calculate the breakthrough dose of an opioid divide the 24 hour dose by 6 and use the same route.

- e.g. a patient having 30mg of Diamorphine s/c over 24 hours would have a breakthrough dose of 5mg of Diamorphine s/c.

Increasing the opioid in the syringe pump

If the patient's pain persists, increase the dose of opioid in the syringe pump by one third. You will see the effect of a syringe pump dose change within 4 hours. Be aware of signs of opioid toxicity such as drowsiness, reduced respiratory rate, myoclonus, confusion and hallucinations.

If a patient needs two or more breakthrough doses of their opioid in 24 hours consider increasing the background dose (i.e. the dose in the syringe pump). The exception to this is when the breakthrough dose is used for incident pain (i.e. pain on movement or dressing change), in this case continue using breakthrough doses and do not increase the background dose.

Opioid conversion

The table below gives only approximate dosages; due to the risk of toxicity it may be necessary to use lower doses especially in patients who are:

- Elderly and frail.
- Opioid naive.
- In renal impairment.
- In hepatic impairment.
- Already on high doses of opioids (there may be incomplete cross tolerance and it is normal practice to reduce the dose by 30-50%, please ask for specialist advice).

The patient must be regularly reviewed after switching to a different opioid, checking for signs of toxicity and their level of pain control.

OPIOID DOSE CONVERSION GUIDE Note that dose conversions are approximate only							
PO Morphine	24hr total dose (mg)	30	60	120	180	240	360
	breakthrough dose (mg)	5	10	20	30	40	60
S/C Diamorphine	24hr total dose (mg)	10	20	40	60	80	120
	breakthrough dose (mg)	2.5	2.5-5	7.5	10	12.5-15	20
S/C Morphine	24hr total dose (mg)	15	30	60	90	120	180
	breakthrough dose (mg)	2.5	5	10	15	20	30
PO Oxycodone	24hr total dose (mg)	15	30	60	90	120	180
	breakthrough dose (mg)	2.5	5	10	15	20	30
S/C Oxycodone	24hr total dose (mg)	7.5-10	15-20	30-40	45-60	60-80	90-120
	breakthrough dose (mg)	1.25-2.5	2.5-5	5-7.5	7.5-10	10-15	15-20
Fentanyl Patch*	72 hour patch (micrograms/hr)	12	25	50	75	100	150
S/C Alfentanil	24hr total dose	Seek specialist advice before prescribing Alfentanil (and for dosing recommendations)					
	breakthrough dose	Seek specialist advice before prescribing Alfentanil (and for dosing recommendations)					

* Note that the conversion ratio of oral Morphine to transdermal Fentanyl has been based on a figure of 100:1 per the Palliative Care Formulary (PCF5). However it is acknowledged that a ratio of 150:1 may be more appropriate for patients who are highly opioid tolerant, as per the manufacturer recommendations.

Fentanyl patches

Fentanyl patches should not be started as a form of pain control at the end of life. Dying patients often have rapidly changing requirements and the patches take 12-24 hours to achieve therapeutic blood levels so they should only be used for stable pain.

If you remove a Fentanyl patch it will take about 18 hours for the blood level to drop by 50%, if you immediately switch to a syringe pump this could result in an overdose. If a patient is already on a Fentanyl patch **DO NOT REMOVE IT,** if you need to increase the level of pain control add a syringe pump with the equivalent of two breakthrough doses (see below). If you need to increase the dose further please call for specialist advice.

If an alternative to the Fentanyl patch is required for reasons such as poorly controlled pain, opioid toxicity, fever (increases drug absorption) or that your patient's sweating is difficult to control and the patch won't stick, please ask for specialist advice.

Fentanyl patch strength (micrograms/hr)	Dose range of subcutaneous Diamorphine (mg) for breakthrough pain	Dose range of Diamorphine (mg) subcutaneous over 24 hours to augment the analgesia of a patient on a Fentanyl patch
12	2.5	5
25	2.5-5	7.5
37	5-7.5	10
50	7.5	15
62	7.5-10	15
75	10	20
100	12.5-15	25

When calculating the dose of Diamorphine in the syringe pump and the breakthrough dose, you may need to use the patient's previous patch strength if they have not already been stabilised for the last 72 hours to reduce the risk of opioid toxicity.

Dose Range Prescriptions for Syringe Pumps

The benefit of prescribing medication dose ranges in syringe pumps for patients in the **community setting** (e.g. Hospice In-Patient Unit, home, Nursing homes) is recognised to help avoid unnecessary GP call-outs and delays in treatment. Where the prescriber feels it appropriate to use a dose range, the Specialist Palliative Care nurses (e.g. SPCT and Hospice In-patient unit) are permitted to use their clinical judgement as to when dose adjustments within the range prescribed will be appropriate.

Other nursing staff (e.g. FNHC, Nursing homes) should only change the dose administered within the range prescribed where they have the necessary skills to do so competently, and in line with any relevant policies or procedures of their organisation. Alternatively advice should be sought from either the prescriber, a member of the SPCT or an experienced colleague competent in this area.

The decision should take into consideration the patients background dose (i.e. dose in the syringe pump), doses needed for breakthrough symptoms in the last 24 hours (the exception being for incident pain), and the patient's overall clinical condition.

Please note that dose ranges for syringe pumps are NOT to be prescribed for patients being cared for in HSSD settings.

Commonly used drugs in the syringe pump

The table below gives APPROXIMATE dosages only. Due to the risk of toxicity it may be necessary to use lower doses especially in the elderly, frail, or in patients with renal impairment and/or hepatic impairment. In such cases specialist advice may be required for dosing recommendations.

