# Policy and Protocol for the use of the CME McKinley T34 Syringe Driver for Adults in Palliative Care

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- McKinley T34 Ambulatory Syringe Pump Operation Manual (2011)
- NHS Education for Scotland Guidelines for the use of the CME McKinley T34 Syringe Pump for Adults in Palliative Care (2011)
- Lincolnshire Policy for the usage of Syringe Drivers MS16A and MS26 in Palliative Care (2010)
- St Barnabas Lincolnshire Hospice Policy and Protocol for the usage of the T34 McKinley Syringe Pump for subcutaneous Infusions (2010)

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## CONTENTS

### SECTION 1  POLICY FOR THE USE OF CME MCKINLEY T34 SYRINGE DRIVER

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
</tr>
<tr>
<td>5</td>
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<tr>
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<tr>
<td>6</td>
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<td>11</td>
</tr>
<tr>
<td>11</td>
</tr>
</tbody>
</table>

### SECTION 2  PROTOCOL FOR THE USE OF THE MCKINLEY T34 SYRINGE DRIVER

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
</tr>
<tr>
<td>13</td>
</tr>
<tr>
<td>14</td>
</tr>
<tr>
<td>15</td>
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<td>18</td>
</tr>
<tr>
<td>19</td>
</tr>
<tr>
<td>20</td>
</tr>
</tbody>
</table>
9.4 Replenishing of an infusion
9.5 Changing a battery during an infusion
9.6 Stopping the infusion and removing the syringe driver
9.7 In the event of a patient’s death
9.8 Cleaning the syringe driver
9.9 If the infusion line snaps
9.10 Event Log
10 Driver Alarms
11 Monitoring during the infusion
12 Troubleshooting
13 References

Appendix 1 Flowchart for assessing syringe pump training in palliative care

Appendix 2 Patient Information Leaflet
SECTION 1 - POLICY FOR THE USE OF CME MCKINLEY T34 SYRINGE DRIVER

1 INTRODUCTION

This policy applies to the use of the CME McKinley T34 Syringe driver for subcutaneous infusions in adults in palliative care. Administration of medications via other routes and use in paediatrics are outside the scope of this policy.

The aims of this policy are: to ensure efficient and safe practice across Lincolnshire Community Health Services NHS Trust, United Lincolnshire Hospitals NHS Trust and St. Barnabas Hospice in the use of the battery operated McKinley T34 syringe driver; to improve the standard of care provided to patients; and to minimise hazards.

The McKinley T34 syringe driver is a portable, battery operated device for delivering medication by continuous subcutaneous infusion.

The policy provides the rationale for the use of the McKinley T34 syringe driver and guidelines to support staff training and management of associated equipment.

This policy is not a stand alone document and is intended to be used in conjunction with the Protocol and Training Pack for this device. This policy should be read in conjunction with policies and guidelines on medicines management, medical devices management, infection control and consent in addition to the following:

- The Code: Standards of conduct, performance and ethics for nurses and midwives (NMC 2008)
- Standards for medicines management (NMC 2008)
- Record Keeping: Guidance for nurses and midwives (NMC 2009)
- CME McKinley T34 Ambulatory Syringe Pump Operation Manual (2011)

2 PURPOSE

Syringe drivers are used for the continuous delivery of drugs into the subcutaneous tissue of patients for whom oral administration would be problematic. It is well-established practice in the care of people with terminal illnesses, and/or with palliative care needs, to use syringe drivers in the control of difficult symptoms, both in hospitals and home settings. The effective use of syringe drivers can enhance the quality of life and can often enable people to be treated in their home or other community setting in comfort and with their symptoms well controlled.

3 SCOPE

- This guidance can only be implemented once staff have completed the theoretical workbook and have received face to face theory and practical skills training in the operation of the McKinley T34 syringe driver
• Nursing staff administering medication via the syringe driver must have current registration and participate in mandatory updates
• The NMC accepts that registered nurses may gain knowledge and competence in an area not related to their original registration entry code and field of practice, and the scope of professional practice allows nurses to undertake nursing care where the nurse and their employer are satisfied that they have the appropriate knowledge, skills and competencies (NMC 2008)
• This policy is relevant to all adult patients receiving care in Lincolnshire Community Health Services NHS Trust, United Lincolnshire Hospitals NHS Trust and St. Barnabas Lincolnshire Hospice

4 RESPONSIBILITIES

4.1 Employers are responsible for ensuring that all staff using medical devices are appropriately trained. All health care professionals and support workers have a personal responsibility and accountability to ensure they receive training in the safe use/observation of any medical devices they need to use (MHRA 2008).

4.2 It is the responsibility of managers to ensure that user training is received by the appropriate staff and documented. Comprehensive records of procedure and medical device training must be kept in a central register. This supports Knowledge and Skills Framework (2003) which, as part of Agenda for Change, is a background influence guiding our practice.

4.3 Professionals undertaking the setting up and recharging of syringe drivers, or providing care to patients with syringe drivers, must ensure that they are competent and have the required level of knowledge and skills. Professionals should record any training received within a training log (professional portfolio) recording learning objectives and outcomes.

4.4 Staff whose role requirement dictates the operation of these devices must be competent in undertaking the management and use of syringe drivers and will be provided with practical instruction and training within the organisations covering both practical and technical matters (MHRA 2008), and offered updating as appropriate. See training pack for process.

4.5 Following training, staff will be expected to demonstrate the following competencies in the use of the syringe driver and to maintain these competencies keeping up to date with current practice:

• The ability to communicate the rationale for the use effectively with patients, carers and other professionals
• The selection of appropriate equipment and the ability to explain the rationale for doing so
• A knowledge of drugs and drug combinations that can be used and their possible side effects and knowledge of where to access additional advice
• Local practices relating to the prescribing, storing and documenting of the specific drugs to be used
• The indications for use of a syringe driver
• Advantages and disadvantages of use
• Skin sites, selection and care
• Identification of problems and solutions
• Effective hand hygiene
• Safe disposal of waste
• The maintenance and cleaning of equipment

4.6 When teams plan to use a syringe driver (either in the community or in the hospital) they should ensure that the appropriate pharmacy or dispensing practice is aware and has the necessary medicines available for continuing the driver.

