Syringe Driver Introduction

Christine Hull & Anita Webb
Staff Nurses, Hospice in the Home
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Aims and Objectives

- To gain an understanding of using the McKinleyT34 syringe driver.
- To review knowledge and understanding of the indications for use of syringe drivers, including the advantages and disadvantages.
- To increase understanding of the medications used and how to calculate medication doses.
- To reflect on professional issues related to caring for a patient with a syringe driver.
Indications for Use

• Persistent nausea and vomiting
• Dysphagia
• Intestinal obstruction
• Decreased level of consciousness
• Weakness
• Poor gastro-intestinal absorption
• If an alternative route for administration is required
Advantages

• Constant delivery of medication maintaining a steady plasma level
• Control of multiple symptoms with a combination of drugs
• Avoids repeated injections
• Less invasive than IV route
• Does not restrict mobility or independence
• Syringe only needs to be changed once a day
Disadvantages

• Psychological implications
• Some patients may find the syringe driver heavy
• Invasion of privacy
• Loss of control
• Association with euthanasia
• Association with dying
T34 SYRINGE PUMP
FEATURES AND FUNCTIONS

LOCK ON MODE
WHAT IS THE T34?  WHY CHANGE?

What is the T34?
A syringe pump with safety features, e.g. syringe detection, alarms & alerts. It calculates the rate of infusion based on volume & duration.

Why Change?
*MHRA recommends that all infusion devices should have a minimum amount of safety features (e.g. alarms & Event Log)

*Medicines and Healthcare Products Regulatory Agency
CLINICAL APPLICATIONS

• For ambulatory use: e.g. hospital/homecare/out-patient settings

• Examples of routes of administration possible:
  – Central & peripheral - Venous/Subcutaneous/Epidural

• Can be used on adults & paediatrics

• Pump can be configured to local setting – Lock ON, Lock OFF & rate mode

• Optional use of lockbox & pouch
MODE OF OPERATION: LOCK ON

VOLUME OVER TIME (Program Lock ON - DEFAULT) – Pump will deliver the full contents of the syringe fitted over the Default Duration set on the pump.

THIS MODE IS IDEAL WHERE – the entire contents of a syringe are always required to be delivered over the same duration (e.g. 24 hours). The duration is locked so the user CANNOT change it. This prevents programming errors and makes setting up an infusion very simple.

• User CANNOT change either the VTBI or the Default Duration time
• Pump calculates the volume, applies the pre-set duration, and calculates the appropriate rate for the infusion.
• User only checks and confirms infusion summary screen (showing duration, rate and volume) matches the prescription before starting the infusion
• User access code required to change any of the pumps settings
• Titration is NOT possible in Programme Lock ON mode
ACCESS CODES & KEYPAD LOCK

Access codes
The T34 employs three levels of user access protection to prevent unauthorised changes to the set up or configuration. Although no access code is required to turn the pump on and run an infusion certain settings and features may have been configured and locked as appropriate to the clinical application the pump is being used for in your practice.

Keypad lock
As well as the ability to lock or limit certain infusion parameters or pump settings, T34 allows users to lock the operation of the keypad if concerned about patients, relatives or un-trained personnel tampering with the pump.
EVENT LOG

The event log shows a complete time and date stamped record of the last 512 pump events along with a record of pump status (volume infused, rate, etc) at the time of the event.

**NOTE:** Each event is assigned a number and the pump stores the last 512 in memory. The event log “loops” adding the newest and deleting the oldest event.
In Lock on & Lock off modes, the pump calculates the mls/hr rate by syringe volume & infusion duration. The RATE IS FIXED. (For rate mode, the duration of delivery will change with changes in rate). There is the ability to manipulate / change the volume & the duration in a programme. E.g:

- **If you increase the syringe volume and resume the programme, the duration of delivery will increase**
- **If you decrease the syringe volume and resume the programme, the duration of delivery will decrease**

When Pre-loading actuator movement takes place (power on, barrel clamp down, and no syringe in place) any programme in the memory is deleted.
## COMMON TERMINOLOGY

