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Queensland Government

A practical handbook for health professionals:

How to safely set-up, commence and provide necessary documentation for the CADD™-SOLIS or CADD™-SOLIS VIP infusion pumps

CADD™-SOLIS

CADD™-SOLIS VIP

NOTE: This document describes the safe practice requirements for the use of the CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps in the administration of **CONTINUOUS SUBCUTANEOUS MEDICINES** for the management of symptoms in palliative care patients.

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Acknowledgements

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Enquiries

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Disclaimer

This handbook is intended as a guide for health professionals to assist them with safely setting up, commencing and providing necessary documentation for the CADD™-SOLIS or CADD™-SOLIS VIP infusion pump.

While the Brisbane South Palliative Care Collaborative has exercised due care in ensuring the accuracy of the material contained in the handbook, the handbook is only a guide to appropriate practice, to be followed subject to the clinician's judgement and local policy and procedures.

The Brisbane South Palliative Care Collaborative does not accept any liability for any injury, loss, or damage incurred by use of, or reliance upon, the information provided within this handbook.

Contents

Introduction

This practical handbook is part of a learning package that aims to enable health professionals to develop skills and knowledge and ultimately demonstrate competency in safely setting up, commencing and providing necessary documentation for the Computerised Ambulatory Delivery Device (CADD)™-SOLIS and CADD™-SOLIS VIP infusion pumps.

The package is relevant to all clinical settings – community, residential aged care, and inpatient.

Components of the learning package

***It is recommended that health professionals review all the following elements of the learning package prior to completing the competency checklist.**

1	A practical handbook for health professionals: *How to safely set-up, commence and provide necessary documentation for the CADD™-SOLIS or CADD™-SOLIS VIP infusion pump*	This handbook contains the essential information you need to know to safely set-up, commence and provide necessary documentation for the CADD™-SOLIS or CADD™-SOLIS VIP infusion pump.
2	Setting up and commencing a CADD™-SOLIS or CADD™-SOLIS VIP infusion pump: A step-by-step guide	This illustrated guide explains how to start a CADD™-SOLIS or a CADD™-SOLIS VIP infusion pump using a step-by-step approach.
3	Short training videos	Two videos illustrate some of the essential elements for ensuring safe delivery of CADD™-SOLIS or CADD™-SOLIS VIP pump infusions. **Video 1:** Getting to know the CADD™-SOLIS and CADD™-SOLIS VIP infusion pump
		Video 2: Starting and subsequent day set-up of the CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps
4	Online education module	The online education module aims to educate clinicians about how to safely use the CADD™-SOLIS or CADD™-SOLIS VIP infusion pump. *This module is not supported for use on a mobile phone.*
5	Competency checklist: CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps	This checklist describes the requirements for ongoing demonstration of competency for safe and effective use of a CADD™-SOLIS or CADD™-SOLIS VIP infusion pump.

Additional resources

Additional resources to support the use of the CADD™-SOLIS or CADD™-SOLIS VIP infusion pump are available at www.pallconsult.com.au for:

Organisations:

- Example policy and procedures – Using a CADD™-SOLIS infusion pump
- Community Subcutaneous Medication Infusion order (over 24 hours)

Families:

- Information sheet for families

Assumed knowledge

Infusion pumps are used in palliative care to deliver medicines subcutaneously to help manage symptoms and keep a person as comfortable as possible. As part of the clinician's role in caring for a person in a palliative care setting, the following knowledge is assumed:

- Principles of Quality Terminal Care
- End of Life Care in Residential Aged Care Facilities: pharmacological symptom management
- The goals of palliative care
- Common palliative care symptoms
- How to assess a patient's symptoms
- Common medicines used in palliative care
- Community-based Palliative Care Anticipatory Medicines: Guidance for Queensland
- Guidelines for the handling of palliative care medicines in community services, (Version 2, 2020)

Competency

To demonstrate competency in the safe use of a CADD™-SOLIS or CADD™-SOLIS VIP infusion pump, a health professional needs to:

- Complete the online education module and generate a Certificate of Completion
- Complete the competency checklist.

