Liverpool Heart and Chest Hospital NHS
NHS Foundation Trust

McKinley Syringe Driver

e-LfH
e-Learning for Healthcare

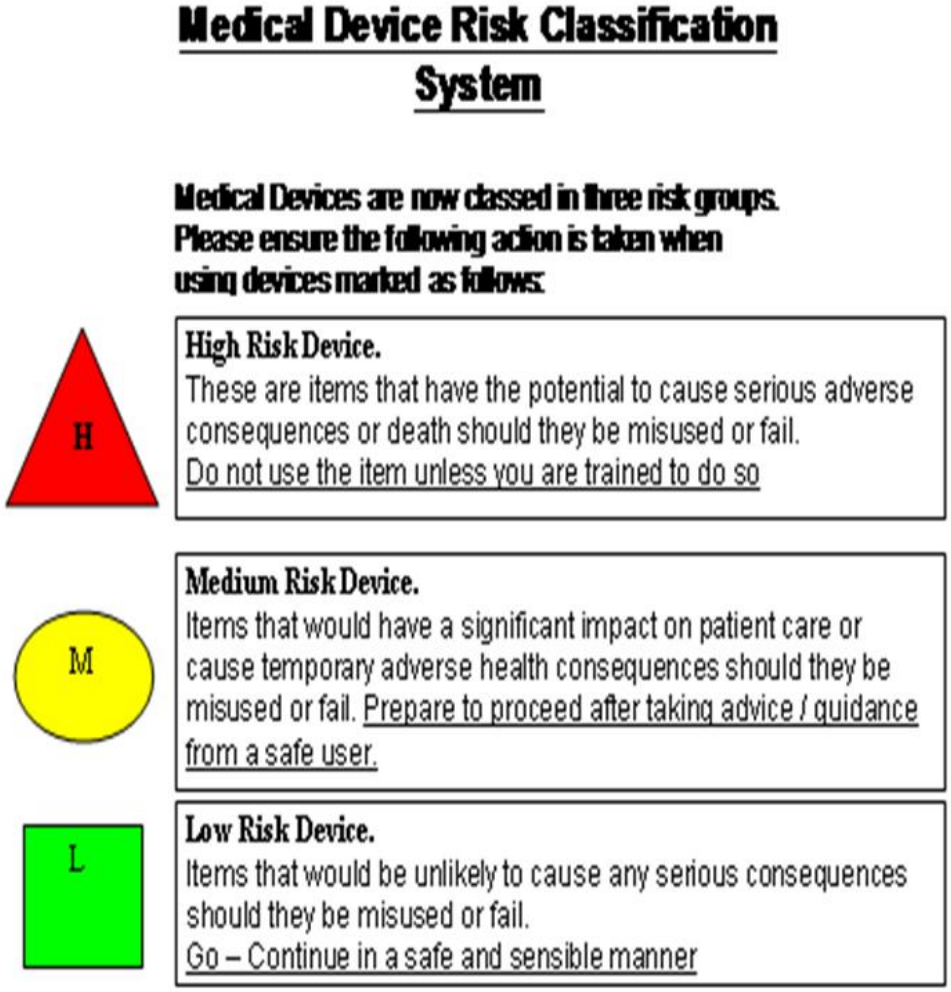
NHS
Health Education England

Inspected and rated
Outstanding ☆
CareQuality Commission

Learning Objectives

By the end of the session you will be able to:

- List the reasons a syringe driver may be used
- Understand which medications are commonly used in a syringe driver
- Use the Saf T Intima giving set
- Know how to set up the syringe driver
- Understand why the syringe driver may alarm and how to problem solve
- Understand the importance of communicating with patients and those important to them, the reasons we are using a syringe driver



- The Syringe driver is classed as a High Risk Device as denoted by the Red Triangle
- Do not use the syringe driver unless training/competence has been attained

Why do we use a syringe driver?

One of the main reasons a palliative care team may choose a syringe driver in order to deliver medication to the patient is when the patient is entering the dying phase of their life. The person may not be able to take medications orally. This may be due to them being in a semi-comatose state or unconsciousness.

