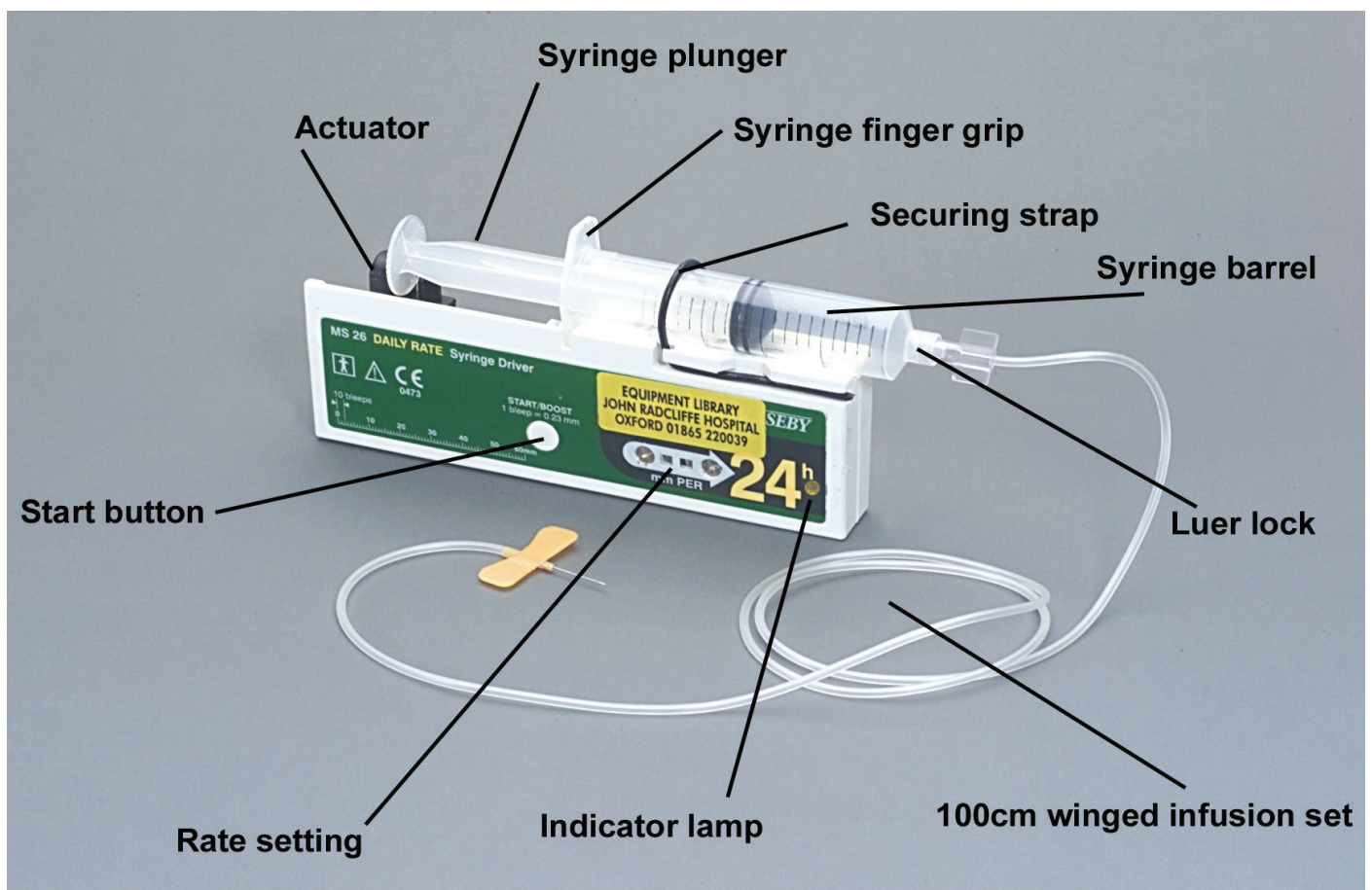


Clinical protocol for the use of syringe drivers in palliative care patients (adults)



These guidelines are written for the use of health care professionals in the Oxford Radcliffe NHS Trust and were produced by Mandie Draper and Stuart Oliver CNS's in the Trust's Hospital Palliative Care Teams who will review the protocol every three years. "Accepted for print on Feb 2004. For review on Feb 2007."