Further information

The manufacturers of the CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps have a comprehensive instruction manual if more detailed information is required.

- www.medonegroup.com
- www.smiths-medical.com[1]

About infusion pumps

An infusion pump is a portable battery-operated device that delivers medicine at a constant rate over an extended period (usually 24 hours) to maintain a steady blood level of the medicine.

The infusion pump delivers medicine through a system including:

- **A subcutaneous cannula** – Placed in the subcutaneous tissue and held in place by a clear dressing
- **An extension set –** The subcutaneous cannula is connected to the infusion pump via a variable length of sterile tubing often called an extension set
- **The medication cassette –** The extension set is attached to a cassette which can contain various medicines as prescribed by a doctor or nurse practitioner for symptom control.

The infusion pump then infuses the medicine at a continuous rate through the extension set and subcutaneous cannula under the person's skin. The medicine can then be absorbed into the body.

Why are infusion pumps used?

Continuous subcutaneous infusion of medicines administered using an infusion pump is a common and accepted practice in palliative care. It can assist with pain and symptom management when other routes of administration are inappropriate or ineffective. The use of infusion pumps, particularly in the last days of life, has made a significant contribution to ensuring a dying person's comfort. [2,3]

What are the advantages of infusion pumps?

Infusion pumps are:

- Portable
- Suitable for all clinical settings
- Pre-set to deliver medicines over a fixed time period
- Able to provide a constant level of medicine, ensuring that the plasma concentration remains at the optimum therapeutic level with no peaks or troughs
- More acceptable to the person being cared for than intramuscular or intravenous routes
- Flexible and can be used intermittently or discontinued if symptoms can later be managed by the oral route
- Protected by a hard case or pouch and lockable keypad.

What are the main indications for use of an infusion pump?

Infusion pumps are used when the administration of oral medicines is inappropriate or likely to be ineffective e.g., if the person has:

- Persistent nausea and vomiting
- Dysphagia
- Gastrointestinal obstruction
- Poor absorption of oral medicines
- Weakness and/or alteration in the level of consciousness.

About the CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps

The CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps are two types of ambulatory infusion pumps used in Australia to effectively deliver continuous subcutaneous medications in the palliative care setting. Indications for use include pain and other symptoms such as nausea, anxiety, agitation, dyspnoea and secretion management. Medication to control these symptoms can be administered via the same infusion device.

The CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps may be considered advantageous over other devices because they have the capacity to accommodate a larger total volume of infusion in comparison to syringe pumps, being available in 50mL or 100mL cassettes.

The CADD™ infusion pumps have a wide range of safety features including security settings, an auto lock function and both audible and visual alarms making it easy to identify and interpret any issues.

This handbook provides guidance for **administration of continuous subcutaneous infusions in the palliative care setting only**; the clinician and intermittent bolus and patient-controlled analgesia (PCA) functions are not covered in this handbook.

The CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps deliver infusions in millilitres (mLs) per hour.

Safety features

Safety features include:

- On-screen colour graphs and trending data, which provide immediate patient assessment and helps support the clinician at bedside
- Design features, such as:
  - Tall man/Short man lettering
  - No trailing zeroes.

Security settings and codes

Security settings are pre-set to prevent unauthorised access to certain programming and operating features.

There are three levels of security clearance, accessed via the relevant pre-set codes, which give different levels of access to the pump programming.

In this handbook, the **administrator code** is used. The administrator code gives the user the ability to change protocol ranges and all settings in the pump.

The administrator code is **921**.

Autolock feature

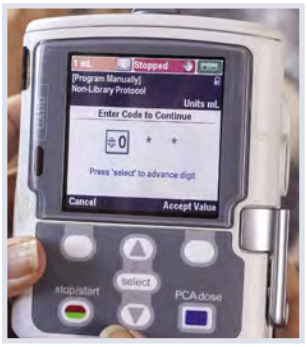
When the keypad is unlocked with a security code and left unlocked, the software will automatically re-lock the keypad.