4.7 All staff will have access to and knowledge of this policy and any revision will be disseminated by managers to the appropriate team members.

5 McKINLEY T34 SYRINGE DRIVER

The T34 is a small, lightweight, robust, battery operated ambulatory syringe driver designed to deliver medication by continuous subcutaneous infusion. The T34 offers 3 point syringe detection enabling the driver to identify all commonly used (or programmed) syringe brands. This feature also enables the driver to calculate the syringe volume and deliver the contents as mls per hour (ml/hour) therefore minimising the risk of programme error. The sensors also activate an alarm if the syringe is removed or partially displaced during infusion.

The driver is configured to (and locked) to the following mode of operation: **Lock on** delivering the contents of a syringe over a fixed duration of 24 hours. The driver automatically calculates the ml/hour rate based on the fixed duration (24 hours) and the confirmed deliverable volume. A lead screw drives the driver actuator and syringe plunger forward at a controlled rate.

The size and weight of the T34 makes it ideal for ambulatory use in either a hospital or home/out patient setting. The driver can be easily concealed beneath clothing in a shoulder holster and combination belt. A compact lock box protects the driver from damage and/or tampering with the driver or displacement of the syringe (McKinley T34 Operation Manual 2011).

6 RATIONALE FOR USE

The McKinley T34 Syringe driver has been introduced because it has:-

• Rate setting in millilitres (ml) per hour
• Mechanisms to stop infusion if the syringe is not properly and securely fitted
• Effective alarm systems alert to occlusions, end of infusions, near end of battery and syringe displacement if a syringe is removed or partially displaced during an infusion
• Lock-box covers and lock-out controlled by password
Policy and Protocol for the use of the CME McKinley 
T34 Syringe Driver for Adults in Palliative Care

• Provision of internal log memory to record all driver events

These features comply with MHRA (2003), IEC standards (1998) and NPSA (2010) requirements to ensure the safety of infusion drivers.

In addition the McKinley T34:
• Reduces the risk of programming error and prevents confusion in driver selection. The driver offers a 3 point detection system enabling identification of all common (or programmed) syringe brands. This feature ensures the driver can make volume and rate calculations minimising the risk of user programming errors
• Has a delivery system allowing a larger volume of drug to be infused which facilitates greater flexibility of drug dose and drug combinations

7 INDICATIONS FOR USE OF A SYRINGE DRIVER

Subcutaneous drug infusion using portable syringe drivers has had a positive impact on patient comfort in palliative care. It permits the continuous delivery of a range of drug therapies at a predetermined rate via the subcutaneous route at any stage during the disease pathway. Palliative care has been defined as:

"an approach that improves the quality of life of patients and their families facing the problem associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual" (WHO 2002).

The decision to administer medication via a syringe driver needs to be taken by the multi-professional team in consultation with the patient and carer. Other methods of administration should be considered prior to choosing the subcutaneous route, e.g. transdermal, rectal or sublingual and may be considered as part of ongoing therapy with a driver.

Circumstances during the palliative and terminal phase of an illness in which a syringe driver may be indicated to administer the necessary medication include:

• Intractable nausea and vomiting not controllable by other means
• Dysphagia and the inability to swallow oral medication
• Intestinal obstruction
• Oesophageal obstruction, due to internal/external compression
• Malabsorption of drugs
• Head and neck lesions/surgery which may cause difficulties in taking medication
• Semi or unconscious state

Relative Contraindication – Thrombocytopenia (Seek Specialist Palliative Care Advice)

Cautions - Heparin and warfarin therapies
The following factors need to be considered when deciding to use a syringe driver for administration of medication:

**Benefits**

- Maintains stable blood plasma serum levels of medication
- Avoids peaks and troughs of episodic administration
- Reduces need for repeated injections
- Permits appropriate control of symptoms, without toxic effects of the peaks and troughs of episodic administration
- The ability to infuse a larger volume or combination of drugs via one route
- Usually reloaded every 24hrs
- Accurate infusion times
- Portable, lightweight and compact, allows mobility and independence

**Disadvantages/Risks**

- Patients may become psychologically dependent on the device
- Inflammation or infection may occur at the site of the cannula insertion and may impede absorption and rate of delivery of drugs
- Drug/patient and drug/diluent incompatibility
- The barrel clamp arm could be vulnerable to damage with rough handling
- Potential cross infection risk if device not cleaned properly
- Planning for the next 24 hours can be restrictive
- Driver failure

If a decision is made to use a syringe driver it must be remembered that it will take some time for medication to reach therapeutic levels, therefore a loading dose will need to be considered (Twycross et al 2007).

**8 COMMUNICATING WITH PATIENTS**

Prior to starting a syringe driver its use should be fully discussed with the patient and his/her family/carers. Explanation is needed about what a syringe driver is, how it works and why its use is indicated. This should be supported by written information which details:

- Name of device
- Operation and control of the device
- Their responsibility for checking of the device when in use
- Recognition of faults or failures and appropriate action to be taken
- Telephone number of who to contact in an emergency, including out of hours
- The maintenance required and its frequency
- Advice should also be given regarding care and appropriate handling of the syringe driver e.g. what to do if the driver is dropped or damaged, to keep the device dry and away from heat or direct sunlight etc.

(MHRA 2008)

The benefits and risks of syringe drivers should be explained and informed consent for administration sought (Mitten 2001). Use in conjunction with the organisation’s
consent policy, professional guidelines (NMC 2008) and the Mental Capacity Act (2005).

It must be remembered that setting up a syringe driver may be routine for the clinician, but it may be a frightening new experience for patients and their carers (Dover 1987).

9 TRAINING FOR STAFF

Training to achieve competence in the management and use of the device must be completed in line with the organisations learning beyond registration practice skills. A pack designed for the training of syringe driver management in palliative care must be completed after completion of pre-qualifying packs.

It is the responsibility of each individual registered nurse to ensure they keep up to date with this aspect of care. Maintenance of skills and competence should be reviewed as part of the annual appraisal process. A mandatory face-to-face update training session should be attended every 2 years. This should be undertaken annually if the need is identified in the appraisal process.