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INTRODUCTION

The syringe driver in palliative care is a small, portable, battery powered infusion device that is suitable for patient use in the hospital and at home. The syringe driver is used to administer a continuous subcutaneous (sc) infusion of drugs from a syringe e.g. analgesics, antiemetics, sedatives or anticholinergics. The syringe is drawn up with a single drug or combination of drugs and administered at a constant rate over a set period of time (usually 24 hours).

It is important to remember that a syringe driver is an alternative route for drug delivery and not a method of pain relief in itself.

Indications for use include:

- Persistent nausea and vomiting
- Intestinal obstruction
- Difficulty in swallowing due to profound weakness / low energy levels
- Sleepiness / coma
- Poor alimentary absorption (rare)
- Intractable pain

The main purpose of this document is to assist the registered nurse in deciding when a syringe driver is needed and to provide guidelines to be followed for setting it up and ongoing management. Principles for deciding on appropriate drug doses will also be discussed.

Rationale for any decision to deviate from these guidelines should be documented in the patient's notes.

The reason for developing this document is for all nurses at the ORH NHS Trust to use syringe drivers in the same safe and effective way when administering drugs to manage distressing symptoms in palliative care situations.

The **Graseby MS 26 (green) delivers drugs over 24 hours and is the syringe driver recommended for sub-cutaneous use in palliative care situations** because of its technical simplicity. In addition, using one model avoids confusion and reduces the risk of error when calculating the rate. This is important as another device exists that appears the same at a glance.

WARNING Graseby manufacture the **MS 16A (blue)** which delivers drugs by the hour and is very similar in appearance. This is used in specialist areas such as paediatrics and outpatients to give a drug over a shorter period of time where use of the MS 26 model would be inappropriate. Any clinical areas owning an MS 16A must keep it locked away to avoid potential fatalities as a consequence of mistaken identity between these devices. This practice would follow the United Kingdom relevant guidance published by the Scottish Office Home and Health Department (1995).

ROLES AND RESPONSIBILITIES

The doctor is responsible for prescribing medication to be infused via the syringe driver. The registered nurse is responsible for the setting up, monitoring and reloading the syringe every 24 hours. Registered nurses have a responsibility to ensure their own training needs are met prior to using the device. A health care assistant may care for a patient with a syringe driver in situ, with responsibility to report any concerns to the qualified nurse. The health care assistant has no responsibility for setting up or monitoring the syringe driver.

Further **specialist advice** can be sought from:

Monday to Friday, 9am to 5 pm:

- Hospital Palliative Care Team at the John Radcliffe Hospital (2)21741
- Hospital Palliative Care Team at the Churchill (2)25863
- Hospital Palliative Care Team at the Horton Hospital (2)29238

Overnight and at weekends:

- Katharine House Hospice 01295 811866
- Sobell House (01865 2)25873

TRAINING NEEDS

The registered nurse will have knowledge of:

- When a syringe driver is needed (see indications for use p.3)
- How to check and start the Graseby MS 26 (see p.7)
- The correct equipment to use (see p.6)
- How to set the correct rate (see p.7)
- What to check regularly, during the infusion (see p.9)
- How to reload the Graseby MS 26 syringe driver (see p.8)
- The rule **not** to use the boost button for breakthrough administration of medication (see p.10)
- The principles applied when selecting the correct drug and dose to ensure the patients needs are met (see p.5,6, and 10)
- How and when to access **specialist advice** (see p.12)

The registered nurse will gain this knowledge through the following ORH NHS Trust resources:

- The Infusion Device Training organised by the manager of the equipment library at the John Radcliffe Hospital
- The Use of Syringe Drivers in Palliative Care (adult) Workbook

MAIN BODY OF TEXT

Advantages of a syringe driver

- Permits good symptom control through steady levels of plasma drug concentration
- Better control of nausea and vomiting
- Control of multiple symptoms often possible with a combination of drugs that can be mixed together
- Avoids repeated injections
- The subcutaneous route is more comfortable than the intramuscular route, especially for the cachectic patient
- Less invasive than the intravenous route
- Avoids the need for IV access
- Does not restrict mobility and independence
- Syringe only needs replacing once a day unless the prescription changes
- Technically simple to set up and use compared with other devices

