


## **Guidelines for the Use of the MS16A Syringe Driver**

**These are Guidelines only – you have a professional responsibility to be trained and competent to use the MS16A Syringe Driver, and to appropriately assess and review the clinical needs of the patient**

<b>Author:</b>	<b>Nicky Ryan, Palliative Care Team; Marion Khan, Practice Development Team</b>
<b>Date of issue:</b>	<b>March 2008</b>
<b>Version:</b>	<b>1</b>
<b>Owner:</b>	<b>Palliative Care Team</b>
<b>Publisher:</b>	<b>Ms Nichola Greenwood, Medical Governance Manager</b>
<b>Review date:</b>	<b>March 2009</b>

# Guidelines for the Use of the MS16A Syringe Driver

## Contents

		Page
1	The MS16A Syringe Driver and delivery of subcutaneous medication: Indications for Use Advantages of Use Contraindications to Use	3
2	Guidelines for Insertion of  BD Yellow Side-Ported Saf-T-Intima Cannula	4
	<b>Table 1:</b> Guidelines for insertion of the Saf-t-Intima Cannula	4
3	The Graseby MS16A syringe driver	6
3.1	Measuring and setting the rate of the MS16A syringe driver	6
	<b>Figure 1:</b> Measurement of millimetre (mm) fluid volume in luer lock syringe	6
3.2	Calculating rate of infusion of the syringe driver	7
	<b>Figure 2:</b> The MS 16A Syringe Driver	7
3.3	Setting up of the syringe driver	7
3.4	Risk assessment	10
3.5	Using two syringe drivers	10
3.6	Changing prescription and medication	11
3.7	Changing insertion sites, lines and cannula	11
3.8	Care and monitoring of patients	12
3.9	Checking the syringe driver	12
3.10	Problem solving the syringe driver	12
3.11	Discontinuing the syringe driver	13
4	Documentation and record keeping	13
5	Complications	14
6	Other Related Issues	15
7	References	15
	<b>Appendix 1:</b> Risk Assessment	17

## 1. The MS16A Syringe Driver and delivery of subcutaneous medication:

### Indications for use

<b>For control of symptoms:</b> <ul style="list-style-type: none"><li>- Pain</li><li>- Nausea and vomiting</li><li>- Restlessness</li><li>- Increased secretions</li><li>- Pain unrelieved by oral medication or intermittent injection</li></ul>	<b>Patients unable to swallow or absorb oral medication:</b> <ul style="list-style-type: none"><li>- Intractable nausea and vomiting</li><li>- Gastro-intestinal obstruction/malabsorption</li><li>- Mouth, throat, oesophageal lesions</li><li>- Profound weakness/unconsciousness</li></ul>
---	---

### Advantages of use

- Constant plasma drug levels resulting in increased comfort and confidence
- Absorption of drugs more reliable
- Change only every 24 hours
- More effective assessment of symptom control.

### Contraindications to use

- Infection and broken skin at infusion sites
- Patients with clotting disorders because of risk of bleeding at the infusion site
- Patients who have poor tissue perfusion
- Peripheral vascular disease of lower extremities
- Pre-existing oedema.

(Ferry et al 1999, Sasson and Shvartzman 2001, Jackson 2004)

## 2. Guidelines for Insertion of Yellow Side-Ported Saf-T-Intima Cannula

It is essential with any procedure, invasive or not, to discuss fully with patients the intervention required and obtain their informed consent to continue. Before commencement of subcutaneous therapy, the nurse must ensure that he or she is confident that the prescription and prescribed therapy are suitable for this route. No nurse must undertake any procedure or practice for which he or she has not received adequate training and assessment of competence (Nursing and Midwifery Council (NMC) 2004). Guidelines for insertion are outlined in Table 1.