When this is the case, the administration of drugs is essential to maintain symptom control. At the end of a person's life we prescribe in 'anticipation' of five symptoms which may or may not present as the person enters the dying phase:

- Pain
- Agitation
- Nausea and/or vomiting
- Breathlessness
- Chest secretions

Why do we use a syringe driver?

Other reasons for using a syringe driver may be to provide an alternative route for the administration of medicines. For example,

- Severe nausea and vomiting that temporarily prevents the use of oral medicines may need a syringe driver to gain control of symptoms.
- Dysphagia and throat lesions may make swallowing oral medications difficult
- Oral, oesophageal and intestinal obstruction can cause the person great distress, pain and induce nausea and vomiting when taking medications orally
- In a patient with poor absorption, taking oral medications can be ineffective and symptoms can be more effectively managed by the administration of medications via a syringe driver route

NB It may be possible to revert back to the use of oral medicines once control of the nausea and vomiting is achieved.

Which drugs do we use in a McKinley syringe driver?

Drug	Indication
Morphine	Pain, breathlessness
Oxycodone	Pain , breathlessness
Alfenatnil	Pain used in renal failure
Cyclizine	Nausea & vomiting
Midazolam	Agitiation
Haloperidol	Nausea & vomiting, hallucinations , hiccups
Levomepromazine	Nausea & vomiting, agitation
Metoclopramide	Nausea & vomiting
Hyoscine butlybromide	Intestinal obstruction
Hyoscine hydrobromide	Excess secretions
Glycopyrronium	Excess secretions

Guidance on Prescribing Drugs to be used in the Mckinley Syringe Driver

GUIDANCE ON PRESCRIBING DRUGS TO BE GIVEN SUBCUTANEOUSLY VIA SYRINGE DRIVER OR AS REQUIRED

PRESCRIBING OPIOIDS – It is the responsibility of the prescriber to ensure that guidelines are followed when prescribing opioids. Advice should be sought if prescribing outside of these guidelines or when the limits of own expertise is reached (Ref: NPSA Alert/2008/RRR05)

IMPORTANT - PRESCRIBING MEDICATION TO BE GIVEN VIA SYRINGE DRIVER

PRESCRIBE ONLY DRIVER-MEDICATION THAT IS REQUIRED TO CONTROL PATIENT'S CURRENT SYMPTOMS BUT ENSURE 'AS REQUIRED' MEDICATION PRESCRIBED FOR ALL SYMPTOMS.

OPIOIDS FOR PAIN RELIEF

MORPHINE and DIAMORPHINE may be used subcutaneously, see conversion boxes below.

OPIOID NAIVE PATIENT IN PAIN - Prescribe **MORPHINE** 10mg/24 hours or **DIAMORPHINE** 7.5mg/24 hours and an as required dose of 2.5-5mg s/c hourly PRN for either opioid. (Avoid in renal failure) Diamorphine not commonly used in hospital setting.

OXYCODONE- If a patient is established on oral **OXYCODONE** convert to the subcutaneous route as below. (Avoid in renal failure)

TRANSDERMAL OPIOID PATCHES. FENTANYL/ TRANSTEC/BUTRANS – in dying phase patch should remain in situ and be replaced regularly according to the prescribing guidance for individual patches. If patient has pain, seek advice from specialist palliative care team. **DO NOT COMMENCE PATCHES IN THE DYING PHASE.**

ALFENTANIL is the Opioid of choice in renal failure patients. Liaise with SPCT for advice

CONVERSIONS OF OPIOIDS FROM ORAL TO SUBCUTANEOUS ROUTE

MORPHINE	OXYCODONE	DIAMORPHINE	AS REQUIRED DOSES
Subcutaneous dose is HALF of total daily oral dose. **eg. MORPHINE MR** 30mg BD = 60mg orally/24 hours Prescribe 30mg over 24 hours via syringe driver	**Subcutaneous dose is HALF of total daily oral dose** **eg. OXYCODONE MR** 30mg BD =60mg orally/24 hours. Prescribe 30mg over 24 hours via syringe driver	**Subcutaneous dose is 1/3rd of total oral daily dose of morphine** **eg. MORPHINE MR** 30mg BD = 60mg/24 hours. Diamorphine not commonly used in hospital setting	**Prescribe 1/6th of the 24 hour dose** ***Please ensure the same drug is prescribed PRN as used in the syringe driver* (with the exception of alfentanil)** **eg MORPHINE,DIAMORPHINE**

OTHER SYMPTOMS- DOSES SUBCUTANEOUSLY OVER 24 HOURS.