SYMPTOM	DRUG AND DOSAGE	PRN DOSE	POSSIBLE SIDE EFFECTS	COMMENTS
PAIN	**DIAMORPHINE** (for the opioid naive start at 5-10mg over 24 hours, for those already taking opioids see page 23)	ONE-SIXTH OF THE 24 HOUR DOSE **Max dose frequency one hourly**	Nausea, constipation, dry mouth, sedation, confusion	Used **first line for pain**, but avoid in renal failure.
	MORPHINE (for the opioid naive start at 10-15mg over 24 hours, for those already taking opioids see page 23)		Nausea, constipation, dry mouth, sedation, confusion	Avoid in renal failure.
	OXYCODONE (see opioid conversion chart on page 23)		Nausea, constipation, dry mouth, sedation, confusion	Use with caution in renal failure if no alternative available, but use a lower dose (please seek specialist advice).
	ALFENTANIL (please ask for specialist advice)	Not suitable for prn doses as has a very short half life	Nausea, constipation, dry mouth, sedation, confusion	Useful for **pain in renal failure.** Do not use prn as half-life is so short. (please seek specialist advice)
NAUSEA AND VOMITING	**LEVOMEPROMAZINE** (6.25-25mg over 24 hours)	6.25mg **Max total 24hr dose 25mg**	Sedation, postural hypotension	**Broad spectrum antiemetic**. Lowers threshold for convulsions. Avoid in epilepsy, Parkinson's disease and Lewy Body Dementia.
	CYCLIZINE (100-150mg over 24 hours)	50mg **Max total 24hr dose 150mg**	Drowsiness, dry mouth, hypotension	**Useful in N&V due to intracranial disease and intestinal obstruction**. Avoid in heart failure.
	HALOPERIDOL (1.5-5mg over 24 hours)	0.5-1.5mg **Max total 24hr dose 5mg**	Extrapyramidal symptoms, dry mouth, sedation, difficulty with micturition	**Useful in nausea due to metabolic causes or drugs.** Avoid in Parkinson's disease and Lewy Body Dementia.
	METOCLOPRAMIDE (10-30mg over 24 hours)	10mg **Max total 24hr dose 30mg**	Extrapyramidal symptoms	**Useful with delayed gastric emptying and gastric irritation.** DO NOT USE in bowel obstruction with colic. Avoid with anticholinergic drugs, in Parkinson's disease and Lewy Body Dementia.

SYMPTOM	DRUG AND DOSAGE	PRN DOSE	POSSIBLE SIDE EFFECTS	COMMENTS
AGITATION AND ANXIETY	**MIDAZOLAM** (10-30mg over 24 hours, and up to 60mg for heavy sedation)	Start at 2.5-5mg, titrate to one-sixth of dose in syringe pump **Max dose frequency one hourly** **Max total 24hr dose 60mg**	GI side effects, hypotension	**This is normally used first line for patients who are anxious, but are lucid.** Higher doses are needed if using as an anticonvulsant (e.g. start at 20-30 mg over 24 hours).
	HALOPERIDOL (2.5-10mg over 24 hours when used for delirium)	1-2.5mg **Max total 24hr dose 10mg**	Extrapyramidal symptoms, dry mouth, sedation, difficulty with micturition	**This is normally used first line for patients who are confused, agitated and/or hallucinating.** Avoid in Parkinson's disease and Lewy Body Dementia. Caution in epilepsy at higher doses.
	LEVOMEPROMAZINE (25-100mg over 24 hours when used for terminal restlessness)	Start at 12.5-25mg, titrate to one-sixth of dose in syringe pump **Max total 24hr dose 100mg**	Sedation, postural hypotension	Lowers threshold for convulsions. Avoid in epilepsy, Parkinson's disease and Lewy Body Dementia.
RESPIRATORY SECRETIONS	**GLYCOPYRRONIUM** (0.6-1.2mg over 24 hours)	200 micrograms **Max total 24hr dose 1.2mg**	Tachycardia, dry mouth	**Normally used first line for respiratory secretions.** Does not cross blood brain barrier, so does not cause sedation.
	HYOSCINE HYDROBROMIDE (1.2-2.4mg over 24 hours)	400 micrograms **Max total 24hr dose 2.4mg**	Sedation, tachycardia, dry mouth	Does cross the blood brain barrier, so may cause sedation.
BREATHLESS-NESS	**DIAMORPHINE** (for opioid naive patients start with 5 mg s/c over 24 hours, for those already taking opioids see page 23)	ONE-SIXTH OF THE 24 HOUR DOSE **Max dose frequency one hourly**	Nausea, constipation, dry mouth, sedation, confusion	**Need to use lower doses than for pain.** Avoid in renal failure. For anxiety associated with breathlessness use a benzodiazepine (e.g. Midazolam).

If a patient's symptoms are not adequately controlled using the medications in the above table, please seek specialist advice.

It should be noted that the Specialist Palliative Care Team may advise to use medications in situations or at doses that would usually not be given, this will usually take place where the risk versus benefit ratio to the patient makes it appropriate to do so.

Diluents for syringe pump

To avoid confusion, consistency of practice is important. Therefore it has been decided that the diluent of choice is **Water for Injections (WFI).**

Sodium chloride 0.9% should only be considered for use in the following circumstances:

- There is a potential/actual problem with inflammatory reactions at the infusion site.
- Levomepromazine is being administered as a single drug subcutaneous infusion (for infusion with drugs in addition to Levomepromazine, WFI should be used).

Syringe pump drug compatibility information

See Appendix 5 for stability information when mixing drugs in a syringe pump.

Subcutaneous administration of drugs

Infusion site problems may be due to a number of reasons, however the following drugs are known to be irritant when administered subcutaneously.

Strongly irritant (do NOT use)
Chlorpromazine (can cause local tissue necrosis)
Diazepam
Lorazepam
Prochlorperazine

Relatively irritant (precautions may be necessary)

Cyclizine
Diclofenac
Ketamine
Ketorolac
Levomepromazine
Methadone
Octreotide (painful if given by S/C bolus injection, this can be reduced if warmed to body temperature beforehand)
Ondansetron
Phenobarbital
Promethazine

It should be noted that several drugs with a long duration of action (e.g. **Dexamethasone** and **Levomepromazine)** can be given as a s/c bolus injection once or twice daily, this could thus eliminate the need for a syringe pump.

The information in Appendix 3 has been obtained from the below references.

Janssen-Cilag Ltd. (2014) *Summary of Product Characteristics: Durogesic DTrans 12/25/50/75/100 mcg/hr Transdermal Patch.* Retrieved from http://www.medicines.org.uk/emc/medicine/17086

Twycross R., Wilcock A., & Howard P. (2014) *PCF5: Palliative Care Formulary (5th Ed.).* Oxford: Radcliffe Medical Press.

Watson M., Lucas C., Hoy A., Back I., & Armstrong P. (2011) *Palliative Adult Network Guidelines (3rd Ed.).*

Family Nursing & Home Care

Jersey Hospice Care

States of Jersey

The States of Jersey Department for Health & Social Services

PRIMARY CARE BODY

Supporting Last Days of Life
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Respiratory Tract Secretions

Present

Prescribe **GLYCOPYRRONIUM 200microgram s/c 4 hourly prn** (Max total 24 hour dose of 1.2mg)

If at least 1 dose is required over a 24 hour period then consider use of a CSCI (Continuous Subcutaneous Infusion) 0.6-1.2mg over 24 hours

Continue to give prn doses accordingly (Max total 24 hour dose of 1.2mg)

If symptoms persist after 24 hours consider increasing the total dose to 1.2mg via a CSCI over 24 hours

Absent

Prescribe **GLYCOPYRRONIUM 200micrograms s/c 4 hourly prn** (Max total 24 hour dose of 1.2mg)

SUPPORTING INFORMATION:

If symptoms persist please contact the Specialist Palliative Care Team (SPCT) for advice on 01534 876555 (24 hour service). Hospital Drs (Clinical Fellow or above) can contact an on-call Palliative Care Consultant off island, outside work hours (Mon-Fri 09.00-17.00) via switchboard.