**Table 1. Guidelines for insertion of the Saf-t-Intima Cannula**

<b>Action</b>	<b>Rationale</b>
Explain procedure to patient and obtain informed verbal consent (if possible).	To ensure patient aware of, and consents to, proposed procedure.
Consider site selection, involving patient in decision if possible.	To select the appropriate infusion site and encourage patient concordance and tolerance.
Wash hands and wear clean gloves.	To minimise risk of infection.
Clean selected insertion site with topical cleaning agent and allow to dry.	To ensure pre-insertion skin disinfection.
Remove white stopper from side arm and prime line with infusion syringe. Attach bionector.	To remove air from line to reduce the risk of air embolism. Ensure medications are delivered as soon as the syringe driver starts.
Grasp “pebbled” side of the cannula wings, pinching wings firmly together. This locks the needle and prevents it from retracting during insertion	To ensure effective insertion of needle into subcutaneous tissue
Ensure the needle is bevel-side uppermost. If the bevel-side is not uppermost, open the wings and gently twist the white shield until the needle is correctly positioned	To guide the needle through the tissue and reduce patient discomfort.
Gently pinch the skin into a fold. In patients with greater adipose tissue, it may be necessary to keep the skin flat to ensure the needle is inserted into the	To lift the subcutaneous layer away from the muscle layer

subcutaneous layer.	
Insert the needle subcutaneously at an angle of approximately 45 degrees.	To ensure the secure entry of the needle into the subcutaneous tissue.
Open the wings (pebbled side down) flat against the skin	To ensure correct positioning of the cannula
There must be no evidence of blood present in the giving set or cannula on insertion or during treatment.	This indicates a capillary has been punctured. The device should be removed and resited.
Apply firm finger-tip pressure over the wings of the cannula (avoiding the centre where the needle retracts) and simultaneously grasp the pebbled end of the white shield and pull in a <b>straight</b> continuous motion until the needle has fully withdrawn into the coloured cylinder and pops off	To remove the insertion needle and activate the safety mechanism.
Gently remove the coloured cylinder from the cannula port, if it has not released spontaneously, exposing the adapter with the rubber bung	To ensure safety needle mechanism as worked effectively.
Place any resultant sharps in sharps bin.	To reduce the risk of needlestick injury.
Remove rubber bung and connect Vygon infusion set, open clamp	To maintain closed circuit
Apply IV 3000 over insertion site.	To ensure secure fixation, allow for site observation and moisture vapour permeability.
Adjust medication delivery rate as prescribed.	To ensure timely and effective delivery of prescription.
Complete necessary nursing documentation and line labels detailing date/time of insertion; insertion site and device used. Complete and sign Drug Chart.	Good record keeping helps protect the welfare of the patient, promotes better communication and ensures the dissemination of information between health professionals.

(Dawkins and Pugh 2003, RCN 2005)

### 3. The Graseby MS16A syringe driver (Figure 2)

#### 3.1 Measuring and setting the rate of the MS16A syringe driver (Figure 1)

The total fluid to be infused should be measured in millimetres (mm) and the rate set in millimetres per hour (mm/hr) for the MS16A (blue).

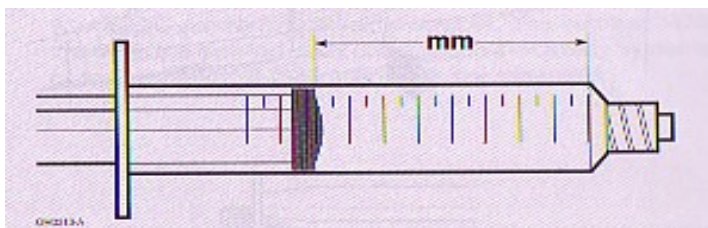
The MS16A (blue) Graseby syringe driver will deliver 48mm of fluid over 24hrs at a rate of 2mm per hour. The length of 48mm is used to calculate the rate per hour setting, i.e.  $2\text{mm/hr} \times 24\text{hrs} = 48\text{mm}$

The length of liquid in the syringe is measured using the mm scale on the side of the machine. If the length of liquid in the syringe is 48mm, it will be delivered over 24hrs at a rate of 2mm per hour (Figure 4).

Different brands of syringes give different total volumes of fluid when measured at 48mm. This is why the volume in syringes is measured in mm to ensure the prescribed medication delivery over 24hrs.

Within the Trust, BD Plastipak luer lock syringes must be used for 10ml and 20ml syringes, and Terumo luer lock syringes for 30mls.

