

Syringe Driver Policy/Procedure
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Newham Palliative Care Team	To reflect Community Services and new Directorate	Joyce Mateta Gail Sad	January 2011

This policy has been developed with thanks to the Newham Palliative Care Team

Text of policy begins on next page

Synopsis:

This policy sets out the PCT's expectations, in respect of the safe administration of medications via the Syringe Driver (MS16A).

The policy has been adapted from the Newham Palliative care team Syringe driver policy

Aims & Objectives: To ensure all staff handling the Graseby MS16A pump understand; when to use, where to obtain, how to set up, how to monitor and when to discontinue use.

Who the policy/guideline applies/is relevant to:

The policy intends to support service delivery within the PCT, reduce risk of errors in practice and for the use of Registered Nurses.

Training implications: All staff are expected to practice competently, which will be taught and assessed within the existing training programme

Equipment:

Graseby MS16A Syringe Driver		
Infusion set 'Graseby Flo-Safer Winged infusion set' (Smiths) with butterfly needle (100cm)		
BD 10ml Luer lock syringe	Water for injection	Battery (9 volt)
Semi permeable film dressing	Drugs	Holsters (optional)
Prescription & monitoring chart	Patients drug sheet	Drug Added sticker
Sharps Bin		

Appropriate use: on all occasions when a Graseby MS16A Syringe Driver has been prescribed and set up according to procedure

Inappropriate use: None

Outcome statement: Graseby MS16A Syringe Driver will be prepared and administered safely with a minimum of twice daily monitoring with the second follow up no later than 18.00hrs to review that pump contents are sufficient overnight.

What to do if policy is not followed by others:

An incident form must be completed and logged with subsequent RCA to actively learn.

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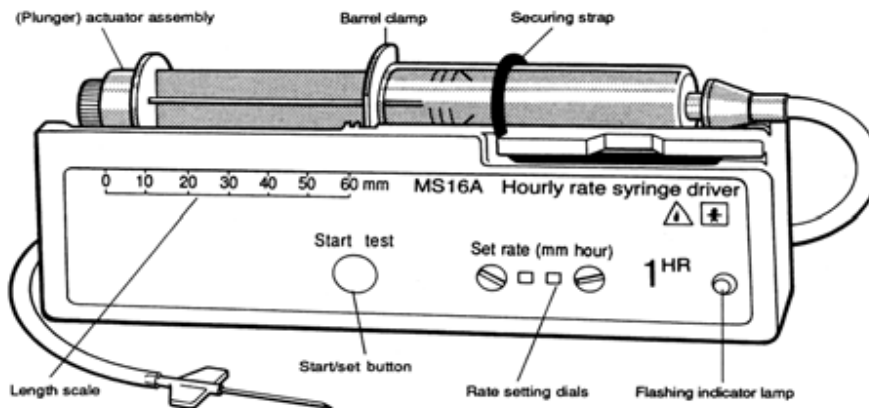
1. SYRINGE DRIVER OVERVIEW

1.1. What is a syringe driver

The syringe driver (S/D) is a means of providing effective symptom control via a continuous infusion in cases of unrelieved pain and other distressing symptoms when other absorption routes are inappropriate.

A variety of pumps are available, however these guidelines refer solely to the Graseby MS16a model that is currently used within the PCT.

Graseby MS16a (Blue) calibrated in millimetres per hour



A S/D is a portable, battery operated device used in the delivery of drugs subcutaneously at a constant rate. (Dickman et al 2005)

NB: Registered nursing staff will have the knowledge and ability to assess when a S/D is appropriate in discussion with the responsible clinician.

1.2. Indications for Use (*Please refer to appendix 1*)

The patient is unable to absorb, tolerate or take oral medications because of; Difficulty in swallowing, risk of aspiration, persistent vomiting, bowel obstruction, poor gastrointestinal absorption severe weakness, semi-conscious state, comatose/moribund patients, administration of drugs by other routes.

1.3.

