

ADULT SYRINGE DRIVER PROTOCOL
(T34)

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1. INTRODUCTION

This protocol covers all inpatient and community services within Harrogate and District NHS Foundation Trust (HDFT).

The CME T34 ambulatory syringe driver is a portable, battery operated device for delivering medication by continuous subcutaneous infusion (CSCI), which complies with all required National Patient Safety Agency (NPSA) standards (NPSA/2010/RRR019). A CSCI provides a safe and effective way of drug administration and can be used to maintain symptom control for palliative care patients who are unable to take oral medication, or who require a constant therapeutic infusion.

2. PRE-REQUISITE QUALIFICATIONS/EXPERIENCE

This protocol applies to all nurses with a valid NMC registration, working with adults in hospital and community settings and working within the Code - Professional Standards of practice and behaviour for nurses and midwives (NMC 2015) Standards for Medicines Management (NMC 2008) and Record Keeping: Guidance for Nurses and Midwives (NMC 2009) whom have undertaken the required training and are competent to administer medication via subcutaneous syringe drivers.

Registered Nurses who have previously undertaken this role outside HDFT may continue to practice with the approval of their line manager, as long as they can provide evidence of previously approved training and assessment and can submit evidence of continuing competence.

2.1. Education and Training

All nurses undertaking this role must attend the HDFT syringe driver training session annually and must complete the T34 e-learning unless trained outside HDFT – see 2. above.

2.2. Assessment of Competence

All registered nurses have a responsibility to assess their own competence in accordance with the NMC (2015) Professional Standards of practice and behaviour for nurses and midwives.

HDFT registered nurses are required to demonstrate competence by self-assessment against the criteria specified during the syringe driver training by completing and signing a competency checklist and providing a copy of this to their line manager for their personal file (Appendix 6).

The nurse should maintain evidence of their competence and practice in their own professional profile and ensure they attend their mandatory annual refresher training.

2.2.1. Patient and Carer Administration in community

In exceptional circumstances patients and their carers may wish to be involved in the administration of medications via subcutaneous injection or T34 syringe driver. The patient must give their written consent for this to take place. The GP and district nurse must be confident that all safety, risk assessments, consent and ethical considerations have been addressed before agreeing to train and delegate administration of medications to the patient or carer. This should be discussed and agreed with the multi-disciplinary team and be documented within the patient's notes and the guidelines for patients and carer administration of palliative care medications should be followed. (Document being drafted)

3. GUIDELINES FOR SYRINGE DRIVER USE

The T34 is the only syringe driver used to administer palliative medicine within the Harrogate and Rural Dales area. If staff attends to a patient who is using a different make/model of syringe driver to the T34, they **MUST** change it.

3.1. Indications for use

The decision to administer medication via a syringe driver needs to be taken by the multidisciplinary team in consultation with the patients/carers and when other methods of administration e.g. oral, transdermal, rectal or sublingual have been considered.

The patient may need a syringe driver if unable to take oral medication for one of the following reasons:

- Persistent nausea/vomiting

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- Difficulty in swallowing
- Comatose or semi-comatose, often shortly before death
- Intestinal obstruction
- Malabsorption of medication
- Rectal route unsuitable
- Too weak to take oral medication

3.2. Advantages in using the syringe driver

- Avoids the necessity of intermittent injections
- Constant level of medication – avoids serum level peaks and troughs which occur with other routes of administration or giving PRN doses.
- Certain mixtures of drugs may be administered (contact pharmacy or the specialist palliative care team for advice).
- The device is lightweight and compact, allowing mobility and independence.

3.3. Equipment Required

1. T34 syringe driver
2. PP3 9 volt Duracell Procell battery
3. Bbraun luer lock syringe – 20ml or 30ml recommended
4. Saf-T-Intima subcutaneous cannula
5. McKinley 100-172S Extension set
6. A semi-permeable transparent adhesive film dressing
7. Documentation
8. Drug additive label
9. Lock box and key
10. Diluent (water for injection or 0.9% sodium chloride)
11. Prescribed medication
12. Sharps container
13. Non-sterile gloves
14. Bionector
15. Non-alcohol detergent wipes (to clean syringe driver and lock box)
16. Community only – washable syringe driver bag and washing instructions



Syringe drivers are available from the Equipment Library (tel 01423 555800) from 8am to 9pm. Out of opening hours, contact the Site Co-ordinator (bleep 2005).

3.4. Prescribing

An appropriately qualified prescriber is responsible for prescribing the medication, diluents and additional medication for breakthrough symptoms. Unless stated, all medication should be diluted with water for injections. Please check diluents and compatibilities prior to preparing the syringe.

Nurses must check that medication has been legally prescribed before administration. If there are any concerns regarding the dose, side effects, compatibility, or the appropriateness of the prescription, the practitioner must contact the prescriber.

Syringe drivers must not be prescribed in anticipation of need. The patient's individual needs must be assessed and the medication prescribed according to the assessed need only. A dose range for titration of the medication can be prescribed with clear instructions on how and when to titrate them.

Anticipatory/PRN medication should therefore be prescribed in addition to the syringe driver to enable this assessment and titration to take place.

This enables the nurse to administer the medication without delay and reduce distress for the patient.

It is also considered good practice in community to count the medications administered and wasted on the stock pages within the community palliative care medication chart. A Datix must be completed if discrepancies are found.

The specialist palliative care team or pharmacist should be contacted for further advice if needed. Nurses must ensure that any previous oral, transdermal or subcutaneous medication has been taken into consideration and any conversions reflected in the prescription for the syringe driver medication.

Remember, any transdermal medication should remain in place when the syringe driver is commenced and continue to be changed when required.

Independent Nurse Prescribers (INPs) are now legally able to prescribe a mixture of licensed medication for administration via a syringe driver following legislative changes passed by government in December 2009.