**Figure 1: Measurement of millimetre (mm) fluid volume in luer lock syringe**



If the total volume of required fluid becomes greater than 48mm in length in the 10ml syringe then change the fluid to a 20ml syringe, and measure the 20ml syringe length to 48mm adding in extra diluent as needed to bring the volume up to 48mm. 30ml syringes can also be used, but care must be taken to ensure that the syringe in this case is the Terumo due to the barrel width of the syringe. The rate remains set at 2mm/hr for MS16A (blue).

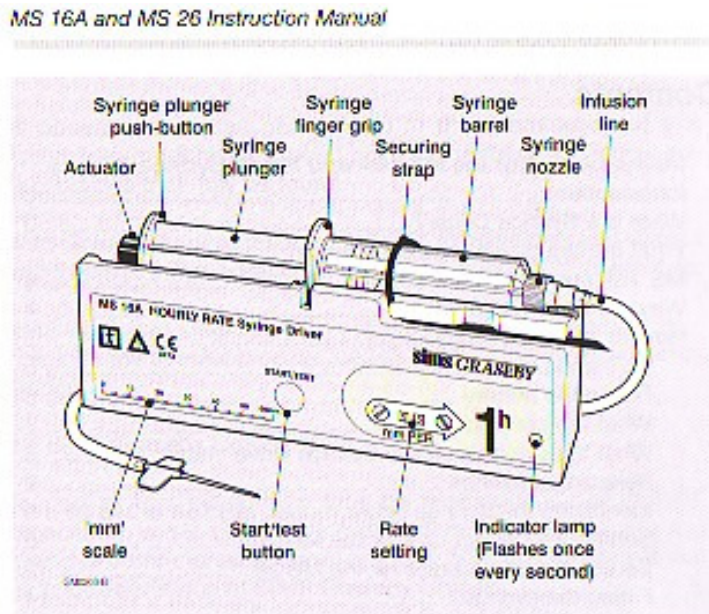
### 3.2 Calculating rate of infusion of the syringe driver

In the MS16A (blue) syringe driver, the following rates of infusion apply:

48mm set at 2mm runs for 24hrs

48mm set at 4mm runs for 12hrs

**Figure 2: The MS 16A Syringe Driver**



**The MS 16A HOURLY RATE Syringe Driver**

### 3.3 Setting up of the syringe driver

Action	Rationale
<ul style="list-style-type: none"> <li>Check service date of syringe driver</li> </ul>	<ul style="list-style-type: none"> <li>To ensure syringe driver is in working order and safe to use</li> </ul>
<ul style="list-style-type: none"> <li>Check driver and plastic transparent cover is cleaned using a detergent wipe before use</li> </ul>	<ul style="list-style-type: none"> <li>To reduce risk of cross-contamination and infection</li> </ul>

<ul style="list-style-type: none"> <li>• Insert new 9v battery and press 'Start' button</li> </ul>	<ul style="list-style-type: none"> <li>• To activate syringe driver and ensure it is working by silencing the alarm and initiating the light to flash</li> </ul>
<ul style="list-style-type: none"> <li>• Check medications on syringe driver prescription chart are correctly prescribed and signed</li> </ul>	<ul style="list-style-type: none"> <li>• To confirm and ensure appropriate drugs are prescribed correctly and are compatible</li> </ul>
<ul style="list-style-type: none"> <li>• Explain procedure to patient and obtain informed verbal consent (if possible).</li> </ul>	<ul style="list-style-type: none"> <li>• To ensure patient aware of, and consents to, proposed procedure.</li> </ul>
<ul style="list-style-type: none"> <li>• A Lock Box risk assessment form (Appendix 1) should be completed regarding the safe administration of medicines via the syringe driver. Identified risk should be recorded and discussed with the appropriate professionals (see Section 3.4).</li> </ul>	<ul style="list-style-type: none"> <li>• Careful explanation is necessary to allay fears and anxieties regarding changing of medication route and medications used. To ensure safe administration of prescribed medication.</li> </ul>
<ul style="list-style-type: none"> <li>• Wash hands according to Infection Control Policy. Ensure all the equipment has been cleaned prior to use.</li> </ul>	<ul style="list-style-type: none"> <li>• To reduce risk of infection</li> </ul>
<p>Check compatibility of drugs and diluent. If concerned please speak with Palliative Care Team, Medicines Information, GP or prescriber. Out of hours, contact St Leonard's Hospice.</p> <ul style="list-style-type: none"> <li>▪ There should be no more than three different drugs in one syringe, due to increased risk of incompatibility and concentration of drugs.</li> <li>▪ Mix drugs with diluents</li> </ul>	<ul style="list-style-type: none"> <li>• Correct drugs are delivered according to prescription.</li> <li>• Reduce possibility of incompatibility.</li> </ul>