Advantages of using a S/D

Delivers drugs at an even rate, continuously maintaining drug concentration at an optimum therapeutic level.

Increases patient control, removing the fear and pain of regular injections

Disadvantages of using a S/D

Local site reactions from irritant drugs

Negative impact upon body image

Potential of technical problems

2. WHERE ARE SYRINGE DRIVERS KEPT?

The Graseby MS16a syringe drivers, batteries, syringes, tubing and butterflies are available within bases and ICES.

If a patient is admitted with another type of S/D from home or another hospital, this must be replaced by an MS16A from the stock.

3. SETTING UP A GRISEBY MS16A SYRINGE DRIVER

Aim: Nursing staff will be able to set up a GRISEBY MS16A syringe driver safely and monitor its effectiveness.

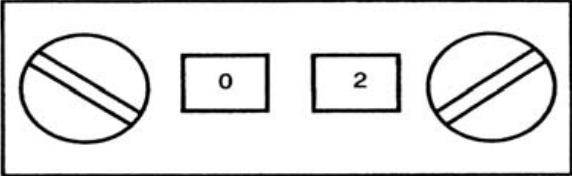
3.1. Equipment Required:

1. Graseby MS16A syringe driver
2. 10ml/20ml or 30mls BD Luer Lock syringes
3. Graseby Flo-Safer Winged infusion set with butterfly needle (SMITH) 100cm tubing
4. Battery (9 volt)
5. Semi permeable film dressing (Tegaderm I.V.)
6. Drug additive label
7. Patients drug sheet, including known allergies
8. Prescription and monitoring chart
9. Water for injection
10. Drugs
11. Holsters (optional)

3.2. Setting up procedure:

ACTION	RATIONALE
<p>Discuss with the patient/carer the use of the S/D, why it has been considered appropriate and how it will be monitored.</p> <p>Respond appropriately to anxieties / questions.</p> <p>Use IMCA/ or Health Advocate if required- show S/D and explain purpose with appropriate diluents</p>	<p>Involving the patient in their care reduces feelings of loss of control (Mitten 2001).</p> <p>Patient and family education promotes safety and acceptance of the S/D as a means to providing improved symptom control (Morgan/Evans 2004)</p> <p>Patient consent is obtained.</p>
<p>The syringe driver will be checked to be in working order, medication drawn up and needle sited by a registered nurses or by a registered nurse and checked by a student nurse</p>	<p>To comply with Trust controlled drug procedure</p>
<p>Assemble relevant equipment</p>	<p>To facilitate ease of procedure</p>
<p>Wash hands</p>	<p>To prevent transmission of infection</p>

<p>Using the appropriate size of syringe (10ml, 20ml, 30ml) draw up the appropriate strength drug(s), then the sterile water.</p> <p>Draw up drugs in accordance with Trust medicines policy, according to the prescription, which should be written on the patients S/D prescription and monitoring chart</p> <p>NB: There must be reference to the s/driver medication recorded on the drug chart</p>	<p>Rate = $\frac{\text{fluid length in millimetres}}{\text{Infusion time in hours}}$</p> <p>e.g. = $\frac{48\text{mm}}{24\text{hrs}} = 2\text{mm/hr.}$</p> <p>48mm = 8mls (in a 10 ml Luer lock syringe)</p> <p>To comply with Trust Medicines Policy</p>
<p>Put the additive label on the syringe ensuring volume markings on the syringe are visible</p>	<p>To allow for twice daily monitoring of the infusion</p>
<p>With new tubing/ butterfly: Attach the tubing and use this (premixed) fluid to prime the line to needle tip</p> <p>NB: The infusion will be completed in approx 21 hours when any of the following has occurred:</p> <ul style="list-style-type: none"> ▪ Setting up a new syringe driver ▪ Changing the tubing and butterfly needle ▪ Reciting of the needle and line 	<p>To ensure that the tubing is primed with the correct dose from the new syringe</p>
<p>When maintaining current tubing/butterfly:</p> <ul style="list-style-type: none"> ▪ Detach old syringe from tubing ▪ Attach new syringe to the current tubing 	<p>To ensure that the prescribed drugs are maintained at constant level</p>
<p>When inserting new butterfly/tubing choose a site for insertion where there is no oedema or broken skin, infection or inflammation. Suitable sites include the upper chest, abdomen, and the outer aspects of the arms or thighs</p> <p>(Please see appendix 2)</p>	<p>The presence of oedema will reduce drug absorption (Dickman et al, 2005)</p>
<p>Insert the butterfly needle at an angle of no more than 45 degrees into the subcutaneous tissue</p> <p>Loop the tubing around the site and cover with a semi permeable film dressing (Tegaderm I.V.)</p>	<p>For subcutaneous infusion</p> <p>To prevent the needle becoming dislodged and to allow for observation of the site</p>
<p>Attach the syringe to the syringe driver:</p> <p>Fit the flange of the syringe into the slot on the S/D driver and secure the strap over the</p>	<p>To ensure the syringe is secured for correct administration</p>