Considerations when using a syringe driver

- There is a need to anticipate the patient's requirements over 24 hours
- An exacerbation of symptoms may necessitate additional injections to supplement the infusion (the boost button is **not** suitable for this see boost button p.10)
- It should not be seen as the solution to all problems – symptoms still need to be assessed regularly and the medication and doses adjusted accordingly
- Some patients may find the syringe driver heavy
- There is a myth regarded by some that the syringe driver is a last resort, or a sign of impending death. In fact some patients use a syringe driver for extended periods of time, and may return to oral medication once symptoms are controlled
- Training of nurses is essential to ensure safe and effective use

Drug compatibility and diluent

There are a variety of drugs that can be used in a Graseby MS 26 syringe driver. Many are compatible and can be mixed together and others may precipitate when combined. Some drugs should not be administered via a syringe driver, if unsure seek **specialist advice** (p.12).

Water for injection is recommended to dilute drugs unless otherwise stated. Information of the appropriate diluent can be found on the manufacturers product information sheet, BNF, pharmacist or seek **specialist advice** (p.12)

Calculating oral morphine to subcutaneous diamorphine

- Diamorphine is the opioid of choice in syringe drivers because it is very soluble, allowing larger doses to be administered in smaller volume
- As a starting dose, **one third of the total** oral morphine dose given to the patient over the previous 24 hours can be converted to the 24 hour subcutaneous dose of diamorphine. This should include the regular doses of oral morphine and any breakthrough (prn) doses
- If at all unsure, seek **specialist advice** (p.12)

Calculating subcutaneous morphine to subcutaneous diamorphine

- As a starting dose, **one half of the total** subcutaneous morphine dose given to the patient over the previous 24 hours can be converted to the 24 hour subcutaneous dose of diamorphine
- If at all unsure, seek **specialist advice** (p.12)

Calculating from other opioids

- If the patient is using fentanyl patches or converting from other opioids whether strong or weak e.g. codeine phosphate, methadone, tramadol, hydromorphone, dihydrocodeine seek specialist advice (p.12)

Equipment

- Syringe driver, clear plastic cover and holster (carry bag)
- Key rate adjuster or paper clip
- Butterfly needle with 100 cm line
- 9 volt alkaline battery
- Suitable syringe. The ORH NHS Trust Clinical protocol for the use of syringe drivers in palliative care patients (adult) recommends that **only luer lock syringes are used.**

They offer more security against accidental disconnection of the infusion line.

10, 20 and 30ml are commonly used, though 50ml syringes can also be used with **specialist advice** (p.12).

Syringes will only fit the syringe driver if underfilled

10ml syringe = approximately 9.5mls total amount

20ml syringe = approximately 16mls total amount

30ml syringe = approximately 21mls total amount

Seek **specialist advice** (p.12) if the total amount of medication is too much for the syringe driver to hold.

- Transparent film adhesive dressing, e.g. Tegaderm, Opsite
- A suitable diluent. Water for injection is recommended as there is less chance of precipitation, unless otherwise indicated
- The prescribed drug(s), prescription chart, a sticky label, and syringe driver chart
- When setting up a syringe driver or drawing up the next 24 hour syringe, two qualified nurses should check the drugs, the rate and the identity of the patient

Preparing the patient and family

It is important to recognise that having a syringe driver can be a frightening new experience for the patient and their family.

- Spend time with the patient and family explaining the procedure
- Be aware that some people believe a syringe driver is a last resort, a sign of impending death, or a means of euthanasia. These are fears that will need exploring, providing reassurance that these fears are not true
- Invite questions, acknowledge anxieties and reassure where appropriate
- Remember that the patient with lethargy may not have the energy to follow explanations

Checking and starting the pump

- Ensure the pump is the Graseby MS 26 with a green label. If not seek **specialist advice** (p12)
- Insert battery. The alarm will sound for about 15 seconds and then fade
- Press and hold down the start/boost button. The motor will turn and stop after 10 seconds, the alarm will continue for a further 15 seconds
- Once the alarm has finished, releasing the button starts the syringe driver
- Do not use the pump if the motor does not stop or the alarm does not sound
- Check that the indicator lamp is flashing (the lamp will begin to flash every 25 seconds)

IMPORTANT

Graseby recommend starting the syringe driver in this way to check that the safety system and alarm are working.