The e-learning training programme is available as an additional resource for staff: -
http://www.cmemedical.co.uk/online-training/

If skills and competence have not been maintained, Section 1 (Theoretical Knowledge) of the Training Pack should be repeated prior to attending an update programme.

Flowchart for assessing syringe driver training in palliative care - see Appendix 1.

Staff already experienced in the procedure through current training systems will be required to prove competence through Accreditation of Prior Experiential Learning (APEL) as detailed in flowchart and training pack.

An up to date record of training must be maintained centrally within each organisation.

10 INCIDENT REPORTING

An incident is an untoward or adverse event that gives rise to, or has the potential to produce, unexpected or unwanted effects which could be detrimental to the safety of service users, other persons, staff or the Trust (refer to local incident reporting and learning policy).

A significant incident has occurred when “There is an unusual or unexpected event associated with the use of a medical device that has a detrimental effect on the patient or to others” (MHRA). It does not have to relate to a failure of a medical device, but can arise from shortcomings in the device, its accessories, its operating instructions, user practice, servicing and maintenance and conditions of use. Whenever a medical device is in use and circumstances occur that cause harm or could cause harm, careful consideration should be given to reporting.
All adverse incidents or near misses involving the device or the procedure must be reported and managed as described in the organisations incident reporting policy (MHRA Devices Bulletin DB2010(01)).

In addition, all adverse incidents will be monitored by the appropriate person/group identified within the organisation and any trends identified. Audits of this information, along with audit against the standards for the use of syringe drivers assists in identifying training needs. Adverse drug reactions should be considered for reporting through the “yellow card scheme”. This facility is available for nurses, doctors and pharmacists.

11 SYRINGE DRIVER MAINTENANCE

The driver is designed for ambulatory use and should withstand everyday handling. If the driver is dropped onto a hard surface, or is suspected of being dropped/damaged, subjected to excessive moisture, humidity or high temperature, the driver should be removed from service and returned to Clinical Engineering to allow the operation and calibration to be checked.

The drivers must be serviced at least annually according to local policy to ensure their function is maintained. A record of servicing must be maintained for each individual driver.

12 CLEANING AND DECONTAMINATION

Cleaning and decontamination should be carried out according to local policy and the operating manual. However CME McKinley does not recommend the use of alcohol sprays and wipes when decontamination of the lockbox is required as extended use could result in the lock box becoming brittle and susceptible to damage (Operation Manual 2010).

13 POLICY MONITORING AND REVIEW

This policy and procedure will be reviewed every two years or at any such time that there are relevant changes to working practices, or from feedback through audit/learning or from legal or statutory requirements.
SECTION 2 - PROTOCOL FOR THE USE OF THE MCKINLEY T34 SYRINGE DRIVER

1 CME MCKINLEY T34 SYRINGE DRIVER

This protocol is not a stand alone document and is intended to be used in conjunction with the policy and the training pack for this device and in conjunction with other organisational policies. The setting up of the syringe driver should only be undertaken by, or under the supervision of, appropriately trained personnel.

1.1 Component parts of the McKinley T34 Syringe driver

INFO
Scroll UP/DOWN
Yes Start
No Stop
Actuator Movement Forward(FF) / Back
Power ON/OFF
Infusion light status indicator
- Green (running)
- Red (stopped)
- No Light (off)

Barrel Clamp
Arm & Sensor
Syringe Flange
Collar Sensor
Actuator
Plunger Sensor
1.2 Set up parameters

The McKinley T34 is calibrated in ml per hour. The standard delivery period for a continuous subcutaneous infusion in palliative care is 24 hours. The McKinley T34 drivers are programmed for LCHST and ULHT for use in adult palliative care to deliver the ‘delivery volume’ as displayed by the driver over 24 hours. The duration is locked therefore the user cannot change it. This simplifies use and prevents everyday users having to repeatedly confirm or change common set up parameters whilst setting up the infusion therefore reducing the risk of errors. The driver calculates the volume, applies the pre set duration (24 hours) and calculates the appropriate rate of the infusion.

The user checks only to confirm the infusion summary screen (showing duration, rate, volume) matches the patient prescription before starting the infusion.

A user code is required to change ‘set up’ mode and prevent unauthorised access. In normal use the user will not see this or be prompted for access codes.

The ‘purge option’ is not used in order to simplify the process and reduce the risk of set up errors.

The event log displays a complete time and date stamped record of events along with a record of driver status (volume infused, rate etc.) at the time of the event. Event logs cannot be deleted or altered.

2 EQUIPMENT REQUIRED

9 volt alkaline battery identifiable by the international marking code 64R61 (a recommended battery of this type is the Duracell MN1604). Access to spare batteries. Never try to force a battery into battery compartment as this may damage the battery contacts. A PP3 size lithium battery can be used to extend the operating time. Rechargeable batteries must not be used. ULHT - All batteries must be supplied by Ward Managers.

The following items should be contained within a suitable rigid, wipeable, lidded storage box. The box should be stored securely, in a cool dry place, where it can be readily accessed.

- McKinley T34 syringe driver and plastic lock box and key. The driver must be checked before use and be clean, free from damage and serviced within the last 12 months
- Sterile administration set (100cm extension set with anti-siphon valve and female luer lock) with small (0.5ml) prime volume (McKinley Micro set 100-172S). Inspect packaging and contents/expiry dates before use. Do not use if any evidence of damage or the sterility of packets has been compromised
- Saf-T-Intima cannula - Blue 22G/Yellow 24G
The following section applies to LCHS Staff only

- 70% alcohol wipe/2% Chlorhexidine in 70% isopropyl alcohol skin preparation wipe
- Clear sterile semi-permeable dressing for infusion site
- Sterile 20ml or 30ml BD Plastipak or B Braun luer lock syringe - LCHST
- Sterile blue needle
- Additive label
- Subcutaneous infusion monitoring chart
- Dosposable holster (for mobile patients)
- Valid patient prescription
- Prescribed medications and diluents (either sterile Water for Injection or sterile Sodium Chloride 0.9%, depending on the drugs used - see section 5 Diluents)
- BS7320 and ISO9002 compliant sharps receptacle
- 9 volt alkaline battery identifiable by the international marking code 64R61 (a recommended battery of this type is the Duracell MN1604). Access to spare batteries. Never try to force a battery into battery compartment as this may damage the battery contacts. A PP3 size lithium battery can be used to extend the operating time. Rechargeable batteries must not be used.
- written patient information specific to McKinley T34 syringe driver

NB The professional should replace any used items both during usage and on returning the box to base/store following completion of episode. This will ensure that the box is ready for further use and all equipment is checked and consumable items are in date.