<p>barrel</p> <p>Slide the actuator by pressing the white release button so that it fits firmly against the syringe plunger</p> <p>Ensure that the rate is set to: 2mm per hour for 24 hour infusion 4mm per hour for 12 hour infusion</p>	<p>NB: rate set = length of fluid delivered in one hour e.g. 02 = 2 mm in 1 hour</p> 
<p>Press the start button. The pump indicates functioning with an intermittent flashing light</p> <p>Put the syringe driver in its case and assist the patient to find a suitable place to secure it</p>	<p>To ensure the syringe driver is starting to function</p>
<p>Sign and complete the S/D prescription sheet and monitoring chart</p> <p>Record that a S/D has been commenced on the patient's drug chart and document any drug wastage and CD stock balance.</p>	<p>To comply with trust medicines procedure</p>

4. ONGOING CARE AND MONITORING

ACTION	RATIONALE
<p>Every 24 hours draw up a new supply of drugs (as previously directed) required for the next 24 hour period, having re-assessed the patient for drug/dosage requirements.</p>	<p>To comply with trust policy.</p>
<p>Examine the injection site - look for signs of inflammation, irritation, redness, swelling, pain, bleeding, fluid leakage, hardness or drug precipitation in the line</p>	<p>These are signs that the drugs are not being absorbed properly, and that the butterfly line needs changing</p>
<p>Check that the light is flashing on the syringe driver</p>	<p>This shows that the pump is working</p>
<p>Check the rate of administration by: Measuring the number of mls remaining in the syringe and document on the prescription chart</p>	<p>To ensure the correct rate</p> <p>To ensure the drugs are being administered at the correct rate and the pump is working correctly</p>
<p>Check the patient's symptoms</p>	<p>They may require PRN medication and review</p>
<p>If symptoms persist and the syringe driver is functioning, give PRN medication as prescribed ('Break through' medication dose) Do not alter the rate of the infusion.</p>	<p>Changing the rate of the infusion will alter the total dose of the drugs given over a 24 hour period, and will result in a drug error</p>
<p>Sites usually last less than one week. It is suggested they are changed every 3-4 days (Stilwell, 1992). They may need changing more</p>	<p>If the site is not satisfactory, the drugs will not be absorbed effectively</p>

frequently	
If the infusion needs to be altered, e.g. due to an increase in symptoms, a new prescription needs to be written and a new infusion started. This includes changing the butterfly line	To ensure the new dosage is administered effectively, and to reduce the risk of errors
The pump must be kept dry	Otherwise it will malfunction
The pump should not be dropped	This could cause damage. A holster bag is available
The pump should be kept out of direct sunlight	This can cause the drugs to crystallize or become unstable
The use of the syringe driver must be acceptable to the patient	To maintain patient autonomy and consent to treatment
When the syringe driver is no longer required, it should be returned to community equipment store for cleaning and maintenance.	To maintain safe and continued use of machine.