<p>and dilute up to 48mm and measure against syringe driver gauge. (See Figure 2)</p> <ul style="list-style-type: none"> <li>▪ Dilute with water for injection or sodium chloride 0.9% depending on which diluent is most compatible with drugs prescribed.</li> <li>▪ Use ampoule breaker if available to avoid sharps injury</li> </ul>	
<ul style="list-style-type: none"> <li>• Complete additive label with information regarding patients name, date of birth/hospital unit number, drugs, dosage, diluent, date and time, and signature. Attach label to the syringe trying to ensure the syringe measures can be seen.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensures correct medication given to correct patient, and enables visible check of syringe flow</li> </ul>
<ul style="list-style-type: none"> <li>• Priming of line- Remember on initial priming of line, the infusion will finish 2 or 3 hours earlier (use only 100cms clamped tubing) This is because part of the syringe contents remain unused in the tubing until a new syringe is set up.</li> </ul>	
<ul style="list-style-type: none"> <li>• Select appropriate site</li> </ul>	<ul style="list-style-type: none"> <li>• Good siting will allow even absorption of drugs without discomfort to patient.</li> </ul>
<ul style="list-style-type: none"> <li>• Applying syringe and driver to patient Check the identity of the patient as outlined in the 'Positive Patient</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure correct patient receives treatment. Ensure procedure for insertion is correctly followed</li> </ul>

<p>Identification Policy' (2008) Using SAF-T-Intima giving set, insert and secure as described in Section 2. Document on the monitoring section of the syringe driver drug chart the area used for siting, the date and the time.</p>	
<ul style="list-style-type: none"> <li>• Recheck drug chart and check against label.</li> </ul>	<ul style="list-style-type: none"> <li>• Confirm correct prescription</li> </ul>

### 3.4 Risk assessment

A risk assessment must be carried out on all patients who require a syringe driver to deliver medications. Appendix 1 is the approved risk assessment tool. The aim of the risk assessment is to identify which patients may be at risk of accidental or intentional drug overdose from tampering of the syringe driver. If the risk assessment indicates that the patient requires a lock box these can be obtained from the Palliative Care Team. Out of hours, the lock box can be obtained from the Emergency Drug Cupboard.

During use, the lock box keys should be kept with the Controlled Drug keys.

### 3.5 Using two syringe drivers

If two syringe drivers are to be used on one patient, extra care should be taken:

- The same type of syringe driver must be used if two drivers are needed for one patient to reduce the risk of error.
- Ensure each syringe driver prescription is clearly identified on drug chart.
- Ensure prescription chart drugs and labels are checked carefully to ensure correct drugs used for each syringe driver
- Use separate documentation for each syringe driver

### **3.6 Changing prescription and medication**

If prescription medication and/or dosages are changed, a new syringe and line must be set up and primed. The prescription chart should be re-written with new medication and dosages. The monitoring section of the syringe driver drug chart and labelling of the syringe should be completed accordingly.

#### **Rationale:**

This allows patient to get new drugs and dosage as soon as possible. Documentation should be updated and completed to show new delivery of drugs.

### **3.7 Changing insertion sites, lines and cannula**

When resiting or restarting an infusion, it is recommended that the site selected is rotated using a figure-of-eight principle to maximise site absorption. Frequency of resiting of the selected device is dependent on the manufacturer's instructions; volume and type of infusate and local policies. It is reported in the literature (Brown and Worobec 2000, RCN 2005) that the time *in situ* of the device can vary between one to seven days, and must therefore be guided by regular site assessment and local policies.