A risk assessment should be taken prior to prescribing and commencement of the syringe driver. Consideration should be given to the potential misuse of medicines. Such concerns may include:

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- Known or suspected drug misuse within the family
- When a patient/carer has expressed a wish to hasten death
- Presence of children in the patient's home environment
- Informed consent and mental capacity of the patient

3.5. Preparing the patient

Explain the procedure to the patient and/or relatives. This is to remove any misconceptions around syringe drivers, advising them that this is a device to administer medication to alleviate symptoms when oral medication becomes ineffective or the patient is unable to swallow. Some patients may perceive that a syringe driver is only used when they are dying; nurses should reassure patients that a syringe driver is primarily used to manage symptoms which *may* include symptoms at the end of life. This discussion and reasoning should be clearly documented.

3.6. Skin site selection and insertion of Saf-T- Intima

The best sites to use for continuous infusion of drugs are the lateral aspects of the upper arms and thighs, the anterior chest below the clavicle and occasionally, the back or abdomen (Graham 2006).

Areas which should **not** be used are:-

- Lymphoedematous limbs, e.g. avoid arms at the same side as previous breast/axillary surgery. A cannula breaches skin integrity, thus increasing the risk of infection in a limb which is already susceptible
- Abdomen when distended by ascites or abdominal disease.
- Sites over bony prominences. The amount of subcutaneous tissue will be diminished, impairing the rate of drug absorption
- Previously irradiated skin area. Radiotherapy can cause sclerosis of small blood vessels, thus reducing skin perfusion
- Sites near a joint; excessive movement may cause cannula displacement and patient discomfort

Siting the subcutaneous cannula (Saf-T-Intima)

- Explain and discuss the procedure with the patient
- Wash hands with soap and water, or alcohol hand rub and assemble required equipment
- Expose the chosen site for infusion

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- Clean site for a minimum of 30 seconds with a 2% Chlorhexidine/70% alcohol impregnated wipe and allow to dry naturally
- Hold the wings on the Saf-T-Intima between the thumb and ring finger extending the tubing straight whilst holding the 'Y' port in the same hand. Rotate the white base through 360 degrees (ie one full turn) in order to break the seal over the 'needle introducer' within the subcutaneous catheter – you should see the needle rotate within the catheter
- Grasp pebbled side of wings of the Saf-T-Intima pinching wings firmly together to lock the needle in place
- Insert the Saf-T-Intima needle subcutaneously up to a 45 degree angle
- Open the wings flat against the skin (pebble side down)
- Apply transparent dressing over the insertion site and the wings of the cannula
- Apply firm fingertip 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 **straight** continuous motion until the needle has fully withdrawn into the blue cylinder
- Gently remove the cylinder from the cannula port (if it has not released spontaneously) exposing the adaptor with the rubber bung
- Place the needle shield in the sharps container
- **Remove white clamp from the cannula line**
- Prime the Saf-T-Intima with 0.2 ml of water for injection
- If necessary secure cannula tubing with a small strip of tape just above the Y connection (when sited on a limb, secure to the front of the limb to aid comfort)
- Change the rubber bungs for bionector adaptors. Document the siting and date of insertion on the invasive devices connection record
- Wash and dry hands thoroughly and use alcohol hand rub in accordance with Infection Control Policy

3.7. Setting up the T34

The medication in a syringe driver may take some time to reach therapeutic levels. In view of this, administration of stat doses of additional medication for symptom management eg. sedation, anti-secretory, anti-emetic or analgesic, may be required.

As required analgesia is normally administered at 1/6th of the total 24 hourly dose. (The minimum dose of diamorphine would be 1mg).

3.7.1. Preparation

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Preparation should be undertaken in a clean preparation area. Full infection control procedures must be undertaken.

In hospital, two qualified and appropriately trained Registered Nurses must undertake the setting up of a syringe driver. If only one nurse is available, the site co-ordinator should be contacted to act as the second checker.

In the community, this may have to be done by one nurse only. However, when possible it is good practice for two registered nurses to undertake this procedure. This should not however cause a delay in setting up the syringe driver, thus resulting in potential compromise of patient care.

The syringe driver's serial number (HH number) is to be recorded on the Syringe Driver Prescription and check sheet.

If using two syringe drivers, the drug label, line and prescription **must** be colour coded and marked 'syringe driver 1' and 'syringe driver 2' and prescribed on separate prescription charts. All syringes **must** have a drug label attached (NB – do not attach the label to the line, the driver or the lock box).

3.7.2. Medication preparation

- Best practice as advised by the Specialist Palliative Care team is that **each prescribed medication should be drawn up in separate syringes** in order to ensure exact amounts of the medication. Manufacturers that produce the ampoules do not guarantee the volume of medication in each ampoule, only that the concentration is correct.
- Medication must then be added together into a 20ml or 30ml Luer lock syringe of suitable size. Luer lock syringes are recommended to prevent the extension set and syringe separating, or being pulled apart.
- 20ml and 30ml Luer lock syringes are recommended for use with the McKinley syringe pump. Fill capacity varies dependent on syringe type used – staff should refer to the T34 Operational Manual available at each base to check. The medication must be diluted to the maximum volume possible of the syringe size. ie 17ml in 20 ml syringe and 22ml in 30 ml syringe.
- Drugs should be diluted in a 20ml syringe as a minimum. This is to reduce risk of irritation to the skin site and precipitation of medication.

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- Once the prescribed medication and diluent are drawn up, connect to the extension set and manually prime the McKinley 100-172S extension line until fluid is at the tip of the tubing.

3.7.3. Drug compatibilities

- As there is potential for interaction between drugs in a syringe driver, the compatibility of medication to be drawn up must be checked prior to mixing drugs. The Palliative Care Formulary (Twycross et al 2002) suggests suitable combinations of 2 or 3 medications and other useful resources can be found online at www.palliativedrugs.com (SDSD), www.pallcareinfo.com, www.pallmed.net (Palliative Medicine Handbook).
- Mixing drugs that are not compatible can result in crystallisation, precipitation, the syringe driver not working effectively, or loss of symptom control if one drug is denatured.
- The resulting solution must be checked for any cloudiness or crystallisation. If this does occur **do not use** and obtain advice regarding the compatibility of drugs from specialist palliative care team, General Practitioner (GP) or pharmacy.
- See Appendix 4 subcutaneous medication compatibility table

Place a drug infusion label on the syringe, ensuring it is not positioned obscuring the markings on the syringe barrel.