The time until lockout is about 30 seconds after the last key press. The pump may be unlocked using the pump key (if allowed) or by entering the three digit administrator code.

Press ▲ or ▼ to enter the code **921**.

Press select to advance to the 2nd and 3rd digits.

Once the 3rd digit is entered, select **ACCEPT VALUE**.



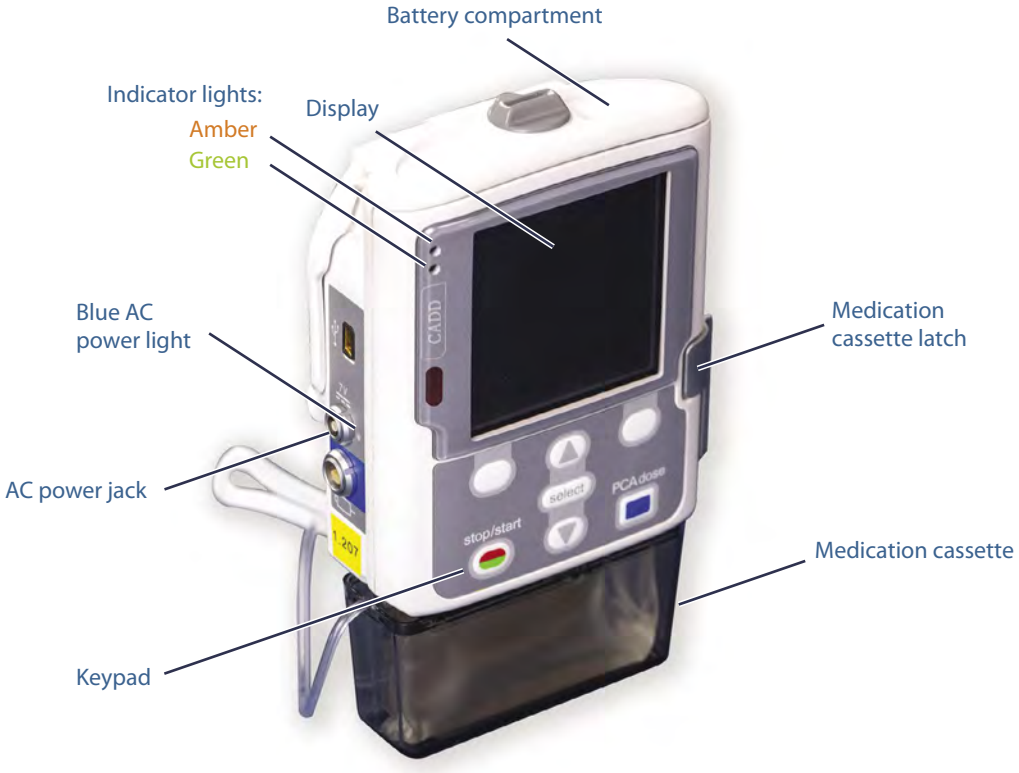
To relock the keypad from the home screen, go to the **Tasks** Menu and confirm **Lock Keypad** by pressing the soft key.

NOTE:

- **Using the pump key to unlock the keypad also unlocks the cassette latch**
- **When using the pump key to unlock the keypad, be sure to keep the cassette latch in the latched position.**

Pump diagram

Front view



Infusion pump features

CADD™-SOLIS infusion pump

Wireless communication module includes WiFi radio, antennae, and rechargeable battery pack

VIsual indication of pump status with colour-coded status bar

Support security with keypad lock status indicator

Drug protocol displayed on Protocol Bar with selected Therapy, Qualifier and Drug

Home screen displays patient-specific delivery parameters with unit of measure

Navigation with soft key interface

Secure attachment disposal with cassette latch and key lock

Eliminate numeric key press errors with scrolling keys

PCA dosing (not used)

CADD™-SOLIS VIP infusion pump

Immediate visual indication of pump status with colour-coded status bar

Drug protocol displayed on Protocol Bar with selected Therapy, Qualifier and Drug