AGITATION	**MIDAZOLAM** 10-30mg.
NAUSEA	**LEVOMEPROMAZINE** 6.25mg-25mg **or** **CYCLIZINE** 150mg (avoid in heart failure) (Max 150mg/24 hrs including PRN) in heart failure use **METOCLOPRAMIDE** 30mgs
BRONCHIAL SECRETIONS	**GLYCOPYRRONIUM** 600-2400micrograms or **HYOSCINE HYDROBROMIDE** 1200-2400 micrograms.
DYSPNOEA	**MORPHINE** 5-10mg + **MIDAZOLAM** 5-10mg

MEDICATION WHICH SHOULD BE PRESCRIBED AS REQUIRED IN ANTICIPATION OF COMMON SYMPTOMS.

NAUSEA & VOMITING	**LEVOMEPROMAZINE** 6.25mg s/c 8 hourly PRN (max 25mgs in 24hrs) **CYCLIZINE** 50mgs s/c 8 hourly PRN (avoid in heart failure) (max 150mg in 24hrs) in heart failure use **Metoclopramide** 10mgs s/c 4 hourly PRN (30mgs in 24hrs)
AGITATION	**MIDAZOLAM** 2.5mg-5mg s/c PRN (Max 30mg in 24 hours including syringe driver)
BRONCHIAL SECRETIONS	**GLYCOPYRRONIUM** 200 micrograms s/c PRN (max 2400micrograms sc in 24 hours) or **HYOSCINE HYDROBROMIDE** 400micrograms s/c PRN (max 2400micrograms in 24hrs
DYSPNOEA	**MIDAZOLAM** 2.5mg-5mg sc 4 hourly PRN + **MORPHINE** 2.5-5mg sc 4 hourly PRN

SPECIALIST PALLIATIVE CARE OUT OF HOURS TELEPHONE ADVICE LINE 0845 223 2900

Specialist Palliative Care Team V2 2016

Drug related site reactions

- Incidence is variable
- Pain, redness and inflammation
- Related to irritant drugs e.g. levomepromazine, cyclizine
- Diluent
- Choice of infusion set
- Regular checks required 4hourly

How to set up the McKinley T34 Syringe Driver


Barrel Clamp
arm and sensor
Plunger Sensor
Actuator
McKinley T34 Syringe Pump
Time Remaining 23:49
Rate 0.7ml/h
20 ml BD Plastipak
INFO
YES START
NO STOP
FF
BACK
ON/OFF
1. Press and Hold key until START UP screens appear
2. Wait until Pre-Loading has finished (actuator stops moving)
3. Load Syringe-position correctly so all sensors stop flashing
4. Confirm ( ) syringe size & brand
5. Press for New Program or to Resume current program
NOTE:-Steps 6-8 are skipped if a pre-set duration is locked in.
Whilst delivering shows infusion data & battery life.
6. Confirm ( ) volume to be infused or Change ( )
7. Confirm ( ) infusion duration or Change ( )
8. Confirm ( ) calculated rate or Change ( )
9. ALWAYS check data on the summary screen matches prescription before pressing key to confirm acceptance
10. Press key to start infusion
Infusion light status indicator
green (running) red (stopped)
Syringe Flange/Collar
sensor

Step 1 - Pre- set up

- Explain the use of the syringe pump and medications to the patient and gain consent.
- Verify the patient's details with the prescription and documentation.
- Check the compatibility of prescribed medication(s) and diluent.
- Check the McKinley T34 is intact, with no parts damaged or missing and has been serviced within the last year.

Step 2 - Prepare the syringe and infusion line

- Draw up the prescribed medication(s) and compatible diluent ensuring total volume is made up to 15ml when using a 20mls luer lock syringe and 20mls when using a 30ml luer lock syringe

- Syringes should be made up immediately prior to administration.

- Complete and attach additive label to the syringe. Ensure that the label does not obscure visual inspection of the syringe for monitoring purposes

- Connect the butterfly infusion set to the syringe and prime the line.