3.7.4. Step 1 – Pre-loading

- Check syringe driver is within service date.
- Install the battery taking care to ensure the battery icons are aligned correctly (+ve/-ve)
- The average battery lasts 2-4 days when at 100%.
- In the community setting, if the battery is below 40%, discard and start the infusion with a new one. This will ensure the battery life will last 24 hours.
- The syringe driver will alert when the battery reaches 15%
- Before powering on, ensure the barrel arm clamp is down and no syringe is in place.
- Press and hold down the ON/OFF key until the “Pump Identification” screen appears. The identification screen briefly displays product information.

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- The LCD display will then indicate pre-loading and the actuator will start to move and the red indicator light will be visible. Do not obscure the actuator. When the actuator stops moving the syringe sensor detector screen will display “Load Syringe”.
- The automatic actuator movement will delete any previous infusion information.
- At the end of pre-loading the actuator will return to the start point of the previous infusion.
- The screen prompt “Load Syringe” will continue to flash until the syringe is correctly seated.
- If at any point the screen shows an error message, follow any prompts on the screen. If the device shows an error without any prompts, turn off the driver and restart. Where a driver shows errors on three consecutive occasions, remove it from use and return to Medical Engineering for servicing.
- Check battery level (%). Press the INFO key to display ‘Battery Level’ press YES to view battery meter. Press NO to return to ‘Load Syringe’ screen. Check if manual adjustment of actuator is required by holding the syringe above the device to align the collar sensor to the syringe collar and plunger sensor to the syringe plunger.

3.7.5. Step 2 – Syringe placement

- To avoid an inadvertent bolus dose, the syringe should be attached to the T34 before attaching to the patient.
- If the actuator is not in the correct place for syringe placement, leave the barrel clamp arm down and use the FF or BACK buttons to move the actuator. The forward movement of the actuator is limited and therefore repeated presses may be required.
- Lift the barrel clamp arm as far as it will go and turn it left or right 90 degrees. Place the filled syringe so that the collar sits in the central slot, the syringe should be vertical and the ml scale should face upwards.
- Click the plunger into the actuator.
- Lower the barrel clamp arm to secure. The syringe graphic on the screen will cease to flash when the syringe is correctly placed.
- The syringe brand and size will then be displayed.
- If the syringe size and brand match the display, press YES to confirm, if not, switch the machine off then back on. If it is still showing the incorrect brand, the driver is faulty and should be exchanged for another then returned to Medical Engineering for checking.
- If no syringe brand and size displays, readjust the syringe in the sensors.

3.7.6. Step 4 – Starting the infusion

Start Infusion?

- The next screen will confirm the total volume, duration of the infusion (this should always be 24 hours) and the rate of the infusion in ml per hour.
- Review the infusion summary and check that the parameters displayed match the prescription.
- **Visibly check if the volume in the syringe matches the volume displayed.**
- Check the rate displayed is the syringe volume confirmed, divided by the duration (24hours) i.e. $22\text{ml}/24\text{hrs}=0.94\text{ml/hr}$ (note: this may be a different rate with each new infusion)

Volume 12.0ml
Duration 24:00
Rate 0.50ml/h
Confirm, Press YES

- To confirm infusion parameters press YES.
- Take the syringe driver to the patient.
- Identify the patient using their full name, date of birth and, if in hospital, the hospital number on name band.
- Discuss with the patient and carer the reasons why a syringe driver is indicated, check their understanding and answer any questions.
- Where possible verbal consent should be obtained.
- Check the line is connected to the Saf-T-Intima already inserted into the patient
- Press YES to start the infusion
- When the pump is running the green LED light flashes and the screen display shows “<<<<Pump Delivering”

3.7.7. Step 5 – Keypad locking and lock box

- Activate the keypad lock function by pressing and holding the INFO key until the black graphic bar moves from left to right. Hold the key until the bar has moved completely across the screen and a beep is heard to confirm the lock has been activated.
- To deactivate the keypad lock function, repeat the procedure – the bar will now move from right to left and the beep will be heard.

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- All syringe drivers are supplied with a lock box. After starting the infusion, check the pump is set correctly and place the pump inside the lock box.
- Universal keys will be held by each ward that has staff trained and competent in the use of the syringe driver.
- All registered nurses with the district nursing service will hold keys individually. They will sign a key holder form (Appendix 7). These must NOT be left in patients' homes.
- If the patient/carer is to change their own syringe driver a key will need to be supplied with clear written and verbal instructions for safe storage of the key and all medications.
- NB – further copies of the key can be obtained from the equipment library manager at a cost of £5 each.
- If a key is lost, a Datix report should be completed and the equipment library manager informed ASAP on 01423 553127.
- Sign the patient's treatment sheet with the date and time the infusion commenced. Complete the check list and ensure the individual syringe driver number (HH) is recorded.
- Clear away equipment and dispose of all waste in accordance with HDFT waste disposal policy
- Wash and dry hands thoroughly.

3.8. Monitoring

Monitoring of the syringe driver in hospital will take place 4 hourly using the syringe driver check sheet. In the community setting, the syringe driver will be monitored at each nurse visit. Patients and carers will be given help and support on how to monitor their driver and encouraged to alert and discuss with the District Nurse/OOH services if they have any comments or concerns.

It is important that the effectiveness of symptom control is also closely monitored and recorded.

Medication should not be added to the syringe during the administration cycle. If additional breakthrough medication is required, this should be administered (if compatible) through the spare port or as a separate subcutaneous injection. This should be given in volumes of less than 2ml and flushed with 0.2ml of water for injection.

If more than 2 PRN doses of the same drug are used in 24hours, the dose of that medication in the syringe driver should be reviewed and increased as per instruction. This action should not be delayed until the next time the syringe driver

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is due for changing if it is clear that the patient's symptoms are not controlled on the current dose.

Clinicians should liaise with the GP or Specialist Palliative Care Team as necessary and also refer to the guidelines for commonly used subcutaneous palliative care drugs (see Appendix 5).