Setting the correct rate

- The following should be checked by two registered nurses
- Work out the likely total volume of fluid (including diluent) before selecting the appropriate size syringe (see equipment p.6)
- Draw up medication into the syringe and dilute to the appropriate volume
- Label the syringe with the drugs used (ensure the markings on the syringe can be seen)
- Attach giving set firmly to the syringe – ensure secure connection
- Prime the line and needle
- Double check that the volume in the syringe will fit in the syringe driver (see equipment p.6)
- Use a ruler to measure the length of fluid in millimetres (mm). This is the calculation in mm of plunger travel for 24 hours. Measure from the empty 0 line on the syringe to the plunger
- Set the rate setting on the syringe driver to the measured amount (in mm) using a key rate adjuster or a paperclip
- Place the syringe in the pump. Ensure the syringe finger grip fits into the slot provided on the syringe driver
- Place the securing strap over the barrel of the syringe
- Slide the actuator to engage the syringe plunger into the slot provided on the actuator
- Double check the light is flashing
- Place the syringe driver into the clear plastic cover for protection
- Place this inside the holster/carry bag to ease mobility

The patient has a distressing symptom at the time of setting up the syringe driver

- It takes approximately four hours for medication to be effective when initially setting up a syringe driver
- Any distressing or uncontrolled symptom at the time of setting up a syringe driver requires a prn dose of medication
- All prn medication needs to be given (as prescribed) at an appropriate dose (see administration of prn medication p.10)

Site selection and needle placement

- Suitable sites for placement of the butterfly needle include: the upper chest; upper arm; anterior abdomen; anterior aspect of the thighs
- Patient preference, the disease process and common sense will influence the choice
- Avoid the upper arm in bedbound patients who require turning and sites over bony areas in cachectic patients
- Avoid areas of broken skin, inflammation, skin folds or oedema / lymphoedema
- Insert the butterfly at an angle to the skin. Holding a fold of skin between finger and thumb may ease insertion. Once inserted lay it flat against the skin
- Loop the tubing once around the insertion site to avoid pulling on the needle. Secure with a transparent adhesive dressing
- Check again that the indicator lamp on the syringe driver is still flashing
- Place syringe driver back in the clear plastic cover and holster/carry bag

Re-loading the syringe

- Re-assess that the drug and dosage meet the patient's needs
- Draw up the required medication (with two nurses checking) in a syringe for the next 24 hour period and re-measure the length of fluid (in mm). There will be no need to prime the infusion line and needle
- Check the rate setting is correct and alter if required
- Replace and secure new syringe
- Restart by pressing the start/boost button
- Check pump function by observing the indicator lamp. If it does not flash, try replacing the battery.
A battery will deliver 50 full syringes

Alteration of drug or dose or adding new drugs

If a drug dose needs to be changed, start again. The syringe should be re-loaded rather than the infusion rate altered because:

- Alteration of the rate will deliver all of the drugs at the increased or decreased rate
- If the rate is changed, the finish time for the infusion will be at an unknown time for reloading the syringe

If a new drug is to be added, start again. The syringe should be re-loaded rather than adding drugs to the syringe insitu because:

- Each new prescription needs to be addressed with a new syringe
- It ensures the prescribed drugs are delivered over the prescribed time
- The effectiveness of the new prescription can be more accurately assessed

Regular checks

A dedicated syringe driver chart should be used to prompt regular checks approximately every 4 hours. This should include:

- Site condition - does the site need changing?
- Leakage at the various connections
- Rate setting - stays the same for the whole syringe
- Volume remaining in millilitres (mls) – is it running too fast or too slow or not at all?
- Appearance of contents of the syringe and infusion line - is it clear or cloudy or can crystals be seen? (precipitation/crystallisation)
- Battery - is the indicator lamp flashing?

IMPORTANT The light stops flashing to indicate that the battery is low and that it needs replacing. It also stops flashing if there has been an occlusion alarm and the pump has turned itself off

The alarm will sound for about 15 seconds if the pump stops. Check the following:

- Empty syringe
- Kinked tubing
- Blocked needle/tubing
- Jammed plunger
- If unsure seek **specialist advice** (p.12)

IMPORTANT There is no OFF switch to stop the syringe driver. To stop it, remove the battery. Once a patient has died, **discreetly** remove the battery if it is not possible to remove the syringe driver before relatives view the deceased. When the syringe driver is to be placed in storage, return the rate setting to 00.