Syringe selection

The T34 driver is calibrated to operate with the most commonly used luer lock syringe brands: BD Plastipak (ULHT and LCHST) and B Braun (LCHST). The syringe MUST have a luer lock facility in order to avoid leakage or accidental disconnection. The correct brand being used MUST be selected during set up. It is recommended that either a 20ml or 30ml syringe is used to allow a greater dilution of medication to reduce the risk of adverse site reaction. The fill volume of a 20 ml syringe is approximately 17mls; the fill volume of a 30ml syringe is approximately 22mls.

3 INFECTION PREVENTION

- Good hand washing and drying techniques are essential on the part of the nurse before and after the procedure

- The need for the use of Personal Protective Equipment (PPE) should be assessed. Gloves should be worn to protect hands from contamination if necessary
Adherence to non-touch aseptic technique must be applied throughout. The chosen site should be cleaned with a swab saturated in an alcohol based solution. The area should be allowed to dry.

Used needles should always be discarded directly into an approved sharps receptacle without being re-sheathed.

Staff should refer to their organisation’s Infection Control Policy and associated guidelines for further guidance.

4 DRAWING UP MEDICATION

When preparing medicines, the Medicines Act 1986, NMC Standards of Medicines Management (2008), local medicines management policies regarding the administration of medicines including controlled drugs, and infection control precautions must be adhered to.

No person must check or administer medicines unless they are competent to do so and they are acting within their sphere of professional practice.

Checking the drugs within a syringe driver and the calculation should be performed by 2 registered nurses in an inpatient setting in accordance with the United Lincolnshire Hospitals Medicines Management Policy. In the community setting there is no current requirement for a second “checker” for any injectable medication but the clinician must ensure that they are working within their competence and confidence and they may in some circumstances choose to have a second person present (SOP for Administration of Injectable Medicines in Community Adult Integrated Services, LCHS 2010). However, best practice dictates that two competent members of staff are involved in the checking and setting up of the syringe driver, and it is best practice to ensure that wherever possible two competent members of staff are involved in the administration of all controlled drugs (SOP for Handling Controlled Drugs within LCHS, 2010).

5 DILUENTS

In the UK, Water for injection (WFI) is generally recommended because of its use in reconstituting lyophilized diamorphine (the parenteral strong opioid of choice in the UK), and the accumulated wealth of supporting compatibility data (Charts 14.1 and 14.3). WFI is isotonic and causes less site irritation (Dickman 2005). WFI also reduces the risk of precipitation with the most commonly used antihistaminic antimuscarinic anti-emetic, cyclizine lactate. Comparison of diluents – ref Hospice and Palliative Care Formulary USA see details at: http://www.palliativedrugs.com/download/HPCFUSA.pdf

Drug information must always be checked as certain diluents are specified with some drugs.
### Advantages | Disadvantages
--- | ---
**Sterile water for injection** | More compatibility data available  
Less chance of incompatibility  
Used to reconstitute lyophilized (freeze-dried) Diamorphine | Large volumes are hypotonic, and may cause infusion site pain and skin reaction

**Sterile 0.9% Sodium Chloride** | Close to physiological tonicity  
Less infusion site pain and skin reaction | Less compatibility data available  
Incompatible with Cyclizine  
Increases likelihood of precipitation when more than one drug is used

As there is potential for interaction between drugs in a driver the compatibility of drugs to be drawn up should be checked prior to mixing drugs. The Palliative Care Formulary (Twycross et al 2007) suggests suitable combinations of 2 or 3 medications. Pharmacy advice should be sought for any number larger than this or for unusual combinations (Regnard et al 1992). On occasions it may be necessary to use more than one driver (Dickman 2005). The resulting solution should be checked for any cloudiness or crystallisation. If this does occur do not use and obtain pharmaceutical advice regarding the compatibility of drugs.

When a 20ml syringe is used it is recommended that the solution be made up to measure approximately 17ml within the syringe barrel as this is the maximum fill volume that can be delivered from a 20ml syringe. When a 30ml syringe is used the solution can be made up to measure approximately 22ml within the syringe barrel as this is the maximum fill volume that can be delivered from a 30ml syringe.

### 6 LABELLING THE SYRINGE

Ensure the label does not interfere with the mechanism of the syringe driver i.e. where there is contact with the barrel clamp arm. When attaching the label, ensure it does not obscure the visual scales on the syringe which may require to be viewed during the infusion. The following details are required on the label **ULHT ONLY**

- Patient name, date of birth, NHS number  
- Medicine name(s) and batch number(s)  
- Dose of each medicine  
- Diluent name  
- Total volume in ml  
- Date and time prepared  
- Initials of individual(s) preparing the syringe
FOR LCHS ONLY  batch numbers and expiry dates to be documented on gold sheet, drug and dosage to be included on label

7  CHOOSING A SUITABLE INFUSION SITE

Where possible, involve the patient in the choice of a suitable site. Both the outer arm and upper thigh are commonly used, but avoid the upper arm in bedbound patients who require frequent turning. Areas suitable for subcutaneous infusion include those with a good depth of subcutaneous fat, towards the trunk of the body particularly if the patient's peripheral circulation is compromised. Avoid the chest wall in cachectic patients due to the risk of causing a pneumothorax.

Acceptable SC cannula insertion sites are shown below:

For confused patients insertion into a suitable area on the patients back may be considered.

The following sites should be avoided:

- Oedematous areas including lymphoedema/ascites (poor drug absorption and increased risk of infection/exacerbation of oedema)
- Bony prominences (poor absorption and discomfort)
- Joints/skin folds (movement may displace cannula, discomfort)
- Areas of irradiated skin (may have poor perfusion and hence poor drug absorption)
- Sites of tumour
- Sites of broken skin/previous scarring
- Areas of inflammation

8  BATTERY TEST/INSERTION
When setting up the driver always check that there is enough charge in the battery to cover the infusion.