Support security with keypad lock status indicator

Intuitive programming with step-by-step instructions on colour-coded screen

Reduce medication errors with clearly displayed infusion delivery parameters with unit of measure

Easy navigation with soft key interface

Effortless attachment disposal with cassette latch and key lock

Eliminate numeric key press errors with scrolling keys

PCA dosing (not used)

Pump screen features

1. The therapy [**Program Manually**], qualifier – **Non-Library Protocol** and Units – **mL** from the current Library protocol.
2. The status bar shows the status of the pump. It also displays messages and alerts.
3. Current reservoir volume
4. The delivery status of the pump – running, paused or stopped
5. The background colour of the screen is dependent on how the protocol is set up in the PharmGuard® Medication Safety Software. If the background screen colour is black, the pump is in manual mode
6. The type of battery being used and an estimation of the approximate amount of battery life remaining
7. Keypad lock status–locked or unlocked
8 Units of measurement and concentration (if applicable) for the drug or solution in the current protocol
9. Screen name and help text (in blue) if needed
10. TALL/short characters improve readability to avoid dosing errors
11. The contents for the displayed screen. Trailing zeros are eliminated to avoid dosing errors
12. Options for navigating the pump. These options change depending on the screen you are on and what functions you are performing with the pump

Pump status colours

The pump colours green, amber, red, and blue are used to help the clinician recognise pump status. Similar to a traffic control light: green means go, amber indicates caution, and red means stop.

- **Green:** Pump conditions are satisfactory. Green numbers in the work area indicate that a programmed value falls within a satisfactory range.
- **Amber:** There is a condition to watch, but the current pump conditions are satisfactory. Medium priority alarms and values outside soft limits display in amber.
- **Red:** There is a warning condition that requires immediate attention and the infusion has stopped. All high priority and system fault alarms display in red.
- **Blue:** Low priority alarms and informational messages display in blue.

To understand how colours relate to alarm screens, refer to pp 31 of the *Practical Handbook for Health Professionals*.

Status bar features

Pump reservoir volume

Green – acceptable volume
Amber – low volume
Red – empty (pump stops)

Delivery status

Stopped
Paused
Running

Power source

Full charge

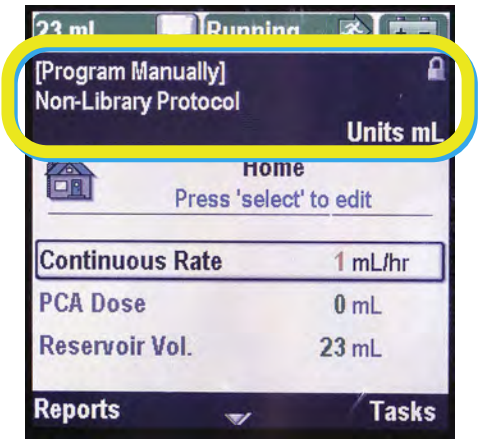
Approx 30% charge

Low charge

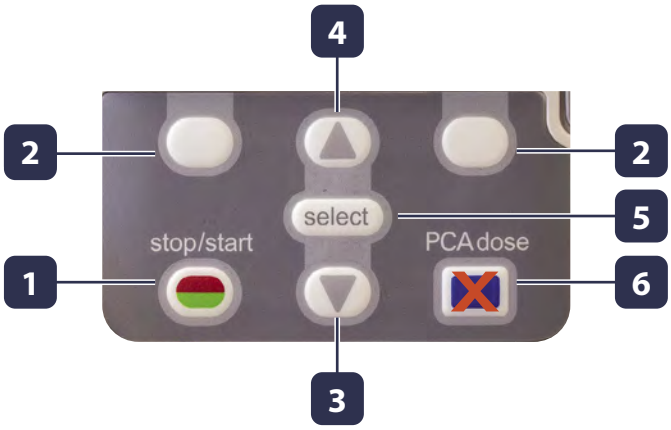
No charge, connected to AC power

Manual program screen

The screen for the manual mode is always black in colour and the therapy, qualifier, and units will appear as follows:



Keypad



1. Starts and stops pump delivery
2. Referred to as "soft keys." Allows you to answer a question on the pump's display. For example, the screen above this key may display 'Yes,' in which case pressing this key would give the question displayed on the screen an answer of 'Yes.'