Record any site reaction on nursing documentation. If reaction occurs again, may need to look at the compatibility of drugs and amount of diluent.

The manufacturers instructions must be followed changing equipment:

- Vygon 100cm line – every 24 hours and when the syringe is changed
- Saf-t-intima – Every 72 hours, after each infusion of 2 litres of fluid (see above) and if the area or site becomes inflamed or sore.
- Syringe – each time a new syringe is made up

### 3.8 Care and monitoring of patients

It is the responsibility of healthcare professionals to monitor patients at regular intervals in accordance with local protocols. Regular monitoring of patients enables healthcare professionals to evaluate the infusion site and assess patients' tolerance and response to the intervention. This will enable prompt identification and management of any complications.

### 3.9 Checking the syringe driver

The following checks must be undertaken at least every 4 hours

- Check the syringe driver is still running
- Light is flashing
- Whirr sound can be heard
- Syringe volume has decreased since last check and contents clear
- Syringe remains in place in driver
- Correct rate
- Record check on syringe driver documentation

Also check

- The line for kinks and to ensure clamp is off
- The site for signs of inflammation
- The patient for symptom control

### 3.10 Problem solving the syringe driver

<b>Problem:</b>	<b>Indication for the problem:</b>	<b>Solution:</b>
Infusion running too slow	Clamp may be on or tubing kinked, battery may need changing. Site may be blocked or inflamed	Unclamp line, unkink tubing, change battery, check site for blockage or inflammation and if occurred remove cannula and resite.
Infusion running too fast	Rate may be set wrong Patient may have tampered with syringe	Check calculation and rate. Recheck reassessment

	driver	
The light stays on	The battery is low	Change the battery as soon as possible
The light stops flashing	The infusion may be blocked	Re-site syringe driver and change the line
Alarm sounds	This means the syringe driver has stopped. This could be due to the following: <ul style="list-style-type: none"> <li>a. Syringe empty</li> <li>b. Tubing kinked</li> <li>c. Tubing is clamped</li> </ul>	Renew syringe. Unkink or replace tubing. Unclamp tubing.
If none of the above- change syringe driver and send for servicing Syringe drivers must be serviced annually.		

### 3.11 Discontinuing the syringe driver

When the syringe driver is discontinued: -

- Remove Saf-T-Intima and place in clinical waste. Apply sterile dry dressing (if appropriate)
- Discard syringe, its contents and line into sharps box in accordance with hospital policy. Ensure to record the amount of discontinued medication on the prescription chart or checklist
- Clean driver and discard battery before storing away.

## 4. Documentation and record keeping

Documentation of site selection and assessment is fundamental to the care and monitoring of the patient receiving subcutaneous infusions.

Ensure the Syringe Driver Drug Chart [including Monitoring Sections] are completed accurately in accordance with NMC record keeping guidelines. Documentation must be completed for each syringe driver set up, when the syringe driver is changed, and at every drug round in the hospital.

**Rationale:**

- Maintain safe practice.
- Maintain safe accuracy of drug delivery

**5. Complications**

With appropriate and correct usage, the risks and complications associated with subcutaneous infusions are generally minimal and easily resolved. Any complication that does arise, however, requires potential resiting and review of patient needs and prescription.

<b>Complications</b>	<b>Prevention &amp; Management of complications</b>
<b>At insertion site:</b>	
Oedema	Ensure cannula inserted as per Section 2 above, and cover and secure with sterile dressing. Change equipment and rotate sites. If complications occur remove cannula and resite. Treat patient symptoms with analgesia / antipyretics, may require antibiotics / surgical intervention for abscess.
Infection	
Irritation	
Pain and inflammation	
Abscess	
<b>Infusion induced:</b>	
Drug incompatibility	Ensure drugs are compatible
Patient drug allergies	Ensure allergies identified prior to prescribing and allergy band in situ. If allergic reaction occurs, stop infusion treat symptoms and document on alert sheet and in records
Circulatory collapse	Stop infusion, support patient and summon medical help.