5. DISCONTINUE A SYRINGE DRIVER.

The use of a syringe driver to administer medications can be discontinued following review by GP, Palliative Care CNS, Community Matron or District Nurse, if the original indications for its use are resolved. I.e. able to use/ tolerate oral administration of drugs.

ACTION	RATIONALE
Assess patient's symptoms, has the reason they needed the S/D resolved? Or have they RIP	They may now be able to tolerate medications via another route
Explain to the patient what you plan to do Use Health Advocate as required	They are aware of their planned care, and can report any symptom change Effective Communication
Convert back to the oral route	Return to more normal routine.
Ensure the patient is prescribed appropriate PRN medication intramuscular / subcutaneous ,oral and give as needed	If they become symptomatic, the last drug may needed to be added back to the S/D, or the S/D restarted
Check the patient's symptoms remain under control after the S/D is discontinued	To assess effect and maintain symptom control Restart if needed

6. DISCHARGE FROM HOSPITAL WITH A SYRINGE DRIVER

ACTION	RATIONALE
Medical staff should write the prescription drugs to take home form (TTA). The following information should be included: <ul style="list-style-type: none"> • Patient's name, address and Date of Birth • The syringe driver prescription and the date. 	This is so the General Practitioner (GP) and District Nurses (D/N) have a prescription to follow.
A referral to the district nurses must be made at least 12 hours prior to discharge. Liaise with the district nurse re the	District Nurses require as much notice as possible to plan their workload.

<p>approximate time of their first visit. –</p> <p>If the patient should go home with the syringe driver; this must be returned to the ward when it is no longer needed.</p>	<p>To ensure there is enough medication in the syringe until the first D/N visit.</p> <p>To maintain drug administration, but equipment would need to be cleaned prior to return to NUHT ensuring the equipment is returned.</p>
<p>Ensure TTAs have been prescribed for the S/D, including water for injection, and that the patient goes home with at least 7 days supply of medication syringes, infusion sets and semi permeable dressings.</p>	<p>To ensure the D/N has enough medication and equipment in the patient's home for at least 7 days</p>

7. Training

- 7.1. Formal teaching and assessment will be co-ordinated by the Specialist Palliative care Nurse provided locally by the Specialist Community practice teachers based on the S/D procedure is available to all qualified nursing staff. This includes a practical demonstration on setting up a S/D.
- 7.2. A copy of the current S/D procedure is made available to each staff member at the initial teaching session and is also available on each ward, together with the manufacturers' instructions for use.
- 7.3. The checking of the S/Ds function and site is clearly and accurately documented at least twice daily on the S/D prescription and monitoring chart. This includes date/ time is checked, condition of site, rate, battery light flashing, mls / volume of fluid left in the syringe and the nurse's signature.
- 7.4. The teaching session covers the use of PRN medication to maintain optimum symptom control.
- 7.5. All syringe drivers are serviced at least once a year. A record of this is kept in Community Equipment store
- 7.6. For advice if patients discharged from hospital contact Newham Palliative Care team via switchboard at NUHT otherwise contact Community palliative care team based at St Joseph's. (St Josephs Hospice-0208 525 6200 or NUHT 0207 476 4000)

8. Syringe Driver Drugs

8.1. Suitable Drugs

Not all drugs are suitable for subcutaneous administration.

- Chlorpromazine, diazepam and prochlorperazine are too high an irritant for subcutaneous use.

These drugs are not standard, but can be used in a S/D, in conjunction with advice from the Palliative Care Team (PCT):

- Octreotide
- Hydromorphone
- Diclofenac
- Ketorolac
- Methadone
- Phenobarbitone
- Alfentanyl
- Ketamine

Within office hours advice is available from the Community pharmacists, St Joseph's Homecare Team to medical staff regarding S/D prescribing.

