

Syringe Drivers

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Introduction

A syringe driver is a light weight battery-operated machine used for providing drugs at a preset rate through a continuous infusion. It is portable and allows delivery of a variety of medications continuously via the subcutaneous route.



The Graseby MS26 is used in Manchester; it has a green front section and is calibrated for medication delivery in mm per 24 hours.

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Indications for use

- Dysphagia
- Intractable nausea +/- vomiting [link nausea and vomiting](#)
- Inability to administer medication via oral route i.e. head/neck cancers
- Gastro -intestinal obstruction
- Uncontrolled pain
- Other routes of administration exhausted
- Malabsorption
- Profound weakness/cachexia
- Reduce numerous injections
- Aversion to oral medication
- Patient choice
- End of life [link to ICP](#)

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Advantages of using a syringe driver

- Control of multiple symptoms with combinations of drugs
- Continuous infusion avoids peaks and troughs in plasma drug levels
- Reduces need for repeated injections
- Facilitates effective management of symptoms at home

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Setting up a syringe driver (Method)

Before starting the procedure the prescription chart or authorising letter should be checked and compatibility ascertained. A useful comprehensive evidence based site can be found at www.palliativedrugs.com, see simplified compatibility chart below or contact Macmillan team for specialist advice.

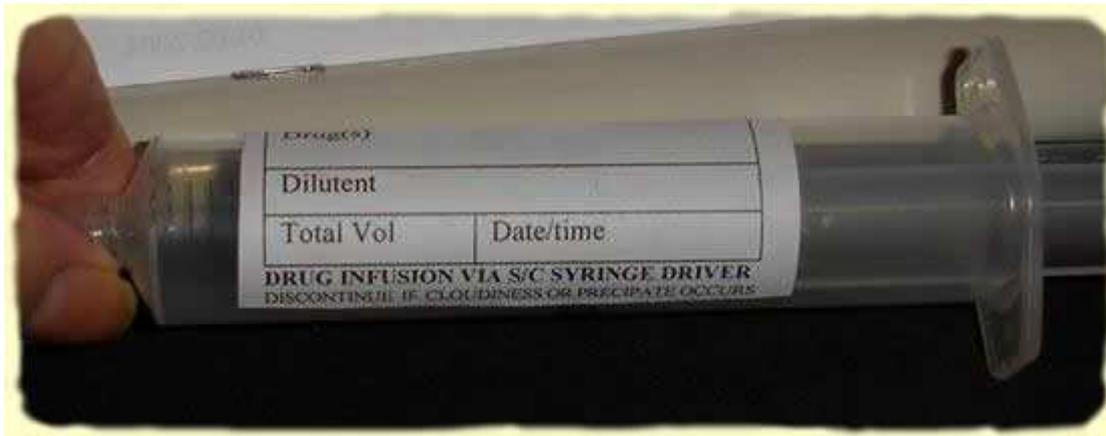
Equipment Needed

- Syringe driver (Graseby MS26)
- Protective plastic cover
- Carrying holster
- 9 volt battery (spare battery should also be available)
- Rate adjusting key (or paper clip)
- Appropriately sized luer lock syringes
- Needles
- Butterfly infusion set
- Transparent adhesive dressing to cover butterfly site
- Appropriate diluent (water for injections or occasionally 0.9% sodium chloride for injections).
- Prescription chart and/or authorising letter from prescriber
- Prescribed medication
- Drug additive labels
- Prepare the patient & carers by explaining the process, reasons for use and negotiating compliance
- If symptoms are controlled, start the syringe driver 1–2hrs before the effect of the previous medication is due to wear off. If symptoms are uncontrolled, set up the syringe driver immediately, and give stat SC doses of the same drugs.
- Luer lock syringes must be used as they stop the giving set and syringe separating if they are unintentionally pulled apart
- Volume permitting use a 10ml syringe. A 20ml syringe allows greater dilution which reduces:
 - the risk of incompatibility
 - injection site skin reactions.
- Fill the syringe with drugs and dilute to a maximum length of 60mm.
- Each time of loading measure from 0 on the syringe driver scale up to the line of the