Advice can be obtained from GP or the Specialist Palliative Care Team or out of hours from Saint Michael's Hospice.

Frequent checks should be made and documented for (minimum 4 hourly in hospital):

- Skin – pain, inflammation, leaking, bleeding, redness, rash
- Mechanical – driver is working, rate set correctly, light is flashing
- Ensure syringe is secured to the syringe driver and the extension set remains firmly attached to the Saf-T-intima
- Medication – Labelled correctly, solution clear, correct amount left in syringe

3.9. Battery Life

Once the battery level reaches 40% the infusion cannot be guaranteed to continue for a full 24 hours and it should therefore be changed at this point within the community setting.

Within the inpatient setting the battery should be changed as soon as the syringe driver alerts at battery level of 15%.

3.10. When changing the syringe only with the same medication

Follow the procedure as above but do not re-prime the line or resite the cannula unless there is a site reaction or a problem with the line. Replace the existing syringe with a newly primed syringe. The giving set can be used for up to 5 days as long as the same medication is used.

3.11. When changing the syringe driver using new medication

Follow the procedure as above but change and re-prime the giving set. Leave the Saf-T-Intima cannula in situ if there is no site reaction. Attach the newly primed line to the cannula.

3.12. To give a bolus injection using Saf-T-Intima whilst continuous infusion is running

Check compatibility of drugs to be inserted and those infusing via the syringe driver, if not compatible a separate injection will need to be given or a separate Saf-T-Intima inserted for bolus injections.

- Explain the procedure to the patient/carer, obtain verbal consent if possible.
- Wash and dry hands thoroughly, use alcohol gel and put on gloves
- Draw up prescribed medication in a 2ml syringe
- Do not give any more than 2ml volume as a bolus, as this can compromise site and cause discomfort
- Draw up 0.2ml of water for injection in a separate syringe
- Check the site for any swelling, redness or bleeding. Change the cannula as per policy if any of the above are present
- Clean the bionector adaptor with an alcohol swab
- Slowly administer the bolus injection followed by the 0.2ml water for injection flush
- Remove all clinical waste and discard as per HDFT waste disposal policy

3.13. Stopping the infusion and removing the driver

When the infusion is nearing completion (approximately 15 minutes before) the syringe driver will alert and a warning will be shown on the display. When the infusion is complete and the syringe is empty, the driver will stop automatically and an alarm will sound.

If the driver is no longer required press YES to confirm the end of the infusion or NO to stop infusion.

It may, in some circumstances, be necessary to waste a small volume of the solution so that the syringe driver changes can be undertaken at a time that is

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convenient to staff and patient. This waste should be witnessed and recorded in line with the HDFT Medicines Policy.

Disable the keypad lock and press and hold the ON/OFF button to switch off the driver.

Should the patient die the syringe driver should be removed and recorded by a qualified nurse. If the patient is in the community setting this should be a community nurse or member of the Community Fast Response and Rehabilitation Team. The medications should be discarded in accordance with the medicines management policy and the syringe driver cleaned and returned to stock.

3.14. Temporarily stopping the infusion

- Press STOP and disable the keypad lock and press the ON/OFF button
- Do not remove the syringe from the driver

If the infusion is to be stopped before the syringe is empty it should also be disconnected from the patient for safety reasons.

If the current infusion is interrupted:-

- To resume the current infusion, check the prescription, syringe label and patient details.
- Press the ON/OFF button until a beep is heard.
- The screen will request confirmation of syringe size and a syringe brand
- If the syringe size and brand match those the display, press YES to confirm, if not switch the machine off then back on. If it is still showing the incorrect brand, the driver is faulty and should be exchanged for another then returned to Medical Engineering for checking.
- The syringe driver will display “Press YES to resume NO for new syringe”
- If the Saf-T-intima needs re-siting – flush the Saf-T-intima only with 0.2ml

Press YES to Resume,
NO for New Syringe

water for injection. The infusion can then be re-attached and resumed

- If the extension set needs changing, you will need to change the whole infusion, including medication

Warning – do not press NO - the driver will delete the infusion memory and deliver the remaining contents over 24 hours as it will presume this is a new syringe

3.15. Problem Solving

When the driver detects a problem, the following may occur:-

When an **ALERT** is activated:

- the infusion will continue
- three beeps are heard approximately every 3-4 minutes
- a screen message alternates with the infusion running screen

ALERT activates approximately 15 minutes prior to infusion end

When the **ALARM** is activated:

- the infusion stops
- The LED indicator light turns red
- An audible alarm activates (this will continue until either the YES key is pressed to mute and/or the problem is rectified)
- A screen message appears on the display indicating the cause

Troubleshooting

Display	Possible Causes	Action Required
Low battery	Alert: battery is almost depleted	Prepare to change battery
Syringe nearly empty	Alert: infusion will end soon	Prepare to change syringe or turn pump off
Pump paused too long	Alarm: Pump has been left in STOP mode (on hold) for 2 minutes	Either start the infusion or turn pump off
End Battery	Alarm: battery is depleted	Change battery
End Programme/Syringe	Alarm: infusion is complete	Close down or start new infusion
Syringe displaced, check syringe	Alarm: one or more of the syringe detection sensors is not detecting	Check screen messages for assistance. Check the syringe placement and re-site as necessary.
Occlusion Check line and syringe	Alarm: patient access device is either blocked, clamped or occluded	Flush/replace access device, ensure the clamp has been removed. If occlusion cleared, then resume the infusion. Alternatively turn pump off and replace syringe medication and infusion line.
System error. Press and hold INFO for details	Alarm: system error	Remove pump from use, return to Medical Engineering. Document error number and a description of the problem.