HYOSCINE HYDROBROMIDE 400micrograms s/c 4 hourly prn (Max total 24 hour dose of 2.4mg) can be used as an alternative.

If Glycopyrronium OR Hyoscine Hydrobromide have been used and found to be ineffective, do NOT switch to the alternative option - instead please contact the SPCT for advice.

Early treatment of respiratory tract secretions is essential. If treatment with the above medications is withheld until the patient already has excessive secretions they are unlikely to be effective.

Please note that treatment will only reduce secretions for about 50-66% of patients[1].

Anticipatory prescribing in this manner will ensure that in the last hours or days of life there is no delay responding to a symptom if it occurs.

[1] Twycross R., Wilcock A., & Howard P. (2014) *PCF5: Palliative Care Formulary (5th Ed.).* Oxford: Radcliffe Medical Press.

Watson M., Lucas C., Hoy A., Back I., & Armstrong P. (2011) *Palliative Adult Network Guidelines (3rd Ed.).*

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Pain

Patient is in pain

Is the patient already taking oral Morphine or another strong opioid* (Fentanyl patches should **not** be removed unless clinically indicated)?

Yes

Review current analgesia, consider opioid dose increase

Consider converting to Diamorphine s/c route if the patient is unable to take medication orally

Consider use of a CSCI (Continuous Subcutaneous Infusion)

Continue to give prn doses as needed (at 1/6th of 24 hour background opiate dose)

No

Review current analgesia

Prescribe **DIAMORPHINE 2.5-5mg s/c 1 hourly prn**

If patient requires 3 doses at hourly intervals seek prompt medical review

Review after 24 hours. If 3 or more doses are required then consider use of a CSCI

Patient's pain is controlled

Is the patient already taking oral Morphine or another strong opioid* (Fentanyl patches should **not** be removed unless clinically indicated)?

Yes

Consider converting to Diamorphine s/c route if the patient is unable to take medication orally

Consider use of a CSCI

Continue to give prn doses as needed (at 1/6th of 24 hour background opiate dose)

No

Prescribe **DIAMORPHINE 2.5-5mg s/c 1 hourly prn**

If patient requires 3 doses at hourly intervals seek prompt medical review

Review after 24 hours. If 3 or more doses are required then consider use of a CSCI

SUPPORTING INFORMATION:

***For conversion of all other strong opioids (e.g. Oxycodone, Fentanyl) into a CSCI / prn doses, or if symptoms persist please contact the Specialist Palliative Care Team (SPCT) for advice on 01534 876555 (24 hour service). Hospital Drs (Clinical Fellow or above) can contact an on-call Palliative Care Consultant off island, outside work hours (Mon-Fri 09.00-17.00) via switchboard.**

If a dose range is prescribed always commence at the lower dose.

To convert oral Morphine to a 24 hour CSCI of Diamorphine divide the total (24 hour) dose of Morphine by 3 (e.g. 30mg bd orally = 60mg morphine in 24hrs ÷ 3 = Diamorphine 20mg via a CSCI).

For breakthrough pain prescribe a prn dose of Diamorphine which is 1/6th of total 24 hour dose (i.e. the equivalent of Diamorphine 30mg subcutaneously over 24 hours = 5mg s/c 1 hourly prn).

If using opiates for the management of breathlessness this should be taken into account when titrating opiates for pain.

Consider dose reduction for the elderly, frail or patients with dementia and mild / moderate renal impairment (avoid Diamorphine and Morphine in renal failure – seek advice from SPCT).

Anticipatory prescribing in this manner will ensure that in the last hours or days of life there is no delay responding to a symptom if it occurs.

Twycross R., Wilcock A., & Howard P. (2014) *PCF5: Palliative Care Formulary (5th Ed.).* Oxford: Radcliffe Medical Press.

Watson M., Lucas C., Hoy A., Back I., & Armstrong P. (2011) *Palliative Adult Network Guidelines (3rd Ed.).*

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Nausea & Vomiting

Present

If the patient is already being given anti-emetics, review the benefit of continued use

Prescribe **LEVOMEPROMAZINE 6.25mg s/c 6 hourly prn**
(Max total 24 hour dose of 25mg)

Use alternative* if Levomepromazine has already been given and is ineffective

Review after 24 hours (earlier review may be required if patient does not respond to Levomepromazine after 2 doses)

If 2 or more doses are required over a 24 hour period then consider use of giving 12.5mg over 24 hours via a CSCI (Continuous Subcutaneous Infusion)

The dose can be titrated to a max of 25mg over 24 hours

Absent

Is the patient already being given anti-emetics?

Yes

Continue treating with current anti-emetics

Review if nausea and vomiting develop

No

Prescribe **LEVOMEPROMAZINE 6.25mg s/c 6 hourly prn**

(Max total 24 hour dose of 25mg)

SUPPORTING INFORMATION:

If symptoms persist please contact the Specialist Palliative Care Team for advice on 01534 876555 (24 hour service). Hospital Drs (Clinical Fellow or above) can contact an on-call Palliative Care Consultant off island, outside work hours (Mon-Fri 09.00-17.00) via switchboard.

***Alternative anti-emetics may be prescribed:**

- **CYCLIZINE 50mg s/c TDS prn (max 150mg via a CSCI over 24 hours) – NOT recommended in patients with heart failure**
- **HALOPERIDOL 0.5-1.5mg s/c 6 hourly prn (1.5-5mg via a CSCI over 24 hours)**

If using either Levomepromazine or Haloperidol for the management of agitation and restlessness this should be taken into account when titrating doses for nausea and vomiting.

Consider dose reduction for the elderly, frail or patients with dementia.

Anticipatory prescribing in this manner will ensure that in the last hours or days of life there is no delay responding to a symptom if it occurs.