<table>
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<tr>
<th>TERMINOLOGY</th>
<th>DEFINITION</th>
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<tbody>
<tr>
<td>Mechanical Slack</td>
<td>Non engagement of the driver</td>
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<tr>
<td>Purge</td>
<td>Flush, rinse, to get rid of (to take up the mechanical slack in the system)</td>
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<tr>
<td>Occlusion Pressure</td>
<td>The force resulting from restriction of full natural flow of fluid/gas.</td>
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<tr>
<td></td>
<td>The amount of load or force pushing on a unit – e.g. Blockage/Obstruction</td>
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<tr>
<td>Post Occlusion</td>
<td>Unplanned volume of infusion delivered following the release of an occlusion</td>
</tr>
<tr>
<td>Bolus</td>
<td>Preventative device to stop free-flow infusion from syringe/infusion bag</td>
</tr>
<tr>
<td>Anti-Siphon Valve</td>
<td>New set-up of infusion programme/ Return to previous programme</td>
</tr>
<tr>
<td>VI/VTBI</td>
<td>Volume Infused/Volume to be Infused</td>
</tr>
<tr>
<td>Event Log</td>
<td>A record of the systems data over a period of time stored into the software of the infusion pump</td>
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PUMP FEATURES & KEYS
The McKinley T34 Syringe Pump System can be operated with any extension set with a luer connection however, it is recommended that the proprietary McKinley Medical sets are used. This optimizes system accuracy, performance and to ensure that the line, when connected to the syringe, will fit the lockbox.

- Identify set to be used
- Prime manually
- Line safety features available? – Anti free-flow/Siphonage

**WARNING:** Never connect to the patient before loading the syringe into the pump.
To fit or change the battery, slide the compartment cover at the back of the pump. Push the battery into the compartment taking care to ensure that the + / - contacts are aligned as shown on the label inside the compartment. Slide the cover back on.
SYRINGE SELECTION

• The McKinley T34 is programmed to recognize most commonly used syringe brands from 2 to 50 ml.
• Luer lock syringes MUST be used to ensure secure connection of the giving set.
• Common syringe makes and sizes that can be used with the pump are contained in the pump “library”

NOTE: It is not be possible to administer the full capacity of some larger syringes. Around 24ml can be administered from a 30ml BD syringe and 35ml from a 50ml BD syringe.
1. POWER UP & PRE-LOADING SEQUENCE

• Prior to powering up the device, ensure no syringe is loaded and barrel arm is down.
• To power up, press ON/OFF key.
• Screen displayed during pump Self Test shows (1) Pump model name, (2) Software version & (3) Pump ID (default ‘Syringe Pump’ but can be configured to local ID requirements e.g. asset no. or user site.
• The display will indicate PRE-LOADING and the actuator will start to move. Wait until it stops moving and the LOAD SYRINGE flashing screen appears
• During pre-loading a Settings summary screen is displayed showing key locked parameters that may be appropriate to/restrict the programming of the pump.
• NOTE: During Pre-Loading the actuator returns to the start position of the last infusion programmed.

• If the user regularly uses the same syringe brand, size and fills to the same volume the actuator will return to the correct position each time & not require adjustment.

• If the actuator is not in the required position to accommodate the syringe leave the barrel clamp arm down and use the FF or BACK keys to move the actuator to the required position (hold the syringe above the device to gauge the correct location).

• Forward movement of the actuator is limited for safety reasons so repeated presses of the FF key may be required. Backwards movement is not restricted.
2. SYRINGE PLACEMENT

- The syringe graphic on the Load Syringe screen flashes in three places, lift the barrel clamp arm and load the syringe into the pump.
- First position the flange/collar and plunger simultaneously. As you correctly seat each point of the syringe note that the flashing indicator for that sensor becomes solid on the display.
- Finally lower the barrel clamp arm to sit on top of the syringe barrel. If the syringe is correctly loaded the graphic (right) will become solid (no flashing components) and the pump will display the Size and Brand of the syringe detected.
- Check the LCD display to ensure that the Pump has correctly identified the syringe size and brand.
NOTE: If the syringe brand displayed is not correct use the UP or DOWN arrow keys to scroll between brands of similar dimensions. This will only happen if the syringe selected has dimensions within +/-1mm of another commonly used brand that has not been disabled.

Press YES/START key to confirm the displayed syringe brand is correct. If the pump was stopped and turned off before the last program reached “End programme” the Resume prompt screen will appear (e.g. if, during an infusion, the pump was powered off to change the battery).

- Press NO to continue programming the new regime.
- Press the FF key to access purge function.

FROM THIS STAGE THE SEQUENCE THAT DISPLAYS WILL DEPEND ON THE PROGRAMMED SET-UP OF THE PUMP: Lock on, Lock off or Rate mode
LOCK ON SET UP

Once the syringe brand & size are confirmed the pump calculates and displays the Summary Screen, which shows the Volume (To Be Infused), Duration and Infusion rate.

WARNING: ALWAYS TAKE TIME TO CHECK THE CONTENTS OF THE SUMMARY SCREEN MATCH THE PRESCRIPTION BEFORE STARTING INFUSION

• Press YES/START to confirm acceptance of the pre-set programme, Lock ON.