8.2. The following combinations are commonly used:

- Cyclizine + Hyoscine Butylbromide
- Levomepromazine or Midazolam + Hyoscine Hydrobromide or Butylbromide
- Haloperidol + Hyoscine Hydrobromide
- Haloperidol + Cyclizine
- Haloperidol + Midazolam
- Midazolam + Metoclopramide
- Midazolam + Levomepromazine
- Midazolam and Cyclizine

NB: Morphine/ Diamorphine can be added to all the above combination

9 Servicing / Faults

All electrical equipment needs to be checked yearly by the Estates Department. This should be organised by the Ward Manager of each area. Any faults/repairs need to be sent to the Estates for repair.

10 APPENDICES:

1. Choice of Infusion site
2. Trouble Shooting
3. Calculations and scenarios
4. Prescription and Monitoring chart
5. Flow Chart for setting up a S/D
6. Conversion chart

APPENDIX 1

Choice of infusion sites

If possible discuss with the patient their preferred method of carrying the pump before selecting the site.

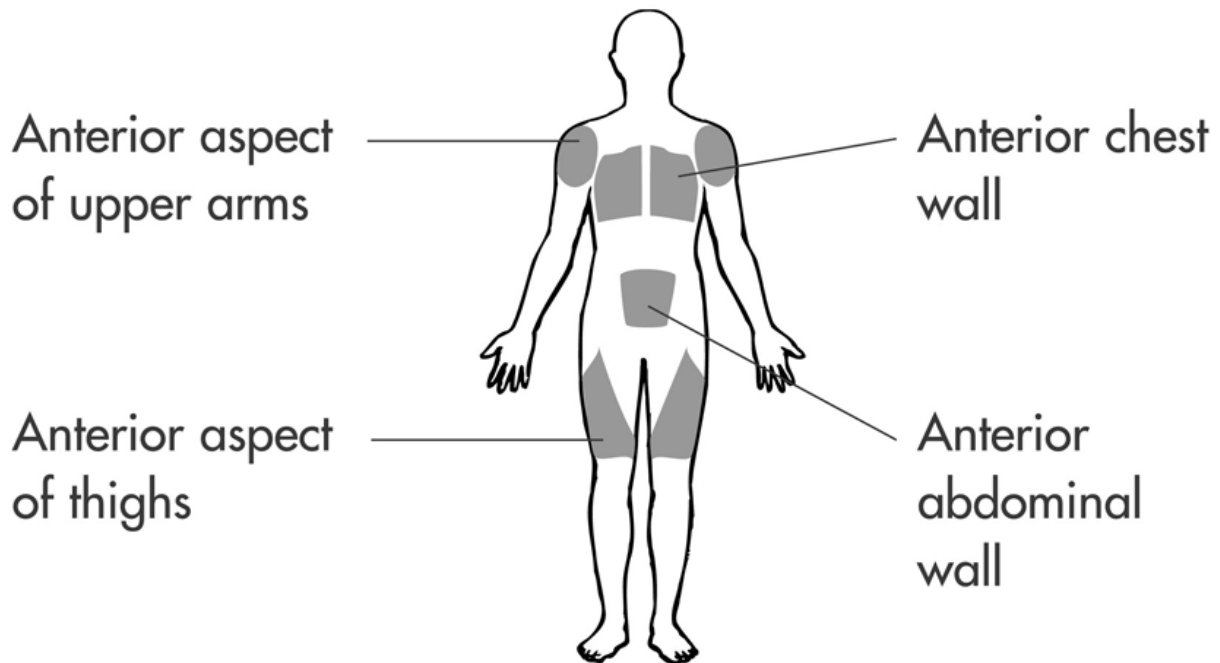
Preferred sites are – NB: Infusion sites should be rotated

Upper chest

Upper arm

Abdomen

Outer thigh upper scapula region (this is a useful site for confused patients).