Twycross R., Wilcock A., & Howard P. (2014) *PCF5: Palliative Care Formulary (5th Ed.).* Oxford: Radcliffe Medical Press.
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Agitation & Anxiety

Present
(Exclude or treat **REVERSIBLE causes***)

Patient is **anxious / frightened**, but **lucid**

Prescribe MIDAZOLAM 2.5-5mg s/c 1 hourly prn (Max total 24 hour dose of 60mg)

If patient requires 3 doses at hourly intervals seek prompt medical review

Review after 24 hours. If 3 or more doses are required then consider use of a CSCI (Continuous Subcutaneous Infusion)

Continue to give prn doses as needed (Max total 24 hour dose of 60mg)

Patient is **confused, agitated** and / or **hallucinating**

Prescribe **HALOPERIDOL 1-2.5mg s/c 4 hourly prn** (Max total 24 hour dose of 10mg)

Review after 24 hours

If 3 or more doses are required then consider value of giving 2.5-10mg over 24 hours via a CSCI

The dose can be titrated to max of 10mg over 24 hours

If patient is still agitated and distressed, consider adding in Midazolam to the CSCI

Absent

Prescribe **MIDAZOLAM 2.5-5mg s/c 1 hourly prn** (Max total 24 hour dose of 60mg)

If patient requires 3 doses at hourly intervals seek prompt medical review

Review after 24 hours. If 3 or more doses are required then consider use of a CSCI

SUPPORTING INFORMATION:

If symptoms persist please contact the Specialist Palliative Care Team for advice on 01534 876555 (24 hour service). Hospital Drs (Clinical Fellow or above) can contact an on-call Palliative Care Consultant off island, outside work hours (Mon-Fri 09.00-17.00) via switchboard.

Exclude or treat **REVERSIBLE causes***, e.g. alcohol withdrawal, hypercalcaemia, infection, opioid toxicity, urinary retention or constipation.

If a dose range is prescribed always commence at the lower dose.

The treatment of agitation and anxiety does not usually require the use of opioids unless it is thought to be caused by pain.

LEVOMEPROMAZINE 12.5-25mg s/c 6 hourly prn (Max total 24 hour dose of 100mg) can be used as an alternative to Haloperidol.

If using either Levomepromazine or Haloperidol for the management of nausea and vomiting this should be taken into account when titrating doses for agitation and restlessness.

Consider dose reduction for the elderly, frail or patients with dementia.

Anticipatory prescribing in this manner will ensure that in the last hours or days of life there is no delay responding to a symptom if it occurs.

Twycross R., Wilcock A., & Howard P. (2014) *PCF5: Palliative Care Formulary (5th Ed.).* Oxford: Radcliffe Medical Press.

Watson M., Lucas C., Hoy A., Back I., & Armstrong P. (2011) *Palliative Adult Network Guidelines (3rd Ed.).*

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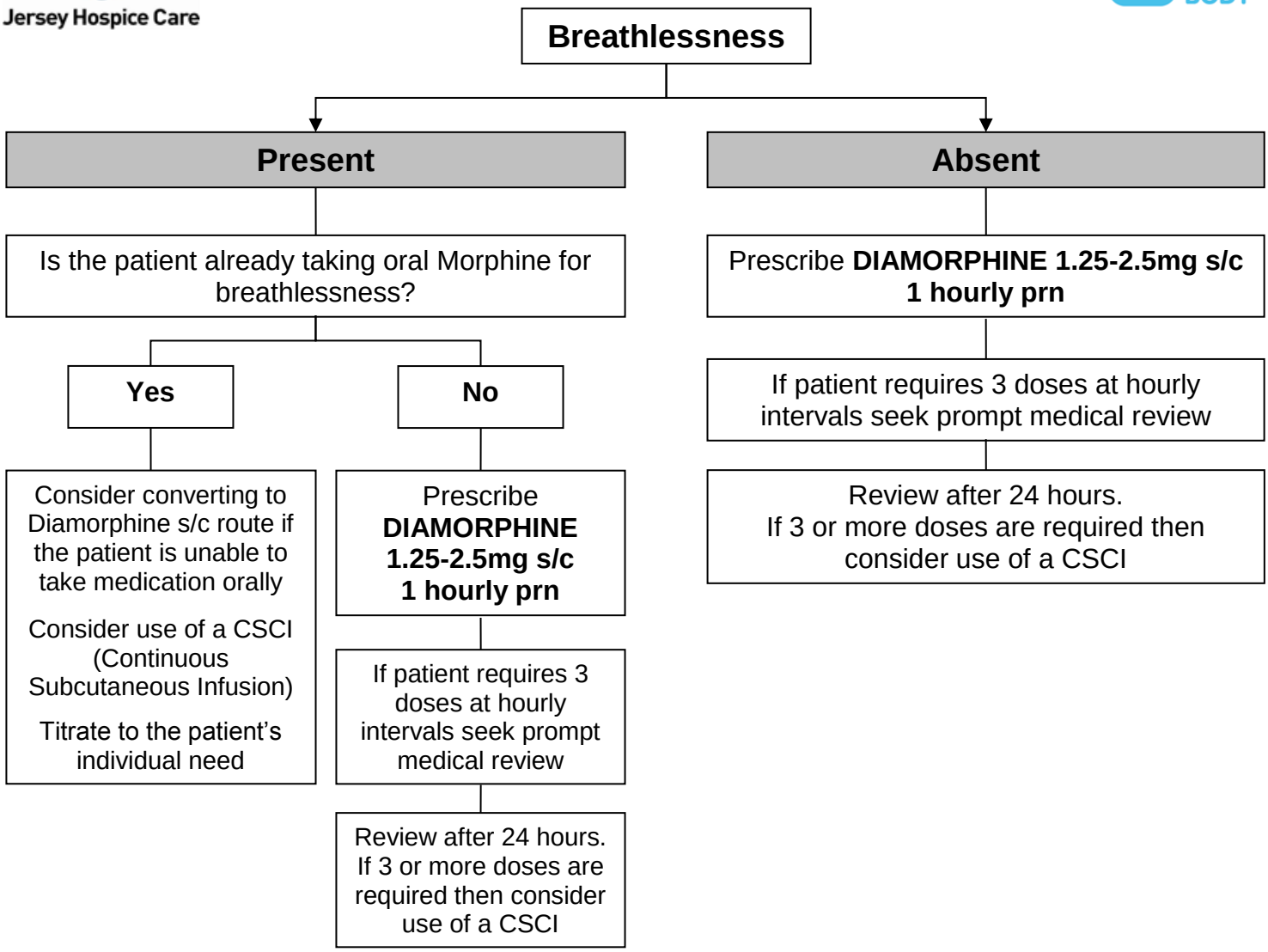


SUPPORTING INFORMATION:

If symptoms persist please contact the Specialist Palliative Care Team (SPCT) for advice on 01534 876555 (24 hour service). Hospital Drs (Clinical Fellow or above) can contact an on-call Palliative Care Consultant off island, outside work hours (Mon-Fri 09.00-17.00) via switchboard.