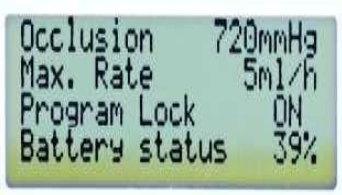
NB 20ml syringe will hold a maximum volume of 18mls
30mls syringe will hold a maximum volume of 24mls

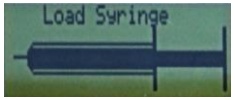
Step 3 - Pre-loading- before placing the syringe onto the pump

- Insert the battery at the back of the pump

- Ensure the barrel clamp arm is down
  - press and hold the on/of key until start up screen appears on the LCD display screen, followed by PRE-LOADING during which the actuator will start to move.

- Whilst the actuator is moving the self test screen is briefly displayed. This shows the pump's configuration.



- Wait until the actuator stops moving and 

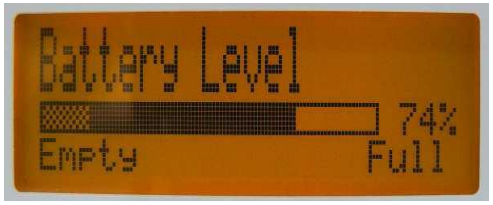
appears on the screen.

Note that during the pre-loading the actuator always returns to the position of the last infusion programmed. Use < and > Keys to move the actuator to the position required for loading the syringe. It is important to correctly position the actuator at this point to enable the syringe to be loaded correctly later !

Before loading the syringe

- Check the battery power: press the 

key until the battery level appears on screen



- Battery must be changed at 10% or less
- Battery life starting at 100% lasts approximately 3-5 days

**NB Important Medical Device Alert dated 28/03/2018 brings attention to need to check battery sizes are correct on insertion – see link:

MDA 010 T34 Ambulatory Syringe Pumps Risk of unintended pump shutdown and delay to treatment - Shortcut.lnk

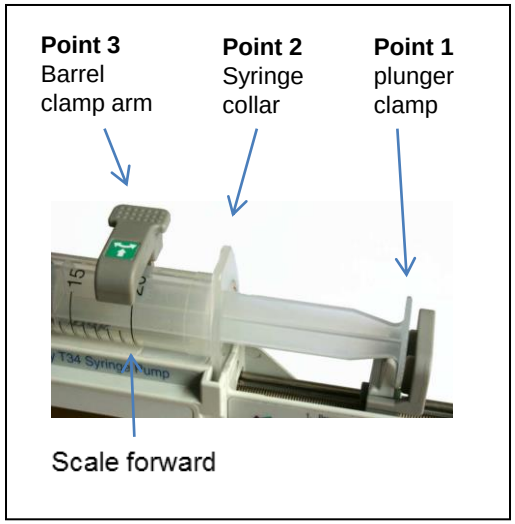
Step 4 - Place the syringe onto the pump

- **Ensure the infusion line is not connected to the patient at this point.**
- Lift and turn the barrel clamp arm.

- Place the filled syringe into the plunger (*point 1* on picture) and collar (*point 2*) sensors simultaneously.

- To click the syringe plunger in securely may require slight pressure. The syringe collar should be vertical and the scale on the syringe barrel facing forward.

- Turn and lower the barrel clamp arm to secure The syringe (*Point 3* on picture.)

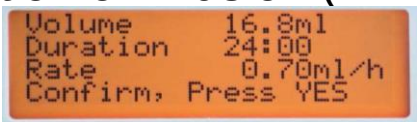


- The **'Load Syringe'** graphic on the screen ceases to flash when the syringe is correctly seated at all 3 points.
- **NB The syringe must be attached to the pump before being connected to the patient**

Step 5 – Programme the infusion

- The pump should recognise the brand and size of syringe. It is vital that the syringe used matches the syringe type recognised by the syringe driver
- Press 

if correct if incorrect use the up and down keys
- After syringe confirmation, the pump automatically calculates and displays the deliverable volume (in ml), duration of infusion (24 hrs) and rate of infusion (in ml per hour.)