Unsuitable sites for subcutaneous infusion are

Oedematous areas – drug absorption may not be effective (Twycross 2002)

Over boney areas as this may cause discomfort

Previously irradiated skin areas

**APPENDIX 2
TROUBLE SHOOTING**

1. Syringe driver will not start

- no battery → batteries should be supplied by the ward
- battery inserted the wrong way round
- flat battery
- Malfunction of motor → report and return S/D to Estates and use a different S/D.

2. Infusion stopped or alarm sounded

- syringe is empty → renew syringe with appropriate prescription
- inflamed/ineffective injection site → replace butterfly, priming with the medication in the syringe
- precipitation of drugs (usually cyclizine and high doses diamorphine)

3. Infusion ended early

- the initial volume in the syringe is smaller than 8 mls, because the line has been primed
- incorrect rate calculation and setting (incident form)
- faulty pump → inform Estates and use a different S/D

4. Infusion taking longer the intended time

- pump stopped, or has stopped and been restarted
- incorrect rate calculation and setting (incident form)
- actuator was not flush against the plunger
- failing battery
- faulty pump → inform Estates and use a different S/D

5. The patient is still symptomatic

- the pump if not working correctly → check the above
- the pump has just been started → it usually takes 2 hours for the drugs to get into the patient's system when a S/D is first set up, they may therefore consider administering PRN medication
- The patient requires PRN medication → this can be given via injection, even when on a S/D, to maintain patient comfort. If the patient is requiring regular PRN doses, or the PRN medication is not helping contact medical staff to review.

6. Pain

- Has the pain improved with the analgesia given in the S/D?
 - **YES**
 - If necessary give appropriate PRN doses of prescribed analgesia until pain relief is meeting the patients needs
 - **NO**
 - Ask GP, Community Matron or Palliative CNS to review dose

7. Agitated / Confused

- Has this increased dramatically since the syringe driver was started?
 - **YES**
 - Ask GP, Community Matron or Palliative CNS to review dose
 - **NO**
 - Maintain the usual regular patient and S/D checks

8. Nausea / Vomiting

- Is this an initial response to starting on an opioid?
 - Consider using an anti-emetic in the syringe driver to prevent this, or use PRN doses as required.
- Is the patient hypercalcaemic?
 - Consider checking blood results and treat accordingly.
- Is the patient on the maximum 24 hr dose of the anti-emetic?
 - Consider increasing dose to maximum amount, and use PRN s/c / i/m doses of an alternate anti-emetic (see Newham Medicines Guide).
- Consider using an alternative anti-emetic in the syringe driver.
- Consider bowel obstruction

APPENDIX 3 CALCULATIONS AND SCENARIOS

1. Syringe volume:

- 1.1. Draw up the prescribed drugs and diluent into a 10ml leur lok syringe, to a total volume of 8mls.
- 1.2. If there is no room for diluent, or the volume is high, then the prescription must be changed to half the dosage over **12hrs**. The rate on the pump must be changed as described below.

1.3. Graseby MS16A pump:

$$\text{Rate} = \frac{\text{distance L in mm}}{\text{Infusion time in hrs}} = \text{mm/hr}$$

Length of 8mls in a 10ml leur lok syringe = 48mm

If the prescription is for 24 hours: - $\frac{48 \text{ (mm)}}{24 \text{ (hrs)}} = 2\text{mm/hr}$

If the prescription is for 12 hours: - $\frac{48 \text{ (mm)}}{12 \text{ (hrs)}} = 4\text{mm/hr}$

Graseby MS16A syringe drivers deliver in millimetres per hour

Set at **02** to run at **2mm/hr over 24hrs**.

Set at **04** to run at **4mm/hr over 12hrs**.

When converting to a syringe driver, you need to consider the total dosage given in 24 hours, including the PRN doses.

2. Scenarios

- 2.1. Mr A is taking 10mg of oramorph every 4 hours (6 doses in total), yesterday he required 3 breakthrough doses of oramorph 10mg. He was comfortable on this, but needs to start a S/D due to dysphagia. What dosage of diamorphine would you put in his S/D?

$$10\text{mg} \times 6 \text{ (regular doses)} = 60\text{mg} + 30\text{mg (prn doses)} = 90$$

Mr A received 90mg in 24 hours

Diamorphine = $\frac{1}{3^{\text{rd}}}$ of oramorph dose.

$$90/3 = 30$$

Ans: 30mg / 24 hrs.