If the patient is breathless and anxious, consider MIDAZOLAM 2.5mg s/c 1 hourly prn.

If a dose range is prescribed always commence at the lower dose.

To convert oral Morphine to a 24 hour CSCI of Diamorphine divide the total (24 hour) dose of Morphine by 3 (e.g. 30mg bd orally = 60mg morphine in 24hrs ÷ 3 = Diamorphine 20mg via a CSCI).

For breakthrough breathlessness prescribe a prn dose of Diamorphine which is 1/6th of total 24 hour dose (i.e. the equivalent of Diamorphine 30mg subcutaneously over 24 hours = 5mg s/c 1 hourly prn).

If using opiates for the management of pain this should be taken into account when titrating opiates for breathlessness.

Consider dose reduction for the elderly, frail or patients with dementia and mild / moderate renal impairment (avoid Diamorphine and Morphine in renal failure – seek advice from SPCT).

Anticipatory prescribing in this manner will ensure that in the last hours or days of life there is no delay responding to a symptom if it occurs.

Twycross R., Wilcock A., & Howard P. (2014) *PCF5: Palliative Care Formulary (5th Ed.).* Oxford: Radcliffe Medical Press.

Watson M., Lucas C., Hoy A., Back I., & Armstrong P. (2011) *Palliative Adult Network Guidelines (3rd Ed.).*

APPENDIX FIVE: Syringe Pump Drug Compatibility and Stability Charts

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

Please note:

- The charts and 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** (please refer to Appendix 3 for information on the usual dose ranges for each medication).
- Compatibility of drugs in the syringe pump is concentration dependent, therefore do NOT assume that doses reported as stable for a 22ml volume will also apply to an 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 please contact the Specialist Palliative Care Team (SPCT) or the Hospital Pharmacy.

For advice on the compatibility of drugs in the following situations please contact the SPCT or Hospital Pharmacy:

- Drug combinations not listed 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%).

HSSD staff please contact pharmacy for advice by either calling medicines information (442628) or bleeping your ward pharmacist. Outside normal pharmacy hours contact the SPCT (876555) or the on-call pharmacist via the site manager (442000).

Staff working in the community setting should contact the SPCT (876555) for advice.

The information in Charts 1-4 and Tables 1-6 has been obtained for the below references and is only valid at the time of writing.

Dickman A., & Schneider J. (2011) *The Syringe Driver: Continuous subcutaneous infusions in palliative care (3rd ed.)*. Oxford: Oxford University Press.

Palliative Care Guidelines: NHS Scotland. (2015) *Syringe Pumps*. Retrieved from: http://www.palliativecareguidelines.scot.nhs.uk/guidelines/end-of-life-care/syringe-pumps.aspx

Palliative Care Matters. *Syringe Drivers: Drug Compatibility Database*. Retrieved from: http://www.pallcare.info/mod.php?mod=sdrivers&menu=14

Twycross R, Wilcock A, Howard P. (2014) PCF5: Palliative Care Formulary (5th Ed.) Oxford: Radcliffe Medical Press.

How to use the compatibility charts and tables:

Refer to Charts 1-4 to make an initial assessment of the appropriateness of the TWO or THREE drug combination prescribed in the syringe pump, and their likely compatibility and stability in water for injections.

If the combination is deemed appropriate refer to the relevant Table (1-6), to confirm the maximum concentration of the drug combination which is physically stable (NOTE: these are NOT recommended doses to prescribe).

If the drug combination prescribed is not listed in Tables 1-6 (i.e. it may not include an opiate), or the doses exceed the stated maximum stable concentration contact the SPCT or hospital pharmacy for advice.

Key:

- Reported as compatible. Should be OK to proceed, but refer to Tables 1-6.
- No data — No compatibility data available. Contact pharmacy / SPCT for advice.
- Not applicable or combination not generally recommended. Refer back to prescriber.
- Pharm — Compatibility concentration dependent. See Tables 1-6 or contact pharmacy / SPCT.
- Do not use, incompatible at usual concentrations. Refer back to prescriber.

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

	Cyclizine	Diamorphine	Glycopyrronium	Haloperidol	Hyoscine hydrobromide	Levomepromazine	Metoclopramide	Midazolam	Morphine
Cyclizine									
Diamorphine	Pharm								
Glycopyrronium	No data								
Haloperidol		Pharm	No data						
Hyoscine hydrobromide									
Levomepromazine									
Metoclopramide				No data					
Midazolam	Pharm								
Morphine sulfate				Pharm				Pharm	
Oxycodone	Pharm								

Chart 1. Compatibility chart for TWO drugs in water for injections

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

	Cyclizine	Glycopyrronium	Haloperidol	Hyoscine hydrobromide	Levomepromazine	Metoclopramide
Diamorphine + Glycopyrronium	No data					
Diamorphine + Haloperidol	Pharm					
Diamorphine + Hyoscine hydrobromide						
Diamorphine + Levomepromazine						
Diamorphine + Metoclopramide						
Diamorphine + Midazolam	Pharm					

Chart 2. Compatibility chart for DIAMORPHINE: THREE drugs in water for injections

	Cyclizine	Glycopyrronium	Haloperidol	Hyoscine hydrobromide	Levomepromazine	Metoclopramide
Morphine sulfate + Glycopyrronium	No data					
Morphine sulfate + Haloperidol		No data				
Morphine sulfate + Hyoscine hydrobromide	No data					
Morphine sulfate + Levomepromazine		No data		No data		
Morphine sulfate + Metoclopramide						
Morphine sulfate + Midazolam						

Chart 3. Compatibility chart for MORPHINE SULFATE: THREE drugs in water for injections

	Cyclizine	Glycopyrronium	Haloperidol	Hyoscine hydrobromide	Levomepromazine	Metoclopramide
Oxycodone + Glycopyrronium	Pharm					
Oxycodone + Haloperidol	Pharm	No data				
Oxycodone + Hyoscine hydrobromide	No data					
Oxycodone + Levomepromazine		Pharm				
Oxycodone + Metoclopramide						
Oxycodone + Midazolam	Pharm	Pharm				

Chart 4. Compatibility chart for OXYCODONE: THREE drugs in water for injections

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

FIGURES STATED IN THE TABLES ARE NOT CLINICAL DOSES TO PRESCRIBE.
Please see Appendix 3 for information on the usual dose ranges for each medication.