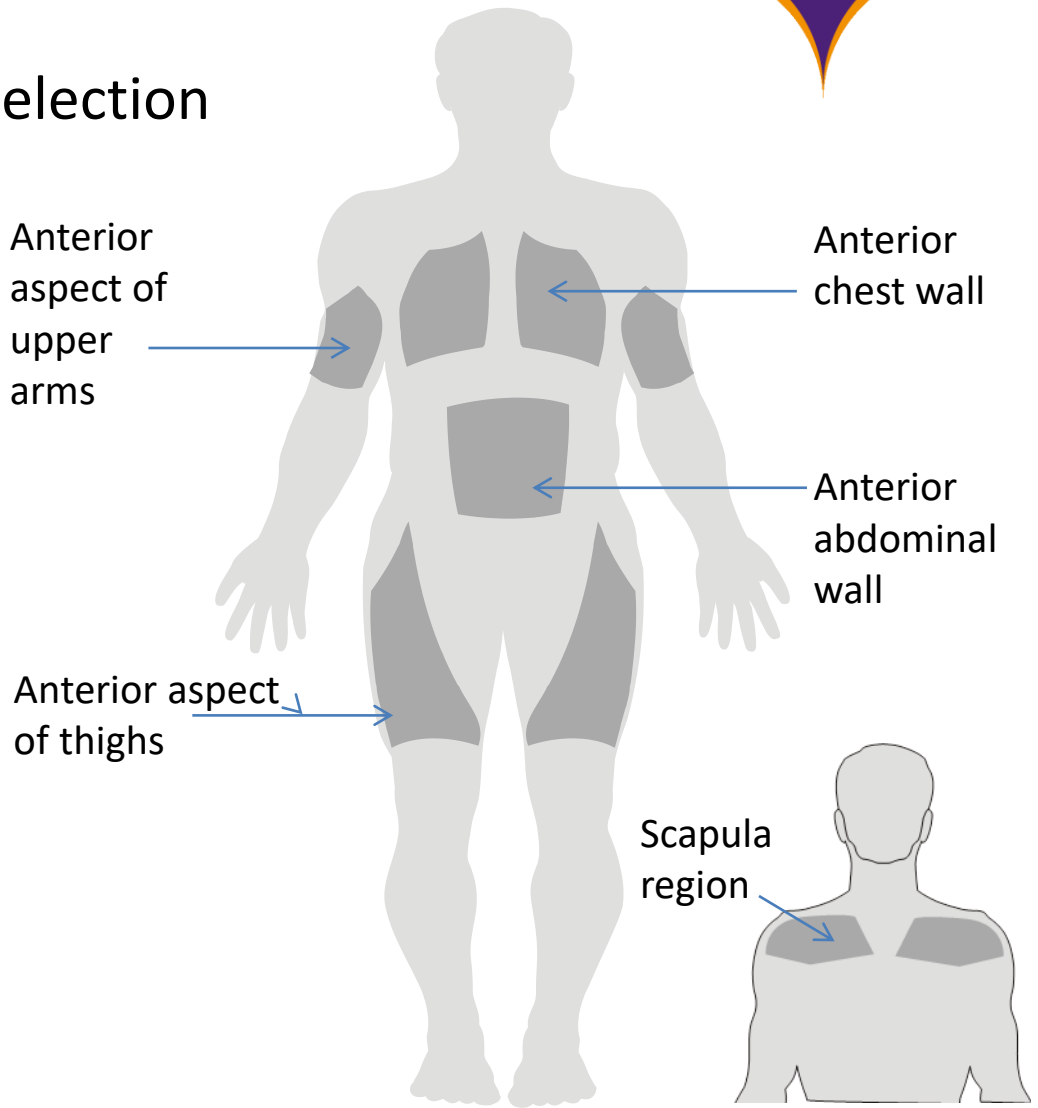
- **Check the details on the display screen are correct**. If correct press 

to confirm.
- If the infusion details are not correct press on/off to switch off the pump. Switch the pump back on. Reload the syringe and if the details are still not correct return the pump for servicing.
- The pump screen should then prompt 

- **But first site the Butterfly infusion line to the patient** , using the BD Saf-T-Intima safety needle system