2.2. Mr B is taking MST 90mg bd; he has required 2 sc injections of diamorphine 10mg to control his pain. What would be the equivalent dose of diamorphine in a syringe driver?

$$90 \times 2 = 180 \text{ (MST dose in 24hours)}$$

$$180 / 2 = 90$$

$$2 \times 90 = 180 \text{ morphine}$$

$$180/3=60 + 2 \times 10 \text{ mg prn} = 80 \text{ mg}$$

Ans: 80 mg / 24 hrs.

3. PRN medication

NB: It is important that anyone with analgesia in their syringe driver has a PRN dose prescribed; this should be given for breakthrough pain.

To work out the dose, divide the 24hr dose by 6 (ie the equivalent to the 4 hourly dose).

e.g

Mr A's prn dose of diamorphine is

$$30\text{mg} / 6 = \mathbf{5\text{mg}}.$$

Mr B's prn dose of diamorphine is

$$80/6 = 13.3 \text{ prn dose} = \mathbf{15\text{mg}} \text{ of diamorphine}$$

APPENDIX 4

SUBCUTANEOUS SYRINGE DRIVER PRESCRIPTION AND MONITORING CHART

**ALL STAFF MUST BE FAMILIAR WITH THE SYRINGE DRIVER PROCEDURE
PLEASE SEE OVERLEAF FOR GUIDELINES ON USING THIS FORM**

GP.....

Patient Name:.....

NHS No:.....

SYRINGE DRIVER *MS16A*

DOB:.....

DATE:.....

TIME STARTED

Nurse's Signature 1.....

Prescription: <p style="text-align: right;">Independent Prescriber/ Dr's Signature.....</p> Total Volume =8mls (48mm)					
TIME CHECKED	CONDITION OF SITE	RATE	BATTERY LIGHT FLASHING	ML LEFT IN SYRINGE	NURSE'S SIGNATURE
.....
.....
.....
.....
.....

DATE:.....

TIME STARTED:.....

Nurse's Signature 1.....

Prescription:					
Total volume =8mls (48mm)			Independent Prescriber/ Dr's Signature:..... Pharmacist Check:		
TIME CHECKED	CONDITION OF SITE	RATE	BATTERY LIGHT FLASHING	ML LEFT IN SYRINGE	NURSE'S SIGNATURE
.....
.....
.....
.....
.....

GUIDELINES FOR USING THIS FORM

PRESCRIPTION

Please indicate on patient's drug chart Syringe Driver in use. Please see separate chart.

When prescribing, please state drugs, dosage, volume, diluent (usually water for injection), infusion time and subcutaneous route.

i.e. xx mg Morphine/Diamorphine/Oxycodone and xx mg antiemetic/sedative made up to 8ml with water for injection to run over 24 hours subcutaneously via Syringe Driver.

See latest section in BNF "Prescribing in terminal care".

MONITORING OF SYRINGE DRIVER AND INFUSION

Infusion Rate

With a 24 hour prescription, the infusion rate is set to 2 mm per hour, using 10 ml Plastipak Luer-Lok syringes. 8 ml=48 mm – you can therefore expect the volume in the Syringe Driver to decrease by 2 ml every 6 hours.

