West Lothian Healthcare NHS Trust

NHS Lothian

Subcutaneous Infusion by Graseby MS26 Daily Rate Syringe Driver

For Symptom Control in Palliative Care

- Safety and Hazards
- Procedure for initiating an infusion by Syringe Driver
- Monitoring
- Renewing the syringe
- Medications
- Points for practice
- Sources of help and advice

Indications for use

To obviate the need for regular injections when medications cannot be swallowed or absorbed eg. persistent nausea and/or vomiting, dysphagia, impaired consciousness.

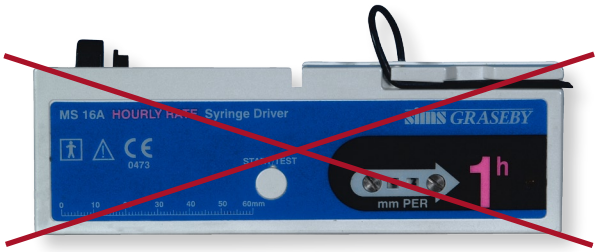
Equipment

- Graseby MS26 daily rate syringe driver with clear plastic cover and holster
- 9v Alkaline battery
- **luer lok** syringe 20ml/30ml
- Diluent
- Transparent dressing
- Green needle
- 25g winged infusion set
- syringe driver additive label

Safety checks must always be performed prior to commencing an infusion by syringe driver. ENSURE;

1. The syringe driver for use is the Graseby MS26 **daily** rate syringe driver.

The MS26 **daily** rate syringe driver (green front facing) should be the only model of syringe driver used in West Lothian. Other models including the MS16a **hourly** rate syringe driver (blue front facing) are used in other geographical areas.



Fatalities have occured when the MS16a hourly rate syringe driver has been set at the daily rate used with the MS26.
ie. the contents of the syringe have been administered over 1 hour rather than 24 hours thus overdosing the patient.

2. The syringe driver should be intact with no parts missing.

3. Battery: check date first used. If new - record date on battery - each should last for 50 daily cycles.

4. Insert the battery into the syringe driver: the alarm will sound. Press and hold the Start/Boost button. The syringe driver will self test: the motor will make a whirring noise and stop after 10 seconds, the alarm will sound for 15 seconds. Releasing the Start/Boost button starts the syringe driver.

5. Check the indicator light is flashing. The light should flash approximately once per 30 secs.

6. The syringe driver is then ready for use. Remove the battery until ready to commence the infusion.

7. Check the compatibility of medications and diluent as per Lothian Palliative Care Guidelines - Syringe Driver in Palliative Care or as advised by Specialist Palliative Care Services. Check with Pharmacy if in doubt.

Prescription

Should state:

- Patient identification: Name, DOB, unit number
- Date of prescription
- Generic name of the medications for infusion by syringe driver
- Dose
- Route and duration of infusion eg. Continuous subcutaneous infusion over 24 hours
- Prescriber's signature

Procedure

1. Explain the procedure to the patient and gain consent.

2. In the hospital setting order a prefilled syringe from Pharmacy where possible.

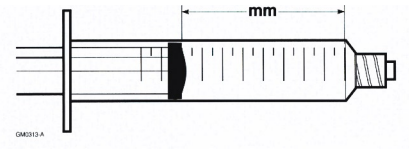
3. In the community or out of Pharmacy hours, draw up the medication in the syringe using diluent to dissolve, then add the second drug where required, adding more diluent to the total volume in the syringe. This is approximately **14mls** in a **20m**l syringe and **17mls** in a **30ml** syringe for stability of the drug combinations listed in the Lothian Palliative Care Guidelines.

Only Luer lok syringes should be used.

4. Invert the syringe to mix, observing for cloudiness or precipitation. Discard if this occurs and contact Pharmacy for advice.

5. Complete and attach a syringe additive label taking care not to obscure the markings on the syringe for monitoring purposes.

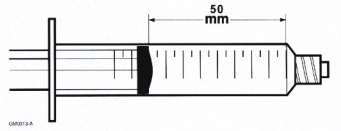
6. Connect the syringe to the infusion set. Prime the line manually. Measure the remaining volume in the syringe and document the volume at the start of infusion on the Syringe Driver Monitoring Form.



7. Set the rate in the syringe driver using rate adjusting key or paperclip.

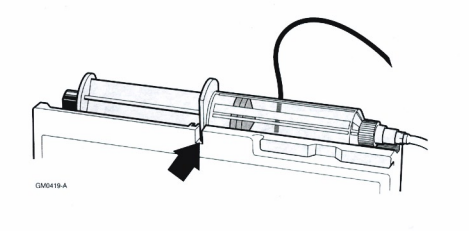
MS26 rate = mm per day (per 24hrs)
Fluid length in mm ÷ time in days = rate in mm per day (24hrs)

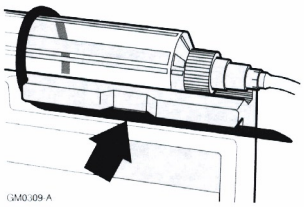
Eg.