1. To fit the battery slide back the compartment cover at the back of the driver. Push the battery into the compartment taking care to ensure that the +/- contacts are aligned as shown on the label inside the compartment.

2. Slide the cover back on.

3. Switch on the driver, pre-loading will commence. Summary screen will then display battery status. Press INFO key and select battery level. Press YES to confirm.

4. Check summary screen display and verify level of battery charge (the average battery life is 3-5 days depending on use).

5. In the community, if the charge is below 40% at the start of the infusion then replace with a new battery. In the inpatient setting, the battery should be changed if the charge is below 15% at the start of the infusion.

6. During an infusion press INFO key twice to check battery level.

7. In the inpatient setting, the battery level should be confirmed at the start of each shift.

8. The battery should be removed from the syringe driver when not in use.

9 CONNECTING AND LOADING THE SYRINGE

Use the CME McKinley syringe extension set with anti-siphon valve and luer lock.

If a new infusion set is required use the measure and prime procedure i.e. Draw medications/diluent to approximately 17mls, maximum fill volume of a 20ml syringe that the syringe driver can accommodate, or to approximately 22mls, maximum fill volume of a 30ml syringe that the syringe driver can accommodate. Connect infusion line. Gently depress the plunger until the line is full and fluid is visible at the end of the infusion set.

The syringe is now ready to load into the driver.

9.1 Pre Loading

- Install battery
- Before loading syringe ensure barrel clamp arm is down
- Press ON/OFF key to power up driver. The screen will display self test showing:
  - driver model name
  - software version
  - driver ID
- The display will then indicate PRE-LOADING
The actuator will start to move, when it stops moving the **LOAD SYRINGE** screen appears.

During PRE LOADING a set up parameters screen is displayed showing key locked parameters:
- occlusion
- max rate
- program lock
- battery status

**NOTE**
The actuator during pre-loading always returns to the start position of the last infusion programmed. If the user regularly uses the same syringe/brand/size fill volume the actuator should return to the correct position and not require adjustment. **The actuator cannot be moved manually.** Do not force the actuator to move manually as this could damage the device.

If the actuator is not in the correct position to accommodate the syringe, leave barrel clamp arm down and **FF** or **BACK** buttons on the keypad to move actuator to fit the syringe.

**NOTE**
Hold the syringe above the device to gauge correct location. Forward movement of the actuator is limited so repeated pressing of the **FF** key may be required. Backwards movement is not restricted. Automatic actuator movement deletes any previous programme in the pump memory.

### 9.2 To Load the Syringe

The syringe graphic on the display flashes in 3 places. Lift the barrel clamp arm and load the syringe into position.

Position flange/collar and plunger first. Finally lower barrel clamp arm on top of the syringe. If correctly loaded the graphic will become solid. The screen will then display size/brand of syringe detected.

If the driver has correctly identified the syringe press **YES/START** to confirm. If the syringe brand is not correct press **UP/DOWN** keys to scroll through the list until the correct syringe brand is found.

(If the driver was stopped and turned off before the end of a previous infusion, the **RESUME** prompt will appear. Press **NO** to commence new infusion.)

When the syringe/size/brand are confirmed the driver will calculate and display the volume to be infused.

**Variance** (between visual reading and computer display)

At the start of each new infusion a visual check must be made of volume to be infused against the computer display of deliverable volume and recorded on the monitoring chart.
**WARNING:** If the volume displayed after loading the syringe is significantly different (more than +/- 0.5ml) than the volume visually confirmed on the syringe scale, remove the syringe, turn off the driver and then try reloading the syringe. If the problem persists, remove the driver from use and return to Clinical Engineering for inspection, testing and re-calibration.

Ensure the summary screen details match the prescription before starting the infusion i.e. Volume / Rate / Duration.

Press **YES** to confirm acceptance of pre-set program infusion parameters.

Start infusion prompt will be displayed.

**Note:**
**Clamp must be locked on Saf-T-Intima line before connection of syringe driver to patient.**

Connect giving set to patient.

When ready to commence infusion, release clamp and press **YES** to start infusion.

Press and hold **INFO** key until display denotes **keypad locked**.

(To de-activate keypad lock press and hold until display denotes key pad lock is off).

**Note:**
It may be necessary to administer a bolus injection to relieve symptoms in the interim until the medication achieves a therapeutic level in the bloodstream.

Secure driver in lock box.

### 9.3 Temporary interruption to infusion / Resuming the Infusion

E.g if the driver is stopped for any reason e.g. showering/bathing.

All stages must be verified by a second trained nurse in the inpatient setting:
- Press **STOP** – unlock key pad and turn driver **OFF**
- Clamp line – disconnect driver. **DO NOT REMOVE SYRINGE FROM DRIVER.**
- Cap cannula and infusion line top to minimise cross infection. Maintain asepsis
- Document time infusion stopped and reason why on monitoring form
- In the in-patient setting, store driver securely in locked CD cupboard until required
- When ready to recommence carefully check prescription, syringe label, verify correct patient/correct infusion and infusion is running to prescribed time.

**Note:** stopping the infusion will delay the end time of infusion
- Reconnect syringe driver/line to cannula maintaining asepsis
- Press and hold **ON** button
- The screen will request confirmation of syringe size/brand
- Press **YES** to confirm
- Screen will display **YES** resume programme, NO new infusion
• Press **YES** to resume programme – screen will display remaining volume/duration/rate of infusion. Ensure all information is per per prescription

**Note:** If NO new infusion is pressed this will reset the remaining infusion to deliver over 24 hrs at a different rate and the infusion will then be incorrect

• Press **YES** to confirm
• Unclamp line
• Press **YES** to start infusion
• Document in syringe driver monitoring form time infusion commenced

**Note:** This will extend time of infusion by however long the infusion was stopped for

• Press and hold **INFO** key to lock keypad
• Replace lock box

### 9.4 Replenishing of an Infusion (new syringe when re-siting of line is not required)

• Prepare new syringe and contents as per policy
• Press **STOP**
• Press and hold **INFO** key to deactivate key pad lock
• Switch driver **OFF**
• Clamp line
• Both nurses (where appropriate) to verify patient identity and confirm prescription/label/monitoring form
• Remove old syringe
• Switch driver on
• As section 9 – preloading/loading of syringe

**NOTE:** Do not connect syringe to patient until secured in syringe driver and line clamp on. Only release clamp when ready to commence infusion.