Crystallisation	<p>Observe for crystallization within the line or syringe. Management:</p> <p><b>1. Increase the volume to allow for more diluent by:</b>          Using a 20ml/30ml syringe for the prescription instead of 10ml          Measure again up to 48mm          Continue to run at 2mm= 02mm/hr in MS16A(blue) for 24hrs <b>OR</b></p> <p><b>2. Change to a 12 hourly regime by:</b>          Measure the syringe contents up to 48mm          Run at 4mm= 04mm/hr in MS16A(blue) for 12 hour regime</p>
-----------------	---

It must be considered that the more serious complications of abscess, allergies and circulatory collapse may be the result of inappropriate prescribing or administration.

## 6. Other Related Issues

### **ADVICE and INFORMATION:**

Palliative Care Team Hospital – 01904 725835 are available for advice between: Monday – Friday, 8.30am – 4.30pm

Out of hours – advice can be sought from:  
 St Leonard’s Hospice – 01904 708553

## 7. References

Brown MK, Worobec F (2000) Hyperdermoclysis: another way to replace fluids. *Nursing*. 30, 5, 58-59

Dawkins L, Pugh J (2003) *Paper entitled “Guidelines for the use of Saf-T-Intima for the Administration of Subcutaneous Infusions and Bolus Medication”*. Earl Mountbatten Hospice, Barnsley

Ferry M, Dardaine V, Constans T (1999) Subcutaneous infusion or hypodermoclysis: a practical approach. *Journal of the American Geriatrics Society*. 47, 1, 93-95.

Sasson M, Shvartzman P (2001) Hypodermoclysis: an alternative infusion technique. *American Family Physician*. 64, 9, 1575-1578.

Jackson A (2004) Subcutaneous Fluid Administration (Hypodermoclysis). Rotherham General Hospitals Trust, Rotherham.

Nursing and Midwifery Council (2004) *The NMC Code of Professional Conduct: Standards for Conduct, Performance and Ethics*. NMC, London.

Royal College of Nursing (2005) *Standards for Infusion Therapy*. RCN, London.

## Appendix 1

### York Hospitals NHS Foundation Trust Risk Assessment for patients requiring syringe driver

Aim: The reduction of non-professional incidents of drug overdose to patients, by accident or intention

**Patient name:**

**Ward:**

Codes: (M) = medium risk (H) = high risk	Initial assessment		Further assessment	
<b>Signature of nurse carrying out assessment:</b>				
<b>Date assessment carried out:</b>				
<b>Identification of risk factors</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>
1. Is the patient confused? (M)				
2. Is the patient agitated? (M)				
3. Does the patient interfere with equipment in general? (H)				
4. Has the patient a history of attempted suicide, or expressed a wish to self-harm? (H)				
5. Has the patient a history of drug abuse?				
6. If a syringe driver is in situ has the patient attempted to/dismantled it? (H)				
7. Has the patients delivered SD medication to themselves? (H)				
8. If independently mobile, does the patient continually forget a SD is in situ, allowing it to fall? (M)				
9. On checking SD medication, is there an unaccountable discrepancy in amount delivered? (H)				

<b>Assessment results:</b>	<b>Risk:</b>	<b>Action:</b>
No and/or N/A to all questions	Low	Reassess if change occurs
Yes to 1 or 2 (M) questions	Moderate	Monitor over 1 <sup>st</sup> 24 hours for increased score then PRN – Consider Lock box
Yes to all (M) questions	High	Lockbox needed
Yes to 1 or more (H) questions	Very high	Lockbox needed

**Outcome of Initial assessment:**

Lock box required?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Lock box available?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	If no state action taken:	
Lock box in place?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Date put in place: If no state reason:	
Removal of lock box:	Date: Reason for removal:	

**Outcome of further assessment:**

Lock box required?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Lock box available?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	If no state action taken:	
Lock box in place?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Date put in place: If no state reason:	
Removal of lock box:	Date: Reason for removal:	

(Adapted with courtesy of St Leonards' Hospice)