• Pump prompts START INFUSION? Check giving set is attached to patient access device and the clamp is released. Press YES/START to commence infusion

• Whilst infusing the display shows: Infusion time remaining, infusion rate and the bottom line will alternate between Syringe Size & Brand and a delivery animation to indicate the pump is running (in case the LED indicator on the keypad has been disabled to conserve battery life).
RECOMMENDED CHECKS DURING INFUSION

It is recommended that procedures are established for regular checks on the progress of the infusion. Patients, relatives or other carers, as well as medical staff, should be made aware of a few simple checks that can be made. These are to confirm the following: -

✓ CHECK THE LCD DISPLAY to confirm the pump is still running at the same infusion rate as originally set (unless the Titration option has been enabled and the user/patient has been authorized to adjust the rate within the programmed limits)

✓ CHECK THE GREEN LED IS FLASHING AND/OR “<<<<<<Pump Delivering” animation appears intermittently on the bottom line of the LCD display (green delivery LED can be disabled or the interval lengthened to preserve battery life)
ALARMS & ALERTS

Alarm

When an alarm is activated, the infusion stops and:
- An audible alarm is activated
- A message appears on the display indicating the cause
- The LED indicator turns red

Alert

Alert is activated for “Near End” of battery and infusion
- When an alert is activated, The infusion continues and:
  - An audible alarm sounds for a short time
  - A message appears on the display and continually alternates with the normal running screen until the infusion is completed.
# Alarm & Alert Screens/Troubleshooting

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<tr>
<th>Screen</th>
<th>Possible Cause</th>
<th>Implication/Action</th>
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<tbody>
<tr>
<td><strong>Press YES to Resume</strong>&lt;br&gt;NO for New Programme/New Syringe</td>
<td>Something has occurred which has interrupted the current programme (e.g. syringe displaced/power failure) so the device is prompting the user to their intention.</td>
<td>Pressing “YES”: Will continue current, interrupted infusion. Check/confirm infusion summary screens and press YES to restart current infusion. **Pressing “NO”: Will Programme a new infusion, e.g. new syringe and/or new patient. The pump will calculate the volume of the syringe and based on duration required will start a new programme.</td>
</tr>
<tr>
<td><strong>Low Battery</strong></td>
<td><strong>Alert</strong> Battery is almost depleted</td>
<td>Prepare to change battery</td>
</tr>
<tr>
<td><strong>Near end/Nearly empty</strong></td>
<td><strong>Alert</strong> Infusion will end soon</td>
<td>Prepare to change syringe or turn pump off</td>
</tr>
<tr>
<td>Pump paused too long Confirm, Press YES</td>
<td>Pump has been left in STOP mode (on hold) for 2 minutes</td>
<td>Either: Start the infusion, continue pause or turn the pump off</td>
</tr>
<tr>
<td><strong>End Battery</strong></td>
<td><strong>Alarm</strong> Battery is depleted</td>
<td>Change battery</td>
</tr>
<tr>
<td><strong>End Program</strong>&lt;br&gt;Press YES to Confirm</td>
<td><strong>Alarm</strong> Infusion is complete</td>
<td>Close down or start new infusion (Pump will default to KVO program me if set)</td>
</tr>
<tr>
<td>Syringe Displaced Check Syringe Press YES to confirm</td>
<td><strong>Alarm</strong> One or more of the syringe detection sensors is not detecting</td>
<td>Check the syringe and re-seat as necessary</td>
</tr>
<tr>
<td>Occlusion/Syringe Empty Check line &amp; Syringe Press YES to Confirm</td>
<td><strong>Alarm</strong> - Patient access device blocked - Clamp on the infusion line - Tubing occluded - Pump has reached the minimum travel position</td>
<td>Flush or replace access device - Release the clamp - Clear the occlusion - Turn pump off</td>
</tr>
<tr>
<td>System Error. Press &amp; Hold INFO for details. If problem persists send pump for service</td>
<td><strong>Alarm</strong> System error</td>
<td>Pressing INFO key will display the reason for the alarm and give advice for correction, if applicable. <strong>If correction not possible:</strong> - Remove pump from use &amp; turn power off - Return to Technical Department or CME McKinley - Include explanatory note of the error code, and a brief description of the problem</td>
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CLEANING, STORAGE & SERVICING

Cleaning & Decontamination

- Pump – Lint-free cloth with warm water & mild detergent, disinfectant or 10% bleach solution
- Once a month (or as required) clean the main Pump screw thread and guiding rods with a small dry brush to remove debris or other particles.

Storage

- If to be stored for extended periods, clean device / remove battery/in a clean, dry atmosphere @ room temperature/in suitable packing for protection

Servicing

- Must be serviced by CME McKinley or a trained & certified Biomedical Technician (EBME)
NMC Code of professional Conduct

• Accountability
• Competence
• Answerable for acts and omissions regardless of advice or direction of other professionals