### 9.5 Changing a battery during an infusion

• Press **STOP** and apply clamp
• Insert new battery
• Restart driver
• Reconfirm syringe size and brand
• Press **YES** to resume
• Reconfirm volume and duration and release clamp
• Press **YES** to recommence infusion
• Lock Keypad

### 9.6 Stopping the Infusion and removing the syringe driver /Unused medication

If the syringe driver is to be discontinued, this must be done by appropriately trained staff.

• Press **STOP** – unlock key pad and turn driver **OFF**
• Clamp line – disconnect driver
• Remove cannula if appropriate or insert new cannula

Any unused medication must be disposed of as per policy. All drug wastage must be documented on the syringe driver monitoring form (in-patient setting) and controlled drugs register/drug stock sheet if controlled drugs have been used. Both sets of documentation must be signed (by two trained nurses in the in-patient setting).

Note: In the event of stopping an infusion with some medication remaining, and there is a variance between visual volume and the computer display of volume remaining, the computer display figure should be the one used for recording wastage in the controlled drug register/drug stock sheet and on the syringe driver monitoring chart. Professional judgement must be exercised if there is a significant difference between the two figures (i.e. more than the hourly rate) and the cause investigated/incident form completed and the driver returned to clinical engineering if the driver delivery appears faulty.

The reason for discontinuation of the driver must also be documented. Review the overall prescription and check it has progressed as prescribed. Any discrepancies must be investigated and actioned. Significant anomalies must be reported via an incident form and incident reporting procedure.

Clean syringe driver, remove the battery and return to store on completion of infusion. If any concerns regarding the efficacy of the syringe driver it must be isolated and returned to Clinical Engineering.

9.7 In the Event of a Patient’s Death

As in section 9.6 above.

If there are any doubts about the circumstances of the patients death remove the driver and quarantine securely, complete with the syringe and line. Cap and leave cannula in situ. Document all relevant details. Inform line manager immediately. If the syringe driver is no longer required, clean driver, remove the battery and return to stock. Store carefully until next required.

9.8 Cleaning the Syringe Driver

After use the driver must be cleaned thoroughly with a slightly damp lint free cloth and detergent and dried. The driver screw and guide rods should be gently brushed to remove any dust/debris. A single use brush should be used e.g. soft toothbrush. This should be either decontaminated or discarded after use.

Cleaning and decontamination should be carried out according to local policy and the operation manual. However CME McKinley does not recommend the use of alcohol sprays and wipes when decontamination of the lockbox is required as extended use could result in the lock box becoming brittle and susceptible to damage. The pump or any part must not be immersed in water or any other solution as this may damage the components.
If heavily contaminated excess debris should be cleaned from the driver and then carefully sealed and labelled contaminated and returned for cleaning with details of contamination to Clinical Engineering.

9.9 If the infusion line snaps

If the infusion line snaps during an infusion the infusion will have to be completely renewed (repriming and continuing with the same infusion will reduce the volume and affect prescribed delivery rate and end time of infusion).

9.10 Event Log

The T34 provides an event log which shows a record of pump status (volume infused, rate etc.).
Press INFO key and scroll to event log.
Press YES to select.
The screen will now show the most current event alarm date, time etc. Use UP/DOWN keys to scroll through events to find events of interest.
Press INFO on any chosen event displays further data regarding the event.

A full history of events can be downloaded by Clinical Engineering for reference if there is an area of concern.
10 DRIVER ALARMS

When the driver detects a problem four things happen:

1. The infusion stops (unless the event is an ALERT# see table below)
2. The LED indicator turns red
3. An audible alarm is activated (this will continue until either the YES key is pressed to mute or the problem is rectified?)
4. A message appears on the display screen indicating the cause

The following table indicates appropriate actions to be taken:

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Possible Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occlusion or Syringe Empty</td>
<td>Patient access device blocked, kinked, clamped or occluded Actuator has reached minimum travel position</td>
<td>Flush/replace access device, release the clamp or clear the occlusion then resume the infusion End of program, switch driver off</td>
</tr>
<tr>
<td>Syringe Displaced</td>
<td>Syringe has been removed or displaced (one or more of the syringe detection sensors is not detecting)</td>
<td>Check screen message for assistance. Check the syringe placement and re-seat as necessary</td>
</tr>
<tr>
<td>Driver paused too long</td>
<td>Driver has been left in STOP mode (on hold) for 2 minutes</td>
<td>Start infusion, continue pause or switch off</td>
</tr>
<tr>
<td>Near End #</td>
<td>15 minutes from end of infusion</td>
<td>Prepare to change syringe or switch off</td>
</tr>
<tr>
<td>End Program/syringe</td>
<td>Infusion complete</td>
<td>Close down or start new infusion (Driver will default to keep vein open (KVO) if set)</td>
</tr>
<tr>
<td>Low Battery #</td>
<td>Battery is almost depleted (30 minutes left)</td>
<td>Prepare to change battery</td>
</tr>
<tr>
<td>End Battery</td>
<td>Battery is depleted</td>
<td>Change battery</td>
</tr>
<tr>
<td>System error. Press and hold INFO for details</td>
<td>System error</td>
<td>Remove driver from use and return to Clinical Engineering. Document error number and description of the problem</td>
</tr>
</tbody>
</table>
11  MONITORING DURING THE INFUSION

It is recommended best practice, in both the hospital and community setting, when a syringe driver is set-up, reloaded or re-sited to observe the syringe driver during the first 15 minutes to ensure it is functioning correctly. Further monitoring checks should be carried out:

- A minimum of 4 hourly within in-patient settings
- At each visit by a nurse in the community setting – the frequency of this depends on factors such as other nursing needs of the patient, the willingness or ability of the patient/carer to assist in monitoring, and the risk of instability of the medicine mixture

Press INFO key once to check infusion summary on the screen which will display:

- Volume to be infused
- Volume infused

After a few seconds the display will return to the main infusion screen which will indicate:

