42.1 GENERAL PRINCIPLES

- The syringe driver / pump is a portable battery operated device that can be used to deliver a continuous subcutaneous infusion of medication when the oral route is not feasible. ⁵
- There are 3 models of syringe driver / pump in general use:
  - Graseby MS26: delivers liquid at a rate set in mm per 24 hours.
  - Micrel MP Daily: delivery is based on mm per 24 hours.
  - McKinley T34: delivers volume over 24 hours.
- Other models include. Graseby MS16 (mm per hour) and Alaris AD (ml / hour)
- Adequate competency based training, relating to the model used in their workplace, should be available for all staff.
- Patients discharged home with a syringe driver/pump in situ should be given a contact number to use in the event of queries or problems. Patients/families should be shown how to check the following:
  - That the syringe driver/pump is working.
  - The presence of site reactions.
  - Clarity of syringe solutions.

42.2 GUIDELINES

42.2.1 Equipment

- A Luer lok® syringe is recommended. This ensures a fixed connection between line and syringe removing the risk of disconnection during ambulation or high pressure states. A 20ml syringe is the recommended minimum size, as this allows for a larger volume of diluent. ⁵ [Level 4]
- The use of extension lines should be avoided as they produce an increase in “dead space,” which can lead to a decrease in the amount of drug delivered to the patient. ⁵ [Level 4]
- If a patient requires repeated administration of subcutaneous breakthrough medication, a subcutaneous butterfly should be used. This will avoid the need for repeated injections. The line of the butterfly should be flushed with a volume of diluent equal to that of the tubing after each dose of medication. ⁵ [Level 4]
- If a fault occurs with the equipment, staff should refer to the operating manual for the model that is in use.⁵ [Level 4]
42.2.2 **Set-up and Use of a Syringe Driver/Pump**

- All syringes should have labels. The label should be attached in such a way that the contents and the volume of the syringe are clearly visible. The label should contain the following information:
  - Name of patient.
  - Name(s) of drug(s) in syringe.
  - Dose(s) of each drug.
  - Name of diluent (if used).
  - Length of total fluid in syringe at time syringe driver / pump commenced.
  - Date and time syringe driver / pump commenced.  

- If the machine has a boost button this should not be used for delivering additional analgesia.  

- For a Graseby MS26/ Micrel MP Daily, the **length** of fluid in the syringe should be measured **AFTER** the line has been primed. The rate is based on length of liquid and not volume.  

- The rate set should be checked every time the syringe in the driver is changed.  

- The following checks should be made on any syringe driver / pump in use:  
  - Presence or absence of site reactions.
  - Length of fluid remaining in the syringe.
  - Clarity of solution in syringe.
  - Battery check.

- The above checks should be documented every 4 hours for inpatients and at least daily for patients in the community.  

- Syringe driver/pump sites should be changed at least every three days.  

- Figure 42.1 illustrates the suggested management of site reactions.

42.2.3 **Drugs**

- It is suggested that most drugs should be diluted in sodium chloride 0.9% when making up a syringe driver. Most injections are isotonic and diluting with saline does not change this.

- Use of water has the potential to make the solution more dilute and more likely to cause a site reaction. At the present this is suggested practice based purely on theory. Appropriate studies are awaited.

- Water for injection should be used for cyclizine and diamorphine > 40mg/ml.  

- The following drugs should be used in a syringe driver/pump as **single** agents unless otherwise advised by a specialist:  
  - Dexamethasone.
  - Diclofenac.
  - Ketorolac.
  - Phenobarbital.
If more than one drug is delivered via the same continuous subcutaneous infusion, always ensure there is stability/compatibility data to support the combination. If a combination of 4 or more drugs is considered, then contact the specialist palliative care team for further advice.  

Avoid using the combination of cyclizine plus hyoscine butylbromide in a syringe driver as there is a risk of crystallisation. If crystallisation or cloudiness does occur, the infusion should be discontinued and the contents of the syringe discarded. The drug combination should then be reviewed.  

Avoid the use of the MS26 or MS16 models for delivering an epidural infusion.  

Prescriptions for an epidural infusion should be on a separate chart from prescriptions for a CSCI.
- Appropriate training in the care of patients with epidural infusions should be delivered to all staff.
- Each unit should have written guidelines for the management of epidural infusions.

### 42.3 Standards

1. All syringes should have labels containing the following information:
   - Name of patient.
   - Name(s) of drug(s) in syringe.
   - Dose(s) of each drug.
   - Name of diluent (if used).
   - Length of total fluid in syringe at time syringe driver/pump commenced.
   - Date and time syringe driver/pump commenced. ⁵ [Grade D]

2. Syringe pump checks should be documented every 4 hours for inpatients and at least daily for patients in the community. ⁵ [Grade D]

3. Patients in the community and / or their families, should be shown how to check the following:
   - That the syringe driver/pump is working.
   - The presence of site reactions.
   - Clarity of syringe solutions. ⁵ [Grade D]

4. All patients/families in the community should be given a contact number to use in the event of queries or problems. ⁵ [Grade D]

5. Any syringe pump with evidence of precipitation (e.g. crystallisation or cloudiness) should be discontinued and the contents of the syringe discarded. The drug combination should then be reviewed. ² ⁵ ⁷ [Grade D]

6. On a Graseby MS26, the boost button should not be used to administer breakthrough medication. ⁵ [Grade D]

7. Drug administration using a syringe driver/pump should meet compatibility guidelines. ² ⁵ ⁷ [Grade D]

### 42.4 References


### 42.5 CONTRIBUTORS

**Lead Contributors**

Mr A Dickman  
Specialist Principal Pharmacist  
Marie Curie Palliative Care Institute  
Liverpool

Dr C Usborne  
Consultant in Palliative Medicine  
Glan Clwyd District General Hospital NHS Trust  
Rhyl  
Denbighshire  
North Wales

**External Reviewer**

Dr T Tate  
Medical Advisor  
Marie Curie Cancer Care  
London and  
Consultant in Palliative Medicine  
Barts and the London NHS Trust