Changing the infusion site

Change the infusion site only when necessary, i.e. if it is painful, or appears to be inflamed or swollen. The frequency of this will depend on the drugs used, for example; cyclizine and levomepromazine may cause local irritation. Some sites, however, remain useable for days or weeks. Should there be a problem consider the following and/or seek **specialist advice** (p.12).

- Decrease the concentration of the drug by using more diluent
- Changing an irritant drug to a less irritant alternative
- Using a plastic (Teflon) butterfly needle (if available)
- Changing the infusion site daily
- Changing to a different route

Administration of prn medication

Where a patient who is receiving regular analgesia continues to experience pain, this is called *breakthrough pain*. Similarly, where a patient who is receiving regular anti-emetic continues to experience nausea, this is called *breakthrough nausea*. The same description applies to any distressing symptom. All of these breakthrough symptoms need to be assessed, and if appropriate, a prn dose of medication needs to be administered.

Calculating a prn dose of opiate

- Each prn dose should be equivalent to a four hourly dose of the 24 hour total. To achieve this, divide the total 24 hour dose prescribed for the syringe driver by 6. This is based on $4\text{hours} \times 6 = 24\text{hours}$.
- It is common for a pain to change and this prn dose can be given hourly (if prescribed) until the patient is free from pain (be aware of the need to assess that the pain is opiate responsive...other types of analgesia may be required) – if unsure seek **specialist advice** (p.12).

Calculating other prn medication

Similar mathematics can be applied to some drugs to address other distressing symptoms as with pain. However, awareness of the drug, such as doses and likely side effects are essential. If unsure seek **specialist advice** (p.12).

Butterfly needles

If the oral route is not suitable, the subcutaneous butterfly needle is the most appropriate route for prn/breakthrough administration because:

- Avoids repeated injections
- The subcutaneous route is more comfortable than the intramuscular route
- Less invasive than the intravenous route
- Avoids the need for IV access
- See **Site selection and needle placement**

Boost button

WARNING The Oxford Radcliffe NHS Trust clinical protocol for the use of syringe drivers in palliative care patients (adult) states the boost button should NOT be used for prn medication or breakthrough analgesia or anti-emetic because:

- When the boost button is pressed a bleep will be heard. The syringe plunger moves forward 0.23 millimetres with each bleep
- It is almost impossible to administer an accurate dose
- It will lead to poor symptom control
- If more than one drug is in the syringe, all drugs will be administered
- The infusion will finish early, which could further add to poor symptom control
- Just don't do it!

Discharging a patient home

Patients can and do go home with syringe drivers. As with any discharge, planning and communication are essential.

- District nurses are familiar with the syringe driver and have their own guidelines
- Contact with the district nurse should be made as early as possible
- The district nurse may be able to provide the patient with the community owned machine prior to discharge. Communication is the only way to establish this possibility and ensure smooth transfer of care
- If a community syringe driver is not available, a loan of the hospital owned machine would be required. Contact and inform the owner of the syringe driver of the name and address of the patient, serial number of the machine and of how/when it is to be returned. The owner could be the equipment library, palliative care support team, ward manager or outpatient clinic manager
- Communication with the district nurse will establish how/when the syringe driver is to be returned
- The district nurse will want to know what time you will reload the syringe prior to discharge so she can plan the time of her visit. At the same visit, she will educate the patient on how the syringe driver will be managed at home
- This can be a very stressful time for the patient and their family, so make time to listen to their anxieties, fears, and to reassure them. Providing the district nurses contact number will help with this stress and anxiety– communicate with the district nurse

Admitting a patient from home

Issues to be aware of when caring for patients who have been admitted to hospital with a Graseby MS 26 syringe driver.

- The ward nurse should attempt to get the hospital owned syringe driver exchanged with the community one as soon as possible
- The district nurse may want to come in to collect it, or for you to send it back to the GP's surgery, via the family or by post
- If the syringe driver is a Graseby MS 26, two nurses should check that the same rate is transferred to the new pump. The other four hourly checks will also need to be carried out (see regular checks p.9)

WARNING if a patient is admitted with a syringe driver that is a Graseby MS 16A, seek **specialist advice** (p.12) before changing to the hospital owned Graseby MS 26.