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Other Monitoring Issues

When monitoring the syringe driver and patient, other issues may be identified that do not sound an alarm

Problem	Action Required
Infusion slow or stopped	<ul style="list-style-type: none"> • Check site for swelling or inflammation • Check tubing is not kinked or stretched • Check connections intact • Check actuator is still against plunger • Check rate setting for accuracy • If any concerns regarding the driver – remove from the patient and quarantine along with all consumables. Complete Datix report and send to Medical Engineering
Infusion too fast	<ul style="list-style-type: none"> • If major over-infusion occurs – stop infusion, check condition of patient and seek medical advice. Complete Datix report as medication incident • Check rate is set correctly • Check for disconnection of line • Check syringe is securely in place • Check no air present in line • If any concerns regarding the driver – remove from the patient and quarantine along with all consumables. Complete Datix report and send to Medical Engineering
Site irritation	<ul style="list-style-type: none"> • Change site • Discuss possible changes of drugs with Doctor/Pharmacist/ SPCT • Dilute drugs to a larger volume • Consider separating drugs into different syringes if more than one is being used • Consider infection or allergy • For severe site reactions consider other treatment options – discuss with doctor
Cloudiness, precipitation, colour change of drug	<ul style="list-style-type: none"> • Stop infusion and discuss with Doctor/Pharmacist/SPCT • Check compatibility information • Dilute to larger volume • Consider separate syringes • Keep away from sunlight • Commence new infusion through new line

3.16. Returning and Cleaning

Staff must ensure that syringe drivers are adequately cleaned before returning them to the Equipment Library. It is recommended that the manufacturer's instructions are followed, or alternatively use a hard surface disinfectant wipe. Never immerse the syringe driver in water or use alcohol wipes. The clear plastic lock box should be washed in soap and water.

When surplus drugs are no longer required in the community setting, the patient's family/carer should be advised to return any of the patient's own drugs to their local pharmacist as soon as possible. This should be documented in the patient's care plan.

3.17. Syringe Driver Management

The syringe driver must be serviced by the Medical Engineering Department every 12 months. Please follow the Infection Control Policy for correct decontamination prior to servicing. All syringe drivers are managed by the Equipment Library, but some are kept in community centres.

4. MEDICATION MANAGEMENT

All medication should be prescribed on a Community Palliative Care medication chart if in the community setting and on EPMA in hospital. It is best practice that the prescriber signs each prescribed drug, adds start date and specified dose or dose range, frequency and discontinuation date (where appropriate

Appropriate 'as required' drugs (not given via syringe driver) should be prescribed to enable all likely symptoms to be managed as they develop. Care must be taken not to exceed maximum total doses when drugs are prescribed as both regular and as required (Appendix 5).

The Nursing and Midwifery Guidelines for the Administration of Medicines (NMC 2010) should be adhered to at all times.

When the prescribed medicine is altered, a **new** syringe and **new** infusion administration section on the check/administration charts must be used. The medication should be marked as discontinued and dated on the prescription chart. When discontinuing a prescription chart the chart must be marked '**discontinued**' and scored through; the chart must be signed and dated by the prescriber.

Adult Syringe Driver Protocol (T34)

It is common to see at least two or three drugs mixed in the same syringe and occasionally four may be required. Common medication used in a syringe driver are as follows:

- Analgesic (e.g. Diamorphine, Morphine, Oxycodone, Alfentanil)
- Sedative (e.g. Midazolam, Levomepromazine, Haloperidol)
- Anticholinergic (e.g. Hyoscine Hydrobromide, Hyoscine Butylbromide, Glycopyrronium)
- Antiemetic (e.g. Cyclizine, Metoclopramide, Haloperidol, Levomepromazine)

These drugs should be checked for physical compatibility prior to mixing (see section 5. Compatibility Chart pg 22). Pharmacy, the specialist palliative care team, the book 'The Syringe Driver; Continuous Infusions in Palliative Care' (Dickman et al 2005), or the syringe driver survey database on www.palliativedrugs.com (this website requires registration which is free) can be a source of additional information regarding drug compatibility.

It should also be noted that the Medicines and Healthcare products Regulatory Agency (MHRA) have produced a statement regarding the legality of mixing medicines in syringe drivers – **MHRA November Drug Safety Update (12.11.09)** Medical and non-medical prescribing: mixing medicines in clinical practice: MHRA

Within the community a drug/diluent stock sheet for drugs needs completing following every drug administration. If there is a discrepancy noted, this should be recorded in the patient's notes. The relevant manager should be informed and a Datix report completed.

5. DISSEMINATION AND IMPLEMENTATION

This protocol has been circulated to the consultation group as listed in Appendix 1 (page 26) and is available on the intranet for staff to view. Members of the specialist palliative care team, end of life facilitator, matrons and ward managers will ensure implementation of the guidelines and will educate staff on its existence as appropriate.

All qualified nurses who use syringe drivers will be required to attend annual training.

6. MONITORING COMPLIANCE AND EFFECTIVENESS

6.1. Standards / Key Performance Indicators

Competency assessments will be completed for each individual qualified nurse who will carry out this protocol. (See appendix 6).

6.2. Process for Monitoring Compliance

Practice will be compared to the standards within this protocol using clinical audit.

Incidents and complaints relating to syringe drivers will be reviewed to determine areas for learning.

7. BIBLIOGRAPHY

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8. FURTHER READING

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9. APPENDIX 1: CONSULTATION SUMMARY

Those listed opposite have been consulted and comments/actions incorporated as required	Groups and/or Individuals Consulted
	Specialist Palliative Care CNSs
	End of Life Facilitator
	Consultant in Palliative Medicine
	Community Services Matron
	Fast Response Team
	District Nursing Sisters
	Policy Review Group
	Clinical Risk Management Group
	Area Prescribing Committee
	Health Records Committee

10. APPENDIX 2: T34 COMMUNITY PALLIATIVE CARE MEDICATION ADMINISTRATION CHART (WHZ061)

Not attached due to size. Available from HDFT supplies.

11. APPENDIX 3: SYRINGE DRIVER MONITORING CHART (T34)



Prescribe each medication on EPMA

Please refer to the Trust Protocol for information on setting up & using this equipment for medication administration by continuous subcutaneous syringe driver.