- Display screen states that syringe brand is same as syringe used
- Time remaining
- Rate ml/hr
- Chevrons will flash to show driver delivery
- Green light will flash

Comprehensive records must be kept in patients notes of:

- Date and time of administration
- Site of administration
- Name, dosage and volume of medication
- Signature of clinician
- Either device identification number or serial number of the driver/device (Clothier report 1994)

The following monitoring checks should be carried out and documented on the Subcutaneous Infusion Monitoring Chart, as follows:

- record the time the syringe driver is checked
- record the location of the infusion site when the syringe driver is set up and when the line is changed
- check the infusion site for:
  - redness
  - swelling
  - discomfort/pain
  - leakage of fluid
- check the medication is controlling the patient’s symptoms
- check for signs of opiate toxicity/intolerance if in the syringe driver
- check the solution in the syringe and the SC infusion line for cloudiness, presence of large air bubbles (small ones not significant), precipitation or colour change
• record the flow rate and check it is correct
• record the volume of solution to be infused and the volume infused and check from this information that the syringe driver is delivering the medication at the desired rate (compare the fluid remaining in the syringe with the driver reading/display)
• check the battery light is flashing. There is no need to record the battery percentage as this has been carried out already as part of the daily set up
• when the infusion site is changed, record the reason in the notes
• at each check inspect the SC infusion line to ensure that it is securely attached to both the syringe and the patient and that it is not leaking, kinked or trapped. If there are any problems, then they must be documented.

The individual carrying out the monitoring checks should document and sign the relevant sections of the monitoring chart. If any checks are not carried out e.g. site check to prevent disturbing the patient whilst asleep, record this and the reason on the monitoring chart. **If any checks indicate a problem e.g. the infusion is not running at the expected rate, the appropriate action must be taken and documented in the notes.**

**Completion of the infusion**

The end of an infusion either planned or early replenishment e.g. due to a prescription change, must be documented and the monitoring chart fully completed.

The chart must be reviewed in the relation to the 24 hour period to ensure the driver has run to the prescribed time and within parameters. Any discrepancies must be investigated and actioned. Professional judgement must be exercised and if discrepancy significant an incident form must be completed and reported as per policy.

12 **TROUBLESHOOTING**

See section 10 Driver Alarms.

**IF FAST** – more than 1 hour (displayed rate) ahead of expected time (there is no tolerance to a driver running fast):

• Inform Doctor, review patients clinical condition, document
• Check the rate setting is correct
• Check the correct syringe brand or size has been selected
• Change the driver
• Complete an incident form
• Send the faulty driver to Clinical Engineering, include a copy of the incident form and syringe driver log and any other relevant information

**IF SLOW** – more than 1 hour behind expected time:

• Inform Doctor, review patients condition, document
• Check rate setting is correct
• Check the syringe driver light is GREEN and flashing
• Check battery level
• Check the correct syringe size and brand has been selected
• Check the syringe is correctly inserted into the syringe driver
• Check whether the driver has been stopped/started for any reason e.g. showering or occlusion
• Check contents of syringe at line for indications or precipitation/cloudiness/kinking of tubingclamp left on
• Check cannula site for redness/soreness/leakage/change if necessary
• If driver significantly slow, more than 1 hour, send to Clinical Engineering with a copy of the syringe driver log

Residual Volume

There may be an occasion where there is a small residual volume remaining at the end of the infusion. This may be due to site resistance, potentially due to oedema/pressure/reduced absorption, however, the pressure may not be enough to trigger the occlusion alarm.
Residual volume may also result from initial variance when the driver was commenced (see Section 9.2).
This is acceptable if the volume equates to approximately the hourly rate (e.g. approximately 1 hour slow).

In this instance the site should be checked for efficacy. If any doubts about potency/absorption the cannula should be re-sited.
The subsequent infusion must be monitored closely for accuracy of infusion time/delivery. If it continues to run slow the driver should be replaced and sent for servicing with full details of the problem.

If the residual volume is more than the hourly rate (more than 1 hour slow) the driver should be replaced and sent with full details of the problem for servicing.

Any residual volume should be disposed of as per policy and clearly documented on monitoring form as “residual volume not infused”. All documentation should be signed/dated (see Section 9.6 Stopping an infusion and unsued medication).
13 REFERENCES


Hospice and Palliative Care Formulary USA, http://www.palliativedrugs.com/download/HPCFUSA.pdf


Lincolnshire Community Health Services (2010), *Standard Operating Procedure for Administration of Injectable Medicines in Community Adult Integrated Services*.

Lincolnshire Community Health Services (2010), *Standard Operating Procedure for Handling Controlled Drugs within Lincolnshire Community Health Services*.

Lincolnshire Policy for the usage of Syringe Drivers MS16A and MS26 in Palliative Care (2010). Lincolnshire.


MHRA DB2010(01) Device Bulletin. Reporting Adverse Incidents and Disseminating Medical Device Alerts.


Appendix 1

Flowchart for Accessing McKinley Syringe Driver Training in Palliative Care

**Start**

Registered Nurse

- Training Needs Analysis – Need identified for Learning Beyond Registration Practise Skill
  - ULHT Route
    - IV additives a guide to practice to be completed
      - Pack to be completed before syringe driver training
    - Infusion Control devices a guide to practice to be completed
      - Pack to be completed before syringe driver training
  - LCHS Route
    - Preceptorship pack for newly qualified Band 5
    - Devices training to be determined. Theoretical knowledge workbook to be completed.

- Theoretical syringe driver training in palliative care a guide to practice to be completed first, followed by practical competency assessment

Review of skills & competence annually as part of the appraisal process. Mandatory 2 yearly face:face update. Use e-learning programme as an additional resource.

**Competent to Practice**

Currently practising Syringe driver management and deemed competent practitioner

APEL current skills and experience against competency check list in McKinley syringe driver pack and complete appropriate route – This could mean entry at any point dependant on the level of skill APEL’d. The minimum entry being reassessment of competencies annually through the appraisal system.
APPENDIX 2

If any of the above occur, or if your symptoms are not controlled, please contact the nurse on one of the phone numbers below.