If infusion rate is too slow

- Check whether cannula is kinked
- Whether battery is working
- Whether pump is switched on
- Battery light is flashing

If infusion rate is too fast

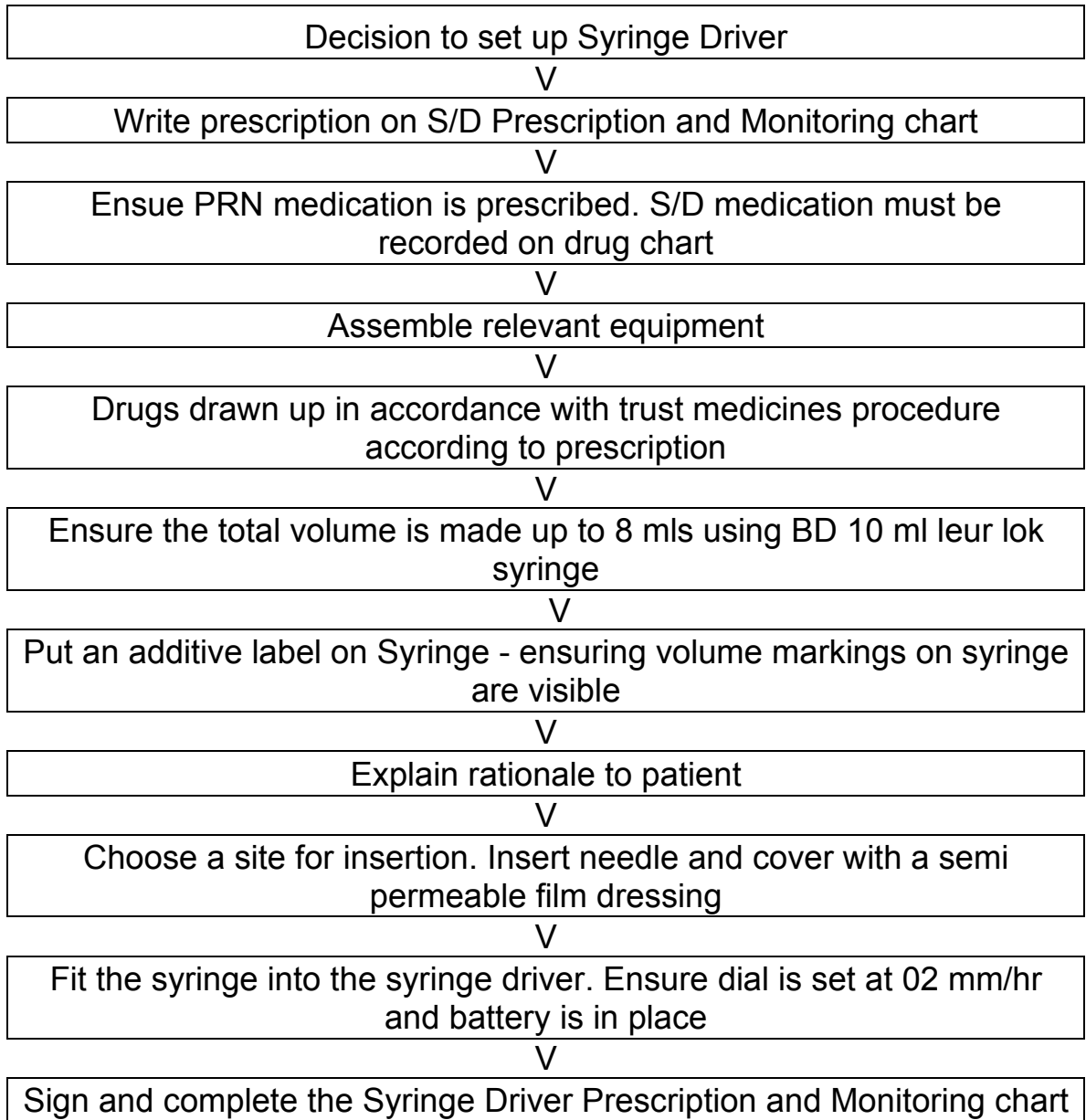
- Check rate setting & rate calculation

Site Check for:

Inflammation, Pain, Bleeding, Evidence of leakage of drugs from needle insertion site

NB If the volume of drugs mixed with water for injection is too large, please seek Palliative care advice

APPENDIX 5

FLOWCHART FOR SETTING UP A SUBCUTANEOUS S/D

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