Drug combinations	MAXIMUM CONCENTRATIONS of TWO drug combinations that are physically stable	
	17ml in 20ml syringe	22ml in 30ml syringe
Diamorphine Cyclizine	550mg 150mg	550mg 150mg
Diamorphine Glycopyrronium bromide	425mg 1.2mg	550mg 1.2mg
Diamorphine Haloperidol	800mg 10mg	1000mg 10mg
Diamorphine Hyoscine HYDRObromide	1000mg 2.4mg	1000mg 2.4mg
Diamorphine Levomepromazine	850mg 100mg	1000mg 100mg
Diamorphine Metoclopramide	1000mg 85mg	1000mg 110mg
Diamorphine Midazolam	560mg 80mg	720mg 80mg

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

Drug combinations	MAXIMUM CONCENTRATIONS of TWO drug combinations that are physically stable	
	17ml in 20ml syringe	22ml in 30ml syringe
Morphine sulfate Cyclizine	300mg 150mg	380mg 150mg
Morphine sulfate Glycopyrronium bromide	300mg 1.2mg	380mg 1.2mg
Morphine sulfate Haloperidol	400mg 10mg	500mg 10mg
Morphine sulfate Hyoscine HYDRObromide	450mg 1.2mg	580mg 1.2mg
Morphine sulfate Levomepromazine	300mg 100mg	380mg 100mg
Morphine sulfate Metoclopramide	120mg 50mg	160mg 70mg
Morphine sulfate Midazolam	300mg 30mg	380mg 35mg

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

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

FIGURES STATED IN THE TABLES ARE NOT CLINICAL DOSES TO PRESCRIBE.
Please see Appendix 3 for information on the usual dose ranges for each medication.

Drug combinations	MAXIMUM CONCENTRATIONS of TWO drug combinations that are physically stable	
	17ml in 20ml syringe	**22ml in 30ml syringe**
Oxycodone Cyclizine	50mg 150mg	200mg 100mg
Oxycodone Glycopyrronium bromide	30mg 0.5mg	40mg 0.6mg
Oxycodone Haloperidol	140mg 10mg	180mg 10mg
Oxycodone Hyoscine HYDRObromide	130mg 1.2mg	160mg 1.2mg
Oxycodone Levomepromazine	120mg 100mg	150mg 100mg
Oxycodone Metoclopramide	80mg 40mg	100mg 50mg
Oxycodone Midazolam	80mg 40mg	100mg 50mg

Table 3. 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.
Please see Appendix 3 for information on the usual dose ranges for each medication.

Drug combinations	MAXIMUM CONCENTRATIONS of THREE drug combinations that are physically stable	
	17ml in 20ml syringe	22ml in 30ml syringe
Diamorphine Cyclizine Glycopyrronium bromide	No data available	No data available
Diamorphine Cyclizine Haloperidol	800mg 150mg 10mg	800mg 150mg 10mg
Diamorphine Cyclizine Hyoscine HYDRObromide	60mg 150mg 1.6mg	No data available
Diamorphine Cyclizine Midazolam	630mg 150mg 40mg	No data available
Diamorphine Glycopyrronium bromide Haloperidol	130mg 1.6mg 10mg	No data available
Diamorphine Glycopyrronium bromide Levomepromazine	70mg 1.6mg 100mg	No data available
Diamorphine Glycopyrronium bromide Midazolam	120mg 1.6mg 30mg	No data available
Diamorphine Haloperidol Hyoscine HYDRObromide	230mg 10mg 1.6mg	No data available
Diamorphine Haloperidol Metoclopramide	80mg 10mg 60mg	No data available
Diamorphine Haloperidol Midazolam	800mg 7mg 65mg	1000mg 10mg 80mg
Diamorphine Hyoscine HYDRObromide Levomepromazine	450mg 2.4mg 100mg	No data available
Diamorphine Hyoscine HYDRObromide Midazolam	720mg 1.6mg 40mg	No data available
Diamorphine Levomepromazine Midazolam	800mg 100mg 60mg	1000mg 100mg 75mg
Diamorphine Metoclopramide Midazolam	420mg 60mg 20mg	540mg 75mg 25mg

Table 4. Compatibility table for DIAMORPHINE: 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.
Please see Appendix 3 for information on the usual dose ranges for each medication.

Drug combinations	MAXIMUM CONCENTRATIONS of THREE drug combinations that are physically stable	
	17ml in 20ml syringe	22ml in 30ml syringe
Morphine sulfate Cyclizine Glycopyrronium bromide	No data available	No data available
Morphine sulfate Cyclizine Haloperidol	90mg 115mg 3mg	190mg 150mg 10mg
Morphine sulfate Cyclizine Hyoscine HYDRObromide	No data available	No data available
Morphine sulfate Cyclizine Midazolam	90mg 115mg 20mg	120mg 150mg 30mg
Morphine sulfate Glycopyrronium bromide Haloperidol	No data available	No data available
Morphine sulfate Glycopyrronium bromide Levomepromazine	No data available	No data available
Morphine sulfate Glycopyrronium bromide Midazolam	25mg 1.2mg 15mg	45mg 1.2mg 40mg
Morphine sulfate Haloperidol Hyoscine HYDRObromide	310mg 7mg 0.9mg	400mg 10mg 1.2mg
Morphine sulfate Haloperidol Metoclopramide	20mg 1.5mg 25mg	15mg 1.5mg 80mg
Morphine sulfate Haloperidol Midazolam	100mg 5mg 20mg	130mg 6mg 25mg
Morphine sulfate Hyoscine HYDRObromide Levomepromazine	No data available	No data available
Morphine sulfate Hyoscine HYDRObromide Midazolam	20mg 0.8mg 20mg	30mg 1.2mg 10mg
Morphine sulfate Levomepromazine Midazolam	90mg 20mg 35mg	120mg 30mg 50mg
Morphine sulfate Metoclopramide Midazolam	90mg 20mg 20mg	120mg 30mg 30mg

Table 5. Compatibility table for MORPHINE SULFATE: 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.
Please see Appendix 3 for information on the usual dose ranges for each medication.