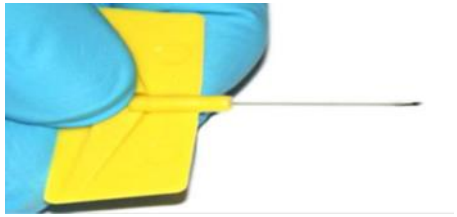
Step 6 - Syringe Driver site selection

- Clean the skin area
- Insert butterfly at 45 degree angle
- Avoid broken , irradiated or oedematous skin due to risk of infection and absorption of medications may be affected
- Avoid bony areas of joints and the upper chest wall in cachexic patients

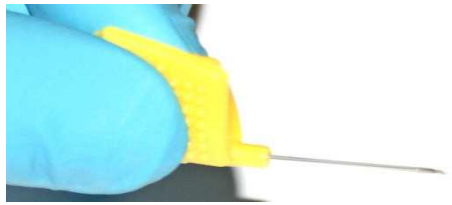


Step 7 - How to use a BD Saf T Intima system

- Clip excess hair from the selected site if appropriate. The skin should be clean. Disinfect the skin with an alcohol impregnated swab for at least 30 seconds and allow to air dry.
- The needle should be bevel side up, sharp side down.



- Pinch the wings to lock the needle in place



- Pinch subcutaneous tissue and insert the cannula at a 30-45 angle, bevel side up and sharp side down.

- Secure using a transparent dressing.
- Write date cannula changed on the dressing

Step 8 – Start the infusion

- With the butterfly inserted and connected the pump can now be started

- The pump screen should prompt 

Press 

to commence the infusion.

- To activate the keypad lock: press and hold the 

key until the progress bar appears and has moved completely across the screen from left (off = unblocked) to right (on = locked) and a beep is heard. The Keypad lock should be used routinely to prevent tampering during the infusion

- Place the syringe driver in a locked box as per Liverpool Heart & Chest Hospital's 'McKinley T34 Syringe Pump for Continuous Subcutaneous Infusion in Palliative Care' policy which reflects national guidelines.

Alarms

- 5 alarms (continuous bleep) will alarm if :
  - Syringe completed
  - Battery depleted
  - Syringe displaced
  - Barrel arm lifted
  - Occlusion
- 2 alarms : (15-30mins prior)
  - Battery near end of life
  - Syringe almost completed

Important practice points

- Protect the solution in the syringe from direct heat and light which may adversely affect stability of the medications.
- The syringe should be disconnected from the patient before removing from the pump in order to avoid inadvertent bolus of medication.
- Never add another medication to an infusion which is already in progress. Make up a new syringe for use. If the patient experiences breakthrough symptoms: use PRN medications.
- The rate should never be changed once the infusion is in progress. If the patient experiences breakthrough symptoms: use PRN medications.
- A separate butterfly can be inserted for intermittent subcutaneous injection
- The butterfly should be gently flushed with a diluent compatible with the PRN medications prior to and following administration.
- Complete care plan documentation.

Information for patients and those important to them on commencing a syringe driver

Initiating use of a syringe driver in a patient during palliative care may represent a significant and unwelcome milestone for the patient and their family because syringe drivers are often required when a patient is close to death.
It is helpful to have discussions with both the patient (if appropriate) and those important to them about what starting a syringe driver actually means. Topics of conversation can include:

- Any past experience they have had with syringe drivers
- The stage of illness they are at and what using a syringe driver means for them for the future, e.g. prognosis
- Reassurance that syringe drivers do not always mean that death is imminent
- Explanation that a syringe driver allows the symptoms associated with the process of dying to be managed, but does not speed up the process of dying
- Addressing any fears or anxieties about the syringe driver, including the medicines used, e.g. opioids
- Advance care planning options and specific advance care directives

To Conclude

- Syringe drivers are not just for the dying patient but are also used in patients who require symptom management which may be for a temporary period of time only. They are also used frequently in respiratory care (Bricanyl)
- Syringe drivers are classed as a high risk equipment and training is essential
- Dilution of medications are important and the recommended min total volume 15mls in 20mls
- On going assessment is vital
- PRN medications should be given via appropriate route with maximum dose indicated
- Use of order set for EOL prescribing should be utilised

The Liverpool Heart and Chest training video and booklets are available on intranet. The training video can be viewed via the following link:

J:\LHCH Staff Events\Video\McKinley device video new.mp4