Affix Patient Label

ADMINISTRATION – to be completed by nurse when infusion commences			OBSERVATIONS – to be recorded by nurse at least every 4 hours									
			Check time	Rate ml/hr	Is light flashing? (Y/N)	VTBI	VI	Battery Power	Time remaining	Site position	Site OK? (Y/N)	Initial
Date and time commenced:												
Signature 1: Print name:	Signature 2: Print name:											
Medication	Batch	Expiry										
Syringe Driver No:												

Date and time commenced:												
Signature 1: Print name:	Signature 2: Print name:											
Medication	Batch	Expiry										
Syringe Driver No:												

VTBI = Volume to be infused VI = Volume infused

Adult Syringe Driver Protocol (T34)

Instructions for checks in use

The following checks must be made & recorded at least every 4 hours in hospital. If any problems are found, refer to the troubleshoot checklist on pages 18/19 in the syringe driver protocol & record in the nursing documentation:

- Check that the rate is correct, that the light is flashing green and the battery has above 40% of charge left.
- Check that the infusion is running to time.
- Check the infusion site for signs of inflammation, swelling, pain or site reaction.
- Check the contents of the syringe and tubing for cloudiness, crystallisation, colour change, kinks or blockage.
- Check that the keypad is locked.
- Check that the T34 is secure in the lock box.

Affix Patient Label

ADMINISTRATION – to be completed by nurse when infusion commences			OBSERVATIONS – to be recorded by nurse at least every 4 hours									
			Check time	Rate ml/hr	Is light flashing? (Y/N)	VTBI	VI	Battery Power	Time remaining	Site position	Site OK? (Y/N)	Initial
Date and time commenced:												
Signature 1: Print name:		Signature 2: Print name:										
Medication	Batch	Expiry										
Syringe Driver No:												

Date and time commenced:												
Signature 1: Print name:		Signature 2: Print name:										
Medication	Batch	Expiry										
Syringe Driver No:												

VTBI = Volume to be infused VI = Volume infused

12. APPENDIX 4: SUBCUTANEOUS MEDICATION COMPATIBILITY TABLE

Unless otherwise stated, all medications should be diluted with water for injection. Please check all compatibilities and diluents prior to mixing. If more than two drugs are used, please seek specialist advice.

MEDICATION	COMPATIBLE WITH	NOT GENERALLY RECOMMENDED Seek specialist advice
Strong opioids ie Alfentanil Morphine Oxycodone Diamorphine For others seek advice	Cyclizine (in low doses) Haloperidol (in low doses) Hyoscine Butylbromide Levomepromazine Metoclopramide Midazolam	Cyclizine (may precipitate at high dose with) Haloperidol (may precipitate at high dose with)
Cyclizine	Haloperidol Midazolam (in low doses) Strong opioids (in low doses)	Strong opioids (may precipitate at high dose with) Midazolam (may precipitate at high dose with) 0.9% sodium chloride (incompatible with) Hyoscine Butylbromide (incompatible with) Metoclopramide (antagonistic effect) Levomepromazine (no added benefit in combined use)
Haloperidol	Cyclizine Hyoscine Butylbromide Midazolam Strong opioids (in low doses)	Metoclopramide (increased risk of extra-pyramidal side effects) Levomepromazine (no added benefit in combined use) Diamorphine (in high doses may precipitate with) Oxycodone (in high doses may precipitate with)
Metoclopramide	Midazolam Strong opioids	Cyclizine (antagonistic effect) Hyoscine Butylbromide (antagonistic effect) Haloperidol (increased risk of extra-pyramidal side effects) Levomepromazine (increased risk of extra-pyramidal side effects)
Levomepromazine	Hyoscine Butylbromide Midazolam Strong opioids	Cyclizine (no benefit in combined use) Metoclopramide (increased risk of extra-pyramidal side effects)
Midazolam	Cyclizine (in low doses) Haloperidol Hyoscine Butylbromide Levomepromazine Metoclopramide Strong opioids	Cyclizine (may precipitate at high dose with)
Hyoscine Butylbromide	Haloperidol Midazolam Levomepromazine Strong opioids	Cyclizine (Incompatible with) Metoclopramide (antagonistic effect)