Drug combinations	MAXIMUM CONCENTRATIONS of THREE drug combinations that are physically stable	
	17ml in 20ml syringe	22ml in 30ml syringe
Oxycodone Cyclizine Glycopyrronium bromide	No data available	70mg 150mg 1.2mg
Oxycodone Cyclizine Haloperidol	100mg 150mg 3mg	180mg 150mg 10mg
Oxycodone Cyclizine Hyoscine HYDRObromide	No data available	No data available
Oxycodone Cyclizine Midazolam	30mg 100mg 5mg	160mg 150mg 10mg
Oxycodone Glycopyrronium bromide Haloperidol	No data available	No data available
Oxycodone Glycopyrronium bromide Levomepromazine	70mg 0.8mg 12.5mg	80mg 0.6mg 25mg
Oxycodone Glycopyrronium bromide Midazolam	25mg 1.2mg 25mg	No data available
Oxycodone Haloperidol Hyoscine HYDRObromide	80mg 4mg 1mg	100mg 5mg 1.2mg
Oxycodone Haloperidol Metoclopramide	35mg 0.75mg 30mg	No data available
Oxycodone Haloperidol Midazolam	80mg 4mg 15mg	100mg 5mg 20mg
Oxycodone Hyoscine HYDRObromide Levomepromazine	No data available	100mg 1.2mg 25mg
Oxycodone Hyoscine HYDRObromide Midazolam	25mg 0.8mg 25mg	30mg 1.2mg 10mg
Oxycodone Levomepromazine Midazolam	40mg 40mg 25mg	50mg 50mg 30mg
Oxycodone Metoclopramide Midazolam	40mg 25mg 25mg	50mg 30mg 30mg

Table 6. Compatibility table for OXYCODONE: THREE drugs in water for injections

APPENDIX SIX: 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)	
			APPROVED DRUG NAME	DOSE
/ / :	17ml or 22ml (CIRCLE)	24 HOURS		
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

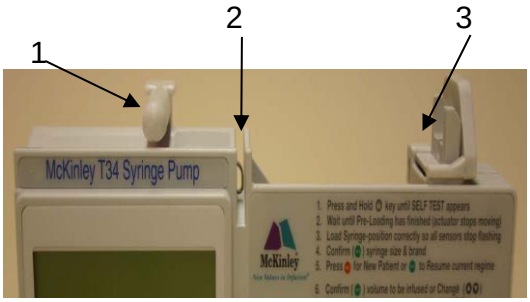
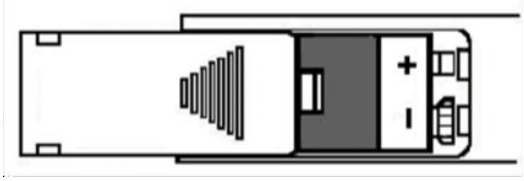
Date	Time	Amount discarded (ml)	Reason	Discarded by (Signature)	Witnessed by (Signature)

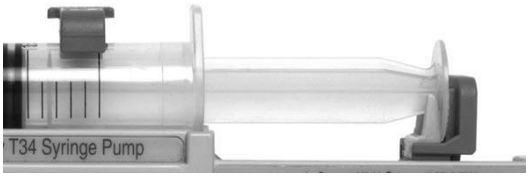
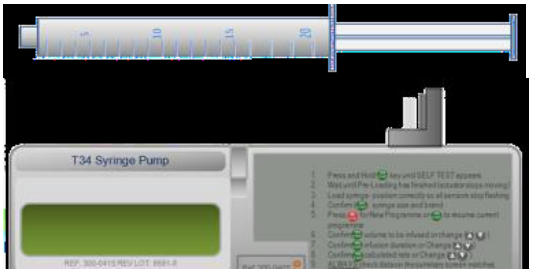
***Codes for specific problems:**

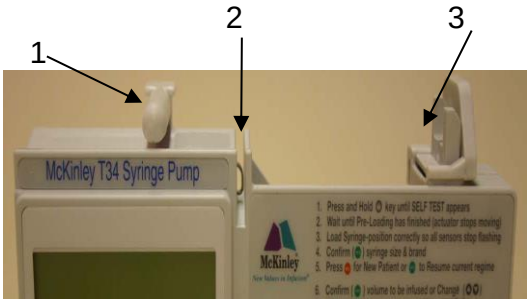
BL = Bleeding
BR = Bruising
C = Crystallisation
CC = Colour Change
L = Leakage
O = Other (specify)
P = Pain
R = Redness
SW = Swelling

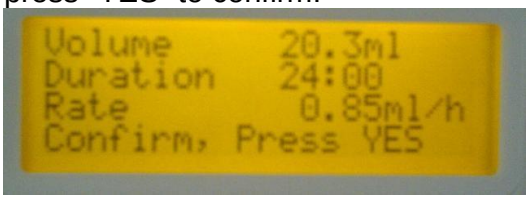
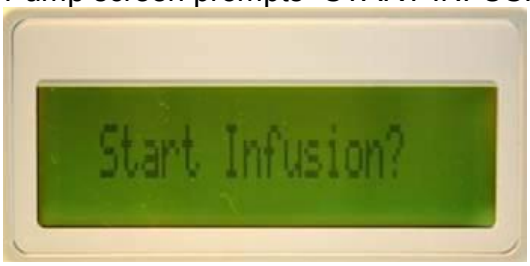
APPENDIX SEVEN: Set-up Procedure

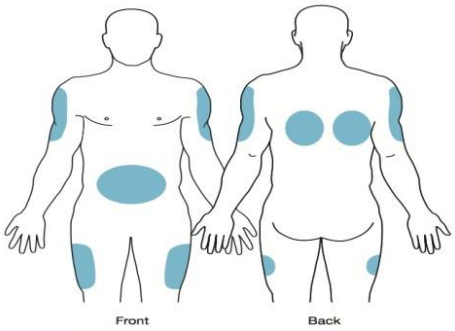
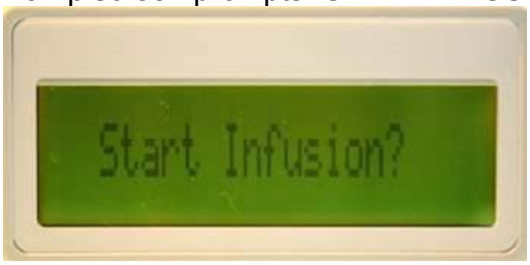
	Action	Rationale
1	Discuss the use of the syringe pump and explain the procedure to the patient, and if appropriate the family. Document the outcome of this discussion in patient notes.	To obtain informed consent and care concordance.
	Breakthrough medication will be required to control symptoms in addition to the syringe pump medications, and until the infusion takes effect.	Due to the slow rate of infusion there can be up to a 4 hour lag period until optimal levels of medication are reached (Twycross et al 2014).
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 Diamorphine first (if prescribed) with at least 1ml of the diluent, then add the second and third drugs where required, adding more diluent to give total volume.	To reduce the risk of precipitation and particulate siphonage (Greater Glasgow and Clyde NHS 2009).
	Recommended volumes are: **20ml syringe - fill to 17ml** **30ml syringe - fill to 22ml**	Diluting the mixture reduces risk of adverse site reactions and incompatibility (Dickman et al 2005).
	McKinley recommend a maximum volume of 18ml (20ml syringe) and 23.5ml (30ml syringe) respectively.	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 Specialist Palliative Care Team and/or Hospital Pharmacy.
	Only Luer lock syringes should be used.	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 (McKinley Medical UK 2006).
	Ensure the correct dosage is withdrawn from medication ampoules, certain ampoules contain an 'overage' which can lead to the incorrect dosage being given.	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 (Twycross et al 2014). Contact the Prescriber, the Specialist Palliative Care Team 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 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.