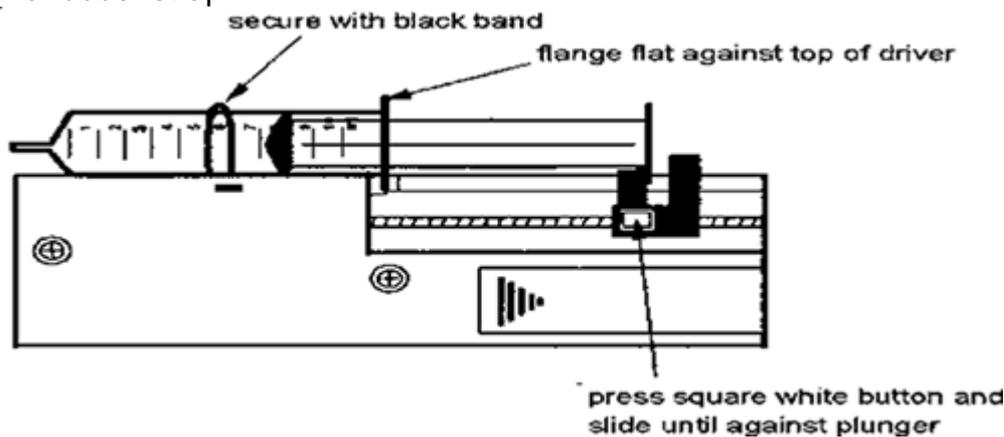


plunger

- Connect the syringe to the tubing attached to the butterfly cannula and prime the infusion line. This entails pressing the syringe plunger until a drop of fluid is visible at the end of the giving set. For the MS26, the tubing can be primed before measuring the length of the barrel and the rate set to ensure delivery over 24h.
- After measuring the length of the barrel against the millimetre scale on the syringe driver, the delivery rate is set.
- The delivery rate is equal to the length of fluid in the syringe.
- The rate is set by turning the rate setting screws on the front of syringe driver using rec screwdriver or paperclip but **not a sharp instrument**.
- The drug additive label then needs to be fixed to the barrel of the syringe.



- Insert the 9V battery and a shrill audible alarm sounds.
- **The battery should be removed and re-inserted at each change of syringe to check it is working**
- Renew the battery if the indicator light fails to flash every 25 seconds . Each battery should last for about 50 full syringes; the light stops flashing 24h before the battery runs out.
- Fit the flange of the syringe into the slot provided on the syringe driver and secure with the rubber strap



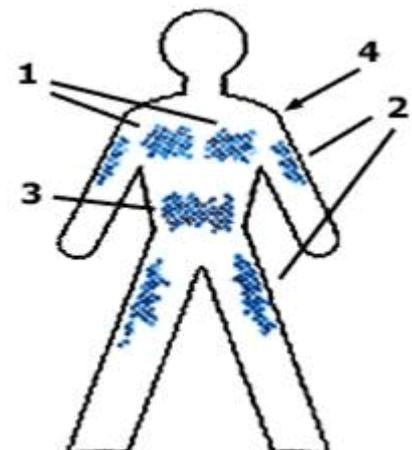
- The syringe driver should then be placed in plastic cover.

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Siting the CSCI

Usual sites are

1. the anterior chest wall below clavicle
2. anterolateral aspects of upper arms/anterior surface of the thighs
3. anterior abdominal wall
4. occasionally the back



Sites to avoid:

- Oedematous limbs/areas
- Bony prominence or near a joint
- The upper abdomen in a patient with an enlarged liver
- Upper chest wall in cachexic patients
- Skin irradiated within last 8 weeks
- Skin folds and breast tissue

A 25 gauge butterfly needle should be inserted at an angle of 30–45° into SC tissue,



The tubing should be secured with a transparent adhesive dressing with a loop to minimise the possibility of pulling out the needle.

Care of infusion site

The infusion site should be checked at least daily for signs of:

- Redness
- Leakage

■ Back flow

If any of the above noted, change the giving set, prime, attach a new butterfly and re-site in a new area.

Generally each site should remain suitable for subcutaneous use for approximately 3-5 days. But this is assessed on an individual basis.

Re-loading the syringe :

- Syringe driver should be re-loaded every 24 hours.
- Check for cloudiness, colour change, precipitation every 24 hours.
- Use a new syringe each time
- Check battery is working

Frequent re-siting

Consider the following:

- use a larger syringe – can dilute mixture and therefore reduce concentration
- change an irritant drug to less irritant alternative e.g. cyclizine to haloperidol
- consider alternative hypoallergenic giving set.

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The MS26 boost facility

Although the Graseby MS26 has a boost button it is **not** recommended for the following reasons:

The boost facility lacks a lock-out period.

- If the boost button is continually depressed, the MS26 will deliver 8 boluses before an alarm sounds and no further boosts are delivered. However, if the button is released, then continually depressed again, a further 8 bolus doses will be administered. Theoretically, this could be continued until the syringe is empty
- One boost delivers a length of fluid equivalent to 0.23mm which will rarely be an effective analgesic dose.
- Analgesics are rarely infused alone and additional doses of the other drugs may be undesirable.
- It may cause stinging at the infusion site.