13. APPENDIX 5: GUIDELINES FOR COMMONLY USED SUBCUTANEOUS PALLIATIVE CARE MEDICATION

MEDICATION	INDICATIONS	STAT/PRN DOSES	STARTING DOSES FOR 24 HR SYRINGE DRIVERS	AMPOULES AVAILABLE	NOTES
Alfentanil	Pain in presence of renal failure	Seek specialist palliative care advice	Seek specialist palliative care advice	Seek advice	15 times stronger than subcutaneous Morphine. 10 times stronger than subcutaneous diamorphine
Diamorphine	<ul style="list-style-type: none"> Pain Cough, dyspnoea 	2.5-5mg stat/PRN (1-4 hourly) Or, if opioid naïve dose reduction to 1mg-2.5mg stat/PRN (1-4 hourly)	If opioid naïve 5mg -10 mg	5mg 10mg 30mg 100mg 500mg Powder ampoules	Can precipitate with Cyclizine at higher doses. If on oral morphine 1/3 rd of 24 hours oral morphine dose. To calculate breakthrough dose of diamorphine divide the 24 hourly dose by 6.
Morphine	<ul style="list-style-type: none"> Pain Cough, dyspnoea 	5-10mg stat/PRN (1-4 hourly) Or, if opioid naïve, dose reduction to 2.5mg stat/PRN (1-4 hourly)	If opioid naïve <ul style="list-style-type: none"> 10mg (pain) 5mg- 10mg (cough or dyspnoea) 	10mg/1mL 20mg/1mL 30mg/1mL	If converting from oral Morphine, use ½ of the 24hr oral Morphine dose. To calculate breakthrough dose of Morphine divide the 24 hourly dose by 6.
Oxycodone	<ul style="list-style-type: none"> Pain Dyspnoea, cough 	2.5-5mg stat/PRN (1-4 hourly) or, if opioid naïve, dose reduction to 1mg-2.5mg stat/PRN (1-4 hourly)	If opioid naïve <ul style="list-style-type: none"> 5mg 2.5mg-5mg (cough or dyspnoea) 	10mg/1mL 20mg/2mL 50mg/1mL	2 nd line choice after Morphine. To convert from oral Oxycodone see Conversion Chart. Or seek specialist advice.
Cyclizine	Nausea and vomiting associated with motion sickness and raised ICP. Intestinal obstruction	50mg stat/PRN (8 hourly) maximum dose 150 mg in 24hours	50-150mg in 24 hrs (maximum 150 mg)	50mg/1mL	Tendency to precipitate in higher doses, especially with opioid analgesics. Moderately irritant to skin. Incompatible with Hyoscine Butylbromide. DO NOT USE WITH METOCLOPRAMIDE
Haloperidol	Drug and metabolic induced nausea. Intractable hiccup. Delirium, terminal agitation	0.5mg-2.5mg stat/PRN (4 hourly) <ul style="list-style-type: none"> Nausea 0.5-1.5mg. Max 5mg in 24 hrs Delirium 1.5-2.5mg. Max 10mg in 24 hrs 	1.5-10mg in 24 hrs	5mg/1mL	Tendency to precipitate in high doses, especially with Hyoscine Butylbromide. Extra-pyramidal side effects and sedation may be seen in high doses. Avoid concurrence with Levomepromazine.
Metoclopramide	Nausea and vomiting from gastric irritation. Impaired gastric emptying	10mg stat/PRN (8 hourly)	30mg in 24 hrs (Range 30-120 mg)	10mg/2mL	Use with care in patients with partial intestinal obstruction as it may increase colic or vomiting. Do not use in complete intestinal obstruction. DO NOT USE WITH CYCLIZINE OR HYOSCINE BUTYLBROMIDE.
Levomepromazine	<ul style="list-style-type: none"> Nausea and vomiting Sedation/confusion/terminal agitation 	<ul style="list-style-type: none"> Nausea 6.25mg stat/PRN (4 hourly) Agitation 12.5-25mg stat/PRN (4 hourly) Seek specialist palliative care advice	<ul style="list-style-type: none"> Nausea 6.25mg-25mg in 24 hours Sedation 25mg-100mg in 24 hours 	25mg/1mL	Moderately irritant to skin. Broad spectrum anti-emetic. 1 st line treatment for nausea and vomiting and terminal agitation.
Midazolam	Terminal agitation, myoclonic jerking, anticonvulsant, dyspnoea	<ul style="list-style-type: none"> Dyspnoea 1mg – 2.5mg 1 hourly Agitation/distress 2.5mg – 5mg 1 hourly 	5mg -60mg in 24 hours Reassess at 60mg/24 hrs and seek specialist palliative care advice	10mg/2mL	Short acting benzodiazepine. Useful for terminal restlessness/anxiety and distress associated with breathlessness.
Hyoscine Butylbromide	Respiratory tract secretions Obstructive symptoms with colic pain	20mg stat/PRN 2-4 hourly to a maximum of 240mg	60-240mg/24hours	20mg/1mL	Seek specialist palliative care advice for higher doses. Does not cross blood brain barrier. DO NOT USE WITH METOCLOPRAMIDE. Can precipitate with haloperidol at higher doses. Incompatible with Cyclizine.

For other medication, please seek specialist palliative care advice

14. APPENDIX 6: ASSESSMENT OF COMPETENCY DOCUMENT

Competency Statement: Can maintain patients' safety while using the CME T34 subcutaneous syringe driver (Competency is: *the skills and ability to practice safely and effectively without the need for direct supervision. NMC*)

Name:	Job Title:
Department:	Ext Number:
Trained By:	Date:
	Signature:

Method of Assessment: Self-assessment of competency in the use of medical device in relation to defined key elements and countersigned by appropriate member of staff (key trainer, manager, educator, mentor etc).

	Competency	Achieved
1	State the clinical application of the T34 Syringe driver	
2	Show awareness of protocol	
3	Explain safety check prior to use	
4	Identify appropriate equipment needed for set up	
5	State the function of all the parts and function keys	
6	Demonstrate the correct procedure for initial set-up, initiating and commencing an infusion safely. Including as follows: <ul style="list-style-type: none"> • Prepare the syringe, attach the giving set and manually prime the line. • Insert the battery • Power on and observe pre-loading • Check battery level %- state lowest acceptable level on starting • Load and confirm the correct syringe • Review and confirm the infusion programme summary screen • Connect line to patient • Start infusion • Check the infusion is running 	
7	Demonstrate understanding of infusion rate calculation and ability to check this	
8	State the time over which the infusion ALWAYS runs	
9	Demonstrate the awareness and understanding of 4 hourly infusion monitoring and documentation of the following: <ul style="list-style-type: none"> • Check volume infused (VI) and volume to be infused (VTBI) whilst the infusion is running • Check battery level whilst the infusion is running • Explain the different types of Alert and Alarm AND HOW TO DEAL WITH THEM • Activate and deactivate the keypad lock. • Correctly close down the syringe driver. 	
10	Demonstrate ability to dismantle the infusion system correctly on completion of infusion	
11	Is aware of the need for decontamination as per Trust's procedure	
12	Has the ability to demonstrate reporting mechanisms for equipment failure	
13	Will ensure correct storage and safe-keeping of equipment	
14	Will be aware of need for annual calibration to ensure safe usage	

Disclaimer:
 (i) Having answered YES to the above key statements and taken into account my personal assessment of my competence in the use of the medical device, I declare that I am competent to use the device safely as per the Trusts' guidelines.
OR
 (ii) I require further training in the use of this equipment in order to reach a competent level of practice and will discuss these needs with my Mentor/Ward Manager/ Trainer/Equipment Controller.

I certify that is competent in the use of - T34 Syringe Drivers
 Signed: Position: Date:

Next Update Due:

15. APPENDIX 7: KEYHOLDER SHEET**Syringe Driver Key Acceptance**

Each T34 Syringe Driver used by Harrogate & District NHS Foundation Trust (HDFT) is issued with a lock box, which can be opened with a universal key.

Each Registered Nurse working in the community for HDFT is issued with one of these keys. It is the responsibility of the individual nurse to keep this key secure. It **must not** be left in patients' homes.

If a key is lost – please notify the Medical Devices Trainer on 01423 553127 – a new one can be provided at a cost of £5.