	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 community, and less than 10% life remaining in a hospital/hospice in-patient 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 in HSSD, FNHC and Hospice 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. • Anteriolateral aspects of the thigh. • Anteriomedial aspects of the thigh. • Anterior aspects of upper arm. Avoid broken/irradiated skin, oedema, bony prominences (Mitten 2001). Avoid the 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. (Mitten 2001)
19	Insert the needle of the infusion set bevel facing down at an angle of 45 degrees into a pinched skin fold and following the natural curves of the skin. Use a dressing to secure the line in place. A transparent dressing (e.g. Smith & Nephew IV3000 1-Hand or equivalent) should be used. 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 (Wilson 2000). 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 up to 4 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 (Dickman et al 2005).

	Action	Rationale
23	**Complete documentation:** • Prescription and monitoring chart. • If used Controlled Drug book/or medication stock sheets in the Community patient care record. • 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 HSSD, FNHC 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. (Medical Device Agency (MDA), 2003) 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 information leaflet (Appendix 2) 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: **HSSD** - 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. Clean the pump and the lockbox (do not immerse pump in water). 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 (HSSD). As per Medicines Policy (FNHC & JHC). It is acknowledged that in some community 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 EIGHT: 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 condition of patient and 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.

(Greater Glasgow and Clyde NHS 2009)

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.

APPENDIX NINE: Audit Tool for Monitoring Concordance with Syringe Pump Policy

Audit tool for assessing use of Syringe Pumps

Each organisation should determine when, and for how long they will undertake this audit. If needed the Specialist Palliative Care Team (Tel. 01534 876555) can be contacted for advice.

The audit should be done in 'real time', and wherever possible the form should be completed within the first 24 hours of a patient being commenced on a syringe pump. Only ONE form needs to be completed for each patient.

Any patient safety/high risk issues identified while completing the audit should be immediately escalated to the nurse looking after the patient and/or the ward manager/team leader as deemed appropriate.

Date		Patient ID No. (preferably URN)		Ward / Organisation (Community)	

Yes = Standard completed No = Not completed N/A = Not Applicable

Training and Competence	Yes	No	N/A	Suggestions / Comments
The ward/organisation keeps a record of staff trained and competent to use the syringe pump.				
Use of Policy and Guidelines	**Yes**	**No**	**N/A**	**Suggestions / Comments**
The syringe pump policy and associated guidelines are easily accessible (either in electronic/paper form) for staff to refer to.				
There is a McKinley T34 pump operation manual available for staff to refer to.				
Rationale for Syringe Pump use	**Yes**	**No**	**N/A**	**Suggestions / Comments**
There is documented evidence of a discussion between the multi-disciplinary team and patient (and/or carers) regarding the decision to administer medication via a syringe pump.				
Syringe Pump Chart: Prescription section states	**Yes**	**No**	**N/A**	**Suggestions / Comments**
Date and Time prescribed.				
Medication (approved names) and Doses.				
Diluent and Total Volume.				
Prescriber Signature, Printed Name and Contact details.				
Syringe pump set-up	**Yes**	**No**	**N/A**	**Suggestions / Comments**
Site for subcutaneous infusion is suitable (see Syringe Pump Policy, Appendix 7).				
Subcutaneous infusion set has been firmly secured, using an appropriate dressing.				
The rate (ml/hour) has been set correctly.				
Correct syringe has been used, the size is appropriate to accommodate drug volume and diluent, and it is a luer lock (e.g. BD Plastipak 20ml or 30ml).				
There is evidence that the syringe pump has been serviced annually.				

Syringe Pump Infusion Label	Yes	No	N/A	Suggestions / Comments
Signed label attached to syringe barrel, and volume scale visible.				
Date and time of pump set-up recorded.				
Syringe pump contents recorded.				
Total volume of fluid is recorded (ml).				
Syringe Pump Chart: Administration and Monitoring section	**Yes**	**No**	**N/A**	**Suggestions / Comments**
Date and time pump set-up recorded.				
Signature(s) of staff setting up syringe stated.				
Evidence is documented that pump rate, infusion site, line, and syringe has been checked at least 4 hourly (HSSD/Hospice IPU/ Nursing Homes) or each visit (Community).				
Evidence is documented that if the infusion site has become inflamed, painful or leaked, it was responded to promptly.				
If a syringe has been discarded it was recorded in the appropriate section of chart.				
Overall	**Yes**	**No**	**N/A**	**Suggestions / Comments**
Syringe pump chart is legible.				
No alterations to existing prescriptions.				
Discontinued medication crossed through with a single diagonal line.				
Discontinued medication dated and signed.				

High risk issues identified:	**Immediate actions taken:**
Escalated to:	**Role:**
Auditor (Print Name):	**Role:**
Auditor (Signed):	**Date:**

On completion of the audit please photocopy the form and given one copy to the ward manager (HSSD/Hospice IPU), or your team leader (Community).

Please send the original copy to the Specialist Palliative Care Pharmacist based at Jersey Hospice Care (Clarkson House, Le Mont Cochon, Jersey, JE2 3JB) who will collate the audit data island wide.

APPENDIX TEN: Contact Details

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

<table>
<tr><td>Specialist Palliative Care Team (Hospital)
(via the hospital switchboard)</td><td>Tel: 01534 442000</td></tr>
<tr><td>HSSD Medicines Information</td><td>Tel: 01534 442628</td></tr>
<tr><td>Specialist Palliative Care Team (24/7 service)</td><td>Tel: 01534 876555</td></tr>
<tr><td rowspan="2">On-call Palliative Care Consultant (Southampton)</td><td>HSSD*
Tel: 01534 442000</td></tr>
<tr><td>Community (via SPCT)
Tel: 01534 876555</td></tr>
</table>

* 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 switchboard.