**How will it affect my life?**
As the syringe driver is portable, you can continue normal activities. However, the syringe driver is not waterproof, so you should take care when bathing or showering to keep the syringe driver dry. The silicone needle site should also be kept dry and is covered with a waterproof dressing. The medication in the syringe is usually renewed every 24 hours by a nurse. If you go on holiday, we can arrange for a nurse to call at your holiday destination (in the UK), to re-fill and change the syringe.

**Contact details if you have any concerns**
Monday to Friday 9am - 5pm
Telephone: ________________
Evenings, weekends and public holidays
Telephone: ________________

**References**
If you require a full list of references for this leaflet please email patient.involvement@ulh.nhs.uk or contact 01476 464560

The Trust endeavours to ensure that the information given here is accurate and impartial.

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If you require this information in other languages, large print, audio (CD or tape) or Braille please e-mail the Public Involvement Team patient.involvement@ulh.nhs.uk or contact 01476 464560.
Aim of the leaflet
This leaflet aims to tell you what a McKinley syringe driver is, why you are using it, how it works and how to care for it. It also provides advice for people using a syringe driver at home.

What is a syringe driver?
A syringe driver is a small battery-powered pump which delivers a continuous flow of medication from a syringe to just beneath the surface of your skin, via a thin tube and small silicone needle. It is small enough for you to carry in a pouch or pocket. A compact lock box protects the driver from damage or displacement of the syringe.

Why do I need a syringe driver?
Syringe drivers are used for the following reasons:
- When you find it difficult or impossible to take medication by mouth, for example, because it is hard to swallow
- When you are not successfully absorbing medication taken by mouth, for example, because you are being sick

A syringe driver reduces the need for repeated injections and gives a constant level of medication. We will talk to you about why it might be helpful for you to have a syringe driver, and about the medications we would put in it. Then you can decide whether you think a syringe driver would be suitable for you.

How does it work?
A nurse or doctor inserts a small silicone needle just under the skin. A thin tube connects the needle to the syringe, and the syringe attaches to the syringe driver. The driver has a battery-driven motor. The motor slowly pushes a plunger into the syringe barrel and so pushes the contents of the syringe into the line and through the silicone needle. You should not feel this at the needle site, as only a tiny amount of liquid is delivered each time the plunger moves.

A green flashing light on the front of the syringe driver tells you that the driver is working and the medication is being delivered. The nurses will re-fill the syringe when it is due each day and will check that the machine is functioning properly. They will use medications according to your prescription. The prescription will be finalised after talking with you and making sure that the medication is working. If you develop symptoms, your medication will be adjusted.

You can put the syringe driver in a pocket or in a fabric pouch that you can carry over your shoulder or attach around your waist.

The silicone needle is usually positioned on your upper arm, upper thigh, upper chest or tummy, but occasionally the upper back is used. It is held in place by a clear dressing which keeps the needle site clean and dry. Once it is inserted, you should not feel any discomfort from the site, and the silicone needle can stay in place for many days.

How do I look after my syringe driver?
There are two key things to remember:
1. Do not get it wet as it is not waterproof.
2. Do not drop it.

Syringe drivers normally work well but occasionally problems do occur. An alarm will sound if a problem is detected. If you are in hospital or in the hospice, the nurse will check the driver regularly.

The pump has an alarm which will sound if the driver detects a problem—for instance, if the plunger cannot move for any reason or if the battery is low. The driver will stop pumping medication and the flashing light on the front will turn red. The alarm will also sound 15 minutes before all the medication is delivered.

The following is for the use of a syringe driver at home only

What if the alarm sounds?
Do not panic. If the alarm is sounding, you should contact the nurse for advice unless you are expecting the nurse to visit within the next 15 minutes to change the syringe. Do not attempt to change the battery yourself.

You can silence the alarm by pressing the ‘YES’ key. Please do not press any other buttons unless the nurse tells you to.

What else should I look out for?
You may notice that:
- the needle site has become red, swollen or sore, or is leaking/wet
- the driver appears to be running too fast or too slowly
Version History Log
This table should detail the version history for this document. It should detail the key changes when a version is amended.

<table>
<thead>
<tr>
<th>Version</th>
<th>Date Implemented</th>
<th>Details of key changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.6</td>
<td>Oct 2014</td>
<td>Front page logo update</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pg6 4.4 remove “through identified trainers”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pg.8 remove paragraph under Caution titled “Graseby Syringe Drivers”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pg.9 7 Add “Relative” to Contraindications, remove the “s”, add “seek Specialist Palliative Care Advice”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pg.9 under Disadvantages/Risks remove “prescriptive errors” and “medication errors relating to drug or dose”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pg.10 8 Replace “Their” with “The patient and carer”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pg.10 8 Remove paragraph starting “Patients should be aware that there is a small risk of mobile……………”</td>
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<tr>
<td></td>
<td></td>
<td>pg10 9 insert <a href="http://www.cmemedical.co.uk/online-training/">http://www.cmemedical.co.uk/online-training/</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change “Flowchart……….. Appendix 2 to 1.</td>
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<tr>
<td></td>
<td></td>
<td>pg13/14 2. Highlighting of section for LCHS staff only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Add “ULHT - All batteries must be supplied by Ward Managers.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pg.16 6. Identification of the labelling of the syringe for each Trust, ULHT /LCHS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pg.22 9.8 Add “does not” to the phrase “However CME McKinley does not recommend the use of alcohol......”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Removal of Appendix 1 – “For teams not trained in the use of McKinley T34 syringe drivers”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pg. 30 New Appendix 1. “Flowchart for Accessing McKinley Syringe Driver Training in Palliative Care”.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Removal of box “Generic section a guide to practice to be completed. Pack to be completed first.” On the ULHT Route of the Flow Chart.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appendix 2. Changes to the Patient Information Leaflet Putting the word “silicone” in front of needle, paragraph 5 and 7. Adding, in What is a syringe driver “A compact lock box protects the driver from damage or displacement of the syringe.” Add “The following is for the use of a syringe driver at home only” in bold print, after “The alarm will also sound 15 minutes before all the medication is delivered.” Remove the paragraph “There is a small risk of mobile phones………” on pg 2.</td>
</tr>
</tbody>
</table>