When a member of staff who holds a key is no longer working in the community, they should return the key to their team leader, who can then pass it on to the new member of staff taking over in the post.

Name	
Base	
Date key given to staff member	
Signature of staff member	
Signature of team leader	
Date key returned	
Signature of staff member	
Signature of team leader	

16. APPENDIX 8: ASSESSMENT OF COMPETENCY OF LAY CARERS DOCUMENT

Competency Statement: Can maintain patients' safety while using the CME T34 subcutaneous syringe driver (Competency is: *the skills and ability to practice safely and effectively without the need for direct supervision. NMC*)

Name:	Address:	
Relationship to patient:	Tel number of carer:	
Trained By:	Job Title:	Date: Signature:

Method of Assessment: competency in the use of medical device in relation to defined key elements and countersigned by appropriate member of staff.

	Competency	Achieved
1	State the purpose of the T34 Syringe driver	
2	Show understanding of process	
3	Explain safety checks required prior to use including safe storage of medications and syringe driver key	
4	Identify appropriate equipment needed for set up	
5	Demonstrate the correct procedure for initial set-up, initiating and commencing an infusion safely. Including as follows: <ul style="list-style-type: none"> • Prepare the syringe, attach the giving set and manually prime the line. • Insert the battery • Power on and observe pre-loading • Check battery level %- state lowest acceptable level on starting • Load and confirm the correct syringe • Review and confirm the infusion programme summary screen • Connect line to patient • Start infusion • Check the infusion is running 	
6	Demonstrate knowledge of when, who, why and how to contact district nursing team for support , review and/or equipment failure if required	
7	Demonstrate understanding and ability to complete necessary documentation	
8	Demonstrate the awareness and understanding infusion monitoring and documentation of the following: <ul style="list-style-type: none"> • Check volume infused (VI) and volume to be infused (VTBI) whilst the infusion is running • Check battery level whilst the infusion is running • Explain the different types of Alert and Alarm • Activate and deactivate the keypad lock. • Correctly close down the syringe driver. • 	
9	Demonstrate ability to contact the district nurses to dismantle the infusion system correctly on completion of infusion	
10	Is aware of the need for cleanliness and safety	

Disclaimer:
 1) Having answered YES to the above key statements and taken into account the assessment of my competence in the administration of medications using a T34 syringe driver and subcutaneous injection, I declare that I am competent to carry out the procedure as per the Trusts' guidelines.

And

 2) Have received appropriate and adequate training and been assessed as competent to carry out this procedure by a qualified district nurse.

I certify that is competent to administer subcutaneous medications via injection and/or via a T34 syringe driver

Signed: Position: Date:

17. APPENDIX 9: INFORMATION ABOUT YOUR SYRINGE DRIVER

INFORMATION ABOUT YOUR SYRINGE DRIVER



This information is available in other formats on request. Please ask your nursing staff to arrange this

What is a T34 syringe driver?

This is a small, portable pump which is battery operated. It allows medicines to be given continuously and in a controlled way via a cannula placed under the skin. The infusion is delivered over a 24 hour period to help relieve your symptoms. It avoids the need for frequent injections.

Why do I need one?

The syringe driver is an alternative way of delivering medicines to control your symptoms. This may be for pain, controlling sickness or for medicines to help you relax. It may be needed if:

- You are having difficulty swallowing medicines
- You are being sick or cannot absorb oral medications
- Your symptoms need more control

The reason will be explained to you by your nurse/doctor. A syringe driver may be used at any stage of your illness and the nurses will monitor the effectiveness of the medication and alter the regime if necessary, after consultation with your doctor. It may be discontinued if it is no longer needed.

How does it work?

The nurse will insert a small needle or plastic tube under your skin called a saf-t-intima. This will be connected by a thin tube to a syringe containing your medicine which is attached to the syringe driver.

The syringe driver gradually pushes in the syringe plunger to deliver the medicines over 24 hours. A nurse will renew the syringe every 24 hours. The time may change according to the district nurse's schedule. The saf-t intima will be taped in place and usually only needs changing if it causes you any discomfort or becomes blocked.

Advantages of using a syringe driver

- Eliminates the need for regular injections which allows comfort and freedom
- Maintains a constant level of medication in your bloodstream (no peaks or troughs) measured to your individual needs which helps with symptom control
- Discrete, comfortable and easy to wear
- Ensures you receive your medication safely and correctly

How do I know if the syringe driver is working properly?

- The nurse providing your syringe driver will have checked it is working before setting it up.
- A small light above the on/off button will flash green regularly. If it turns red, there is a problem with the pump and you should contact your nurse as soon as possible.
- Your nurse will discuss with you what to do if the alarm sounds.

Who will look after it?

Your nurse will regularly check that the syringe driver is operating correctly, that you are receiving the medication prescribed and that the saf-t-intima site is comfortable. The area where the needle is sited will need to be changed if there is any infection or blockage, otherwise the needle can be left in place. They will also show you some simple checks to make sure things are working properly.

What do I do if the syringe driver beeps or an alarm sounds?

- Do not worry
- Inform your nurse as soon as possible and they will be able to advise on what to do

Please do not try to do anything yourself without speaking to your nurse.

Some Do's:

- If you are walking around, you may find it helpful to carry the syringe pump in a small bag or pouch, your nurse will be able to provide one for you
- When you are in bed or resting in a chair, the syringe driver can be put on a flat surface next to you
- Try to keep mobile phones that are switched on about an arms' length away, as they may affect the way the pump works.
- If you want a bath or shower, your nurse will give you advice on what to do

Some Don'ts:

- Do not interfere with the line or pump
- Do not pick up or hold the syringe pump using the syringe
- Do not press the buttons on the pump control panel
- Do not get the syringe pump wet or immerse in water
- Do not drop the syringe driver
- Do not expose the syringe driver to heat or bright sunlight

In the event of any of these happening, do contact your nurse.

Contact your nurse if:

- You are worried that the syringe driver is not working properly or has been damaged
- The colour of the medicines has changed or become cloudy
- The skin around the saf-t-intima is red, swollen or painful
- The alarm sounds
- You have other concerns

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