DO NOT USE BOOST BUTTON ENSURE CORRECT S/C BREAKTHROUGH DOSE IS WRITTEN UP (E.G 1/6 24 HOUR DOSE DIAMORPHINE/OR ALTERNATIVE STRONG OPIOID)

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Transfer of patients into hospital/hospice setting

The following information should be sent with the patient:

- Time last syringe driver set up (on syringe driver label)
- 24hour dose prescribed (on syringe driver label)
- Site of last syringe driver
- PRN dose(s) given in last 24hours
- Request to receiving staff to replace driver at next change with their own. Community staff to make arrangements to collect syringe driver when convenient.

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Common syringe driver drugs

Drug	24 hr range	Indication	Comments
Haloperidol	2.5mg-10mgs	Anti-emetic	Antipsychotic
Cyclizine	50-150mgs	Anti-emetic	Irritation at site
Levomepromazine (Nozinan)	6.25-25mgs 25-200mgs	Anti-emetic Terminal restlessness	Sedating at higher doses
Metoclopramide	30-60mgs	Anti-emetic	Irritation at site
Midazolam	10-100mgs	Terminal restlessness Anti-convulsants Anxiolytic	
Glycopyrronium bromide	600-2400mcg	Antimuscarinic for noisy secretions	Start asap for noisy secretions
Diamorphine	No ceiling doses	Analgesic	
Hyoscine butylbromide	20-100mg	Intestinal obstruction Noisy secretions	Non-sedative
Hyoscine hydrobromide	400-1200mcg	Noisy secretions	Can cause agitation

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Drug compatibility

The following combinations of two drugs are compatible at normal doses and can be mixed with water.

Diamorphine	Cyclizine
Diamorphine	Haloperidol
Diamorphine	Ketorolac
Diamorphine	Metoclopramide
Levomepromazine (nozinan)	Metoclopramide
Glycopyrronium	Midazolam

The following combinations of three drugs are compatible at normal doses and can be mixed with water

Diamorphine	Cyclizine	Haloperidol
Diamorphine	Haloperidol	Levomepromazine (nozinan)
Diamorphine	Haloperidol	Midazolam

Diamorphine	Hyoscine hydrobromide	Levomepromazine (nozinan)
Diamorphine	Hyoscine hydrobromide	Midazolam

For more information on drugs used via this route access www.palliativedrugs.com or www.prodigy.nhs.uk

N.B. many are used off-label, for further information www.palliative-medicine.org

The following drugs are NOT suitable for use in the syringe driver as they are irritant to the skin:

- Diazepam
- Prochlorperazine (stemetil)

Conversion of Oral Morphine to Subcutaneous Diamorphine

[*opioid conversion chart*](#)

When a patient is commenced on a continuous subcutaneous infusion, the dose is based on their previous oral morphine/diamorphine requirement. Conversion of oral morphine to s/c diamorphine requirement is calculated at 1/3 e.g.

30mg oral morphine = 10mg s/c diamorphine

If you have any queries regarding drug compatibility contact your Macmillan Specialist Palliative Care Team

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P.R.N medication

- Recommended practice is to administer via an abboath canula.
- Abboath should be inserted sc into suitable site and secured with a transparent dressing. The end should be sealed using a male luer lock injection port.
- P.r.n medication can be administered directly through the port using a blue needle (larger/smaller gauge needles can cause stinging).
- Abboaths and luer locks are available on order Ref No: FSP 199 ABBOCATH 26G X 19mm. AVON INJECTION PORT MALE LUER LOCK REF R95.
- Use of abboath reduces pain/discomfort to patient and ensures direct delivery of medication into subcutaneous tissue

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Good practice

- All new staff should ensure they are familiar with the MS26 syringe driver before using
- Contact specialist palliative care team for training and/or updates as required .
- Follow protocol for use.
- Any queries or advice contact Macmillan team
- All syringe drivers in use should be serviced regularly

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Advice for patients

Battery



Always have at least one spare 9V battery

Bathing

Patients may have a bath or shower but to avoid getting the syringe driver wet as this will cause it to malfunction and/or serious damage. Patients should place the driver on a shelf or chair outside the bath or shower. Avoid soaking the site in the bath.



Mobile Phones

Avoid using near the driver as this may interfere with the delivery system



Clothing

Loose clothing is preferable e.g. cardigans. Some patients Choose a dressing gown or clothes with a deep pocket where they place the syringe driver.



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References

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