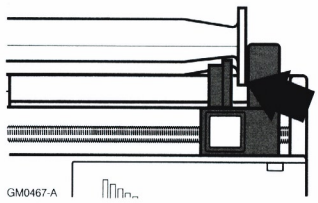


50mm ÷ 1 day = 50

8. Slot the syringe into the syringe driver with the flange of the syringe barrel in the vertical position. Secure the rubber strap over the syringe. Slide the end plate securely against the plunger of the syringe.

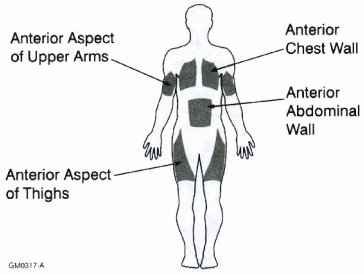






9. Site the infusion: consider mobility, care needs, access.
Avoid broken, irradiated or oedematous skin.
Avoid the upper chest wall in cachexic patients - danger of pneumothorax.

Insert butterfly at 45 degree angle, bevel facing down into the the subcutaneous tissue. Secure by looping the tubing and cover with transparent dressing.
Date dressing.



10. Insert the battery into the syringe driver. The syringe driver should alarm. Press the Start/ Boost button to commence the infusion. Check the indicator light is flashing and the rate setting is correct. Fit the clear protective cover with the hole placed over the Start/Boost button. Use the protective holster.

11. Ensure the syringe driver is not placed > 75cm above the infusion site to avoid the risk of syphonage.

12. Protect the medications in the syringe from light and heat.

13. Complete documentation.

Administering Analgesia via Syringe Driver

Refer to the Symptom Management section of the Lothian Palliative Care Guidelines: Pain Management in Palliative Care.

The starting dose of subcutaneous diamorphine is dictated by prior opioid use.

Patients who are opiate naive start dose = 10mg per 24 hours
Elderly/renal impairment = 5mg per 24 hours.

Patients already taking opiate analgesia:

Conversion ratio: 24 hr subcutaneous diamorphine dose = $\frac{\text{24hr oral morphine dose}}{3}$

1mg s/c diamorphine = 3mg oral morphine
eg.Oramorph / Sevredol / MST

Example;

MST 30mg 12 hourly = 60mg total oral morphine over 24 hours

=> 60 ÷ 3 = 20mg s/c diamorphine over 24 hours

PRN analgesia:

Ratio: Total 24 hour oral morphine / diamorphine ÷ 6 = prn dose

eg. MST 30mg 12 hrly = 60mg per 24 hrs ÷ 6 = 10mg oramorph / sevredol prn pain

Diamorphine 30mg over 24 hrs = 30mg ÷ 6 = 5mg diamorphine prn

Monitoring the Infusion

1. Frequency: **Hospital** = minimum 4hourly **Community** = at each visit / daily.
   Checks should be recorded on the Syringe Driver Monitoring Form.

2. Assess the patient: effect and side effects of medications.

3. Observe the skin site for erythema, leakage or swelling. The site should be changed as soon as this occurs as absorption of medications will be affected.

4. Observe the syringe and infusion set for kinks in the tubing, leakage and precipitation or discoloration of medication. Check the syringe is securely attached to the syringe driver.

5. Measure the volume remaining in the syringe. Calculate the amount infused over the previous 4 hours.
   eg. at rate setting 50mm per 24hrs: amount infused over 4 hrs = approx. 8mm.
   Never remove the syringe from the syringe driver to measure the remaining length.

6. Check the rate setting is correct and that the indicator light is flashing.

7. Complete documentation.

Renewing the Syringe

1. Consider the patient's symptoms and response to medication (prn + continuous infusion) to identify whether any changes to prescription are required.

2. If the skin site is satisfactory a new filled syringe can be attached to the infusion line every 24 hours following the above procedure.

3. Sites can be left intact if satisfactory for up to 7 days. When resited, the infusion should be placed at least 3cm from previous sites.

4. The syringe and the line should be completely changed when the medication prescription is altered.

5. A new infusion line should be used when a new site is required.

Key Points for Practice

1. **Syringes should be made up immediately prior to use. The medications within the syringe as listed in the Lothian Palliative Care Guidelines are stable for 24 hours. Pharmacy filled syringes will be labelled with the expiry date/time.**

2. **Managing breakthrough pain / symptoms:**

a. **PRN medications should be prescribed and administered to control breakthrough symptoms in addition to the medications via syringe driver.**

b. **The Start/Boost facility must not be used. It delivers too small a dose of medication for adequate symptom relief and administers a dose of all the medications in the syringe.**

c. **The rate of the syringe driver should NEVER be increased once the infusion is in progress. The lag time in effect of up to 4 hours means;**

- **The patient does not receive the medication they require to control the breakthrough symptoms at the time they need it but over time accumulation of medication can result in toxicity.**

- **The increased rate administers an increased dose of all the medications in the syringe.**

3. **If the syringe driver is dropped, damaged or gets wet - danger of malfunction - DO NOT USE and return to Medical Physics.**