Re-ordering equipment (from procurement)

- | | |
|--|--------|
| • 10ml luer lock syringe | FWC212 |
| • 20ml luer lock syringe | FWD018 |
| • 30ml luer lock syringe | FWC062 |
| • Butterfly needle with a 100 cm line (for the syringe driver) | FSB034 |
| • Butterfly needle with a short line (for prn doses) | FSB454 |
| • Transparent adhesive dressing to secure butterfly needles | ELW042 |
| • 9 volt alkaline battery | PSB155 |

NOTE check the number of items supplied with each order before placing the order to avoid huge quantities being delivered.

Specialist advice

Monday to Friday, 9am to 5 pm:

- Hospital Palliative Care Team at the John Radcliffe Hospital (2)21741
- Hospital Palliative Care Team at the Churchill (2)25863
- Hospital Palliative Care Team at the Horton Hospital (2)29238

Overnight and at weekends:

- Sobell House (01865 2)25873
- Katharine House Hospice 01295 811866

Pharmacist:

- Each site has pharmacists during open hours
- Medicines Information (ext.21505) based at the John Radcliffe hospital
- On call pharmacists are available through switchboard for out of hours support

AUDIT AND RISK MANAGEMENT

The ORH NHS Trust is providing infusion device training to all registered nurses across the Trust. The equipment library nurse, who leads the Infusion Device Training Team will audit their training. Data collected is to be shared annually with the Hospital Palliative Care Team to inform on the use of syringe drivers. This will rely on an effective working relationship between the team providing the infusion device training and the Hospital Palliative Care Team.

LEGAL AND PROFESSIONAL ISSUES

There are differences of opinion about whether to measure the syringe before or after priming the line when using a Graseby MS 26. This is only an issue when using a new infusion line. The literature does not provide a conclusive discussion of this issue.

Advice was sought from the Oxford Radcliffe NHS Trust's legal department, who directed that manufacturer guidelines need to be followed to deflect litigation from the Trust onto the manufacturer.

For further clarification of the issue, a meeting was held in January 2003 with a representative of the ORH Trust and the Medical Devices Agency (MDA). The MDA stated that the manufacturer guidelines must be followed.

At the time of this meeting the manufacturer, Graseby Medical Limited, was in the process of updating its instruction manual. A representative of the manufacturer indicated that the new version will include a description of both options, with the advice that measuring the syringe before priming the line should only be used if this is directed by a local policy and procedure. Graseby cite Mitten (2001) as evidence for the change in their instruction manual.

In a paper which examines subcutaneous drug infusions, Mitten (2001) briefly mentions the issue of priming the line, referring to Weston (1989), who, on the face of it, offers four different methods to prime and set the syringe driver. However, Weston's findings should be interpreted with some caution: a careful reading of the paper establishes only two ways to prime and set the syringe driver, and the questionnaire used in the study to gather data is problematic.

If the syringe is measured before priming the line, the syringe will empty and need re-loading at an unknown time before 24 hours of it being commenced. Although the alarm on the Graseby MS 26 will indicate that the syringe is empty and needs re-loading, this alarm is quiet, especially compared to other medical devices, and is likely to be missed. This creates the potential for the patient to have a period of time with no medication.

In conclusion, the literature provides no evidence for one method being better than the other. Combining the lack of clear evidence with the need to avoid the potential for patients to receive no medication, **the Oxford Radcliffe Hospitals NHS Trust clinical protocol for the use of syringe drivers in palliative care patients (adult) advises that when using a new infusion line, the syringe must be measured after priming the line.**

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SCOTTISH OFFICE HOME AND HEALTH DEPARTMENT. 1995. The management of infusion systems. Working party on the management of infusion systems executive summary report. Edinburgh: SOHHD.

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WORKING PARTY

Thanks to: John Beale (pharmacist), Sarah Blackburn (pharmacist), Tim Dale (charge nurse), Melanie Delve (equipment library nurse), Marc Mitchell (pharmacist), Julia Newport (palliative care clinical nurse specialist), Jo Radcliffe (equipment library nurse), Jane Smith (district nurse) and Mary Walding (professional development nurse) for their valuable time given proof reading.

Thanks also to the Oxfordshire Community Syringe Driver Group who gave permission for their guidelines to be used as a template and for their contribution to this document.