Troubleshooting Problems in Infusion

Problem	Cause	Checklist	Action
Alarm sounds	Immediately after insertion of battery	This is part of the safety check - to ensure the battery is functioning and correctly placed.	Press the Start/Boost button and release. The indicator light should flash.
	Empty syringe / infusion ended	Expected Unexpected • Check equipment for malfunction	• Renew syringe. • Assess patient and inform medical staff. • Report incident. • Return unit to Medical Physics for repair.
	Syringe driver has stopped - due to back pressure being exerted on the activator.	Is the tubbing kinked or trapped? Is the solution too viscous or crystallised?	• Check line (straighten out or free tubing) • Stop infusion. • Check compatibility: seek advice. • Change the syringe and infusion set.
	Battery discharging whilst syringe driver is running.	The flashing light is a visible indicator that the battery is sufficiently charged to complete the infusion. Extinction of this light indicates a discharging battery.	• Check battery is inserted correctly. • If light is not flashing - replace battery.
	Malfunction		Return to Medical Physics for repair.
Periodic click sound	The mechanism for pushing the syringe plunger is worn and is slipping causing the click.	The infusion has completed but the motor is still running and there is **NO ALARM** sounding. The indicator light still flashes and there is a periodic click.	Return to Medical Physics for repair.
Indicator light has stopped flashing	Battery is low		Replace the battery. A new 9v alkaline battery should last for 50 days.
The syringe driver won't start	Inactivation of Start/Boost button	Has the Start/Boost button been pressed and held down for a few seconds then released?	Press Start/Boost button.
	Battery problems	Has a new battery been inserted? Is the battery inserted the correct way round?	• Check placement. • Replace with new battery.
	Malfunction		Return to Medical Physics for repair.

Problem	Cause	Checklist	Action
The infusion has not run to time	The rate was incorrectly set	Was the rate setting correct? Was the fluid length measured correctly? Has the rate setting been altered? Is the syringe securely attached to the syringe driver?	• Check documentation: previous recordings of setting up and monitoring procedure. • Are the calculations for volume infused correct?
	Accidental damage	Has the pump been immersed in water?	• Return to Medical Physics for repair.
The infusion is runnning faster than expected	Use of Boost button	Has boost button been pressed (delivers 0.23mm per boost)?	**! The Boost facility should not be used.** • Assess patient. • Inform medical staff. • Complete incident report.
	Syringe driver protective cover not fitted correctly with the hole over the Start/Boost button	The Start/Boost button can be depressed leading to over infusion of drugs.	• Ensure plastic protective cover is fitted correctly. • Assess patient. • Inform medical staff. • Complete incident report.
	Malfunction of syringe driver		• Assess patient. • Inform medical staff. • Complete incident report. • Return to Medical Physics for repair.
Is infusion running slower than expected	The rate was incorrectly set. Has the syringe driver sufficient power?	Is the rate setting correct? Is the light flashing?	• Check rate setting. • Replace battery if required.
	Is syringe correctly attached to syringe driver?	Is the activator flush against the plunger?	• Ensure syringe is correctly fitted. • Complete incident form.
	Tubing kinked or trapped.	Is the tubing kinked or trapped?	• Check the infusion line from the patient to the syringe driver releasing any kinks or trapped line.
	Is there a blockage?	Check needle insertion site for any erythema, swelling, tenderness to touch or cannula displacement. Check syringe and infusion line for crystal formation causing a blockage.	• Set up a new syringe and infusion. Resite at least 3cm away from the problem area, or use another recommended site. • Discard previously used syringe/line. • Check compatibility of medications/diluent. Seek advice.

Sources of Help and Advice

Pharmacy Aseptic
St John's Hospital
Tel: 01506 419666
Ext 2461 Bleep 647

Practice Development Facilitators
Nursing and Quality
St John's Hospital
Tel: 01506 419666
Ext 2807 Bleep 623

Hospital Palliative Care Team
St John's Hospital
Tel: 01506 419666
Ext 3062 Bleep 833 / 863

Community Palliative Care Nurse Specialists
St John's Hospital
Tel: 01506 419666
Aircall via Switchboard

Consultant in Palliative Medicine
St John's Hospital
Tel: 01506 419666
Aircall via switchboard

Medical Physics Department
St John's Hospital
Tel: 01506 419666
Ext 2204 / 2287

Out of Hours / Weekends

Fairmile Marie Curie Centre
Tel: (0131) 470 2201

Hazard Notification

Hazards reported by the Scottish Home and Health Department: serious incidents involving Graseby Syringe Drivers.

1. Confusion between the MS16a hourly rate syringe driver (mm per hour) and the MS26 daily rate (mm per 24 hrs) syringe driver resulting in the infusion of a 24hr dose of medication in 1 hour causing fatality.

2. Misalignment or placement of the plastic cover over the Start/Boost button resulting in the infusion of the syringe at an inappropriate rate causing overdosage.

3. Syphonage of syringe contents when the syringe driver has been placed >75cm above the infusion site.

4. Uncontrolled flow of medication when the syringe driver has not been correctly or securely fitted to the syringe driver.

Ref: Medical Photography Dept. St John’s Hospital 03.