   The soft keys also allow you to navigate through some of the pump's screens for example, opening the reports or tasks menus.

3. Allows you to navigate through the menus on the pump, scrolling down, or decreasing a value
4. Allows you to navigate through the menus on the pump, scrolling up, or increasing a value
5. Used to select a highlighted menu item
6. Allows the patient to request a PCA dose if the remote dose cord is not attached.

NOTE: PCA key is not used within the scope of this document

Pump display symbols

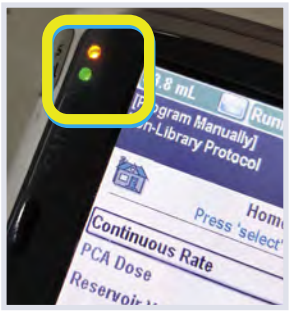
Symbol	Definition
	Reservoir volume
	Charge level of rechargeable battery pack
	Charge level of rechargeable battery pack, AC adapter connected
	Charge level of AA batteries
	Charge level of AA batteries, AC adapter connected
	Incompatible battery
	Pump status is Started or Running
	Pump status is Paused
	Pump status is Stopped
	Item highlighted in the work area is at the top of the menu. Press ▼ to scroll down
	Item highlighted in the work area is at the bottom of the menu. Press ▲ to scroll up

Symbol	Definition
	Home screen
	Keypad is locked
	Keypad is unlocked
	Appears next to a parameter that was reviewed and accepted
	On edit screens. Indicates current parameter value. Press ▲ or ▼ to scroll up or down to edit the value
	On edit screen indicates which setting is being selected
	The requested action cannot be performed
	Review screen
	Saving
	There are more items to see in the work area. Press ▲ or ▼ to scroll up or down

**The above table is adapted from the CADD™-Solis VIP Ambulatory Infusion Pump Operator's Manual (Model 2120), pp11, March 2020. Smith's Medical Pty Ltd*

Pump indicator lights

Indicator lights



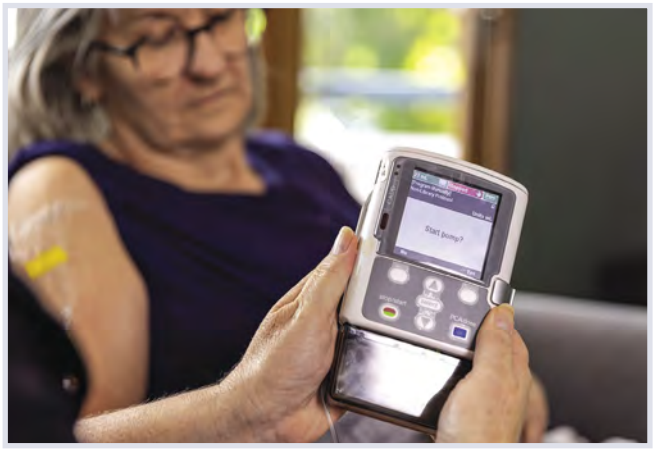
Green Flashes when the pump is running and delivering fluid as programmed.

Amber Flashes when the pump is stopped, an alarm condition exists, or the battery or the reservoir is low. It stays on continuously when the pump is inoperable.

NOTE: If both lights flash the pump is running but there is a condition that needs attention eg. low battery or low reservoir volume.

Display with backlighting

Backlighting helps keep the display panel visible in low light. After a period in which no keys are pressed, the backlighting turns off and the display goes blank to save battery power (except during an alarm or when an external power source is in use).



To turn the display back on, press any key (except the PCA dose key). The backlight intensity can be adjusted between 1-10, however this can affect the battery life.

NOTE: When the display panel is blank, you can determine that the pump is running by observing either the green or amber (or both) indicator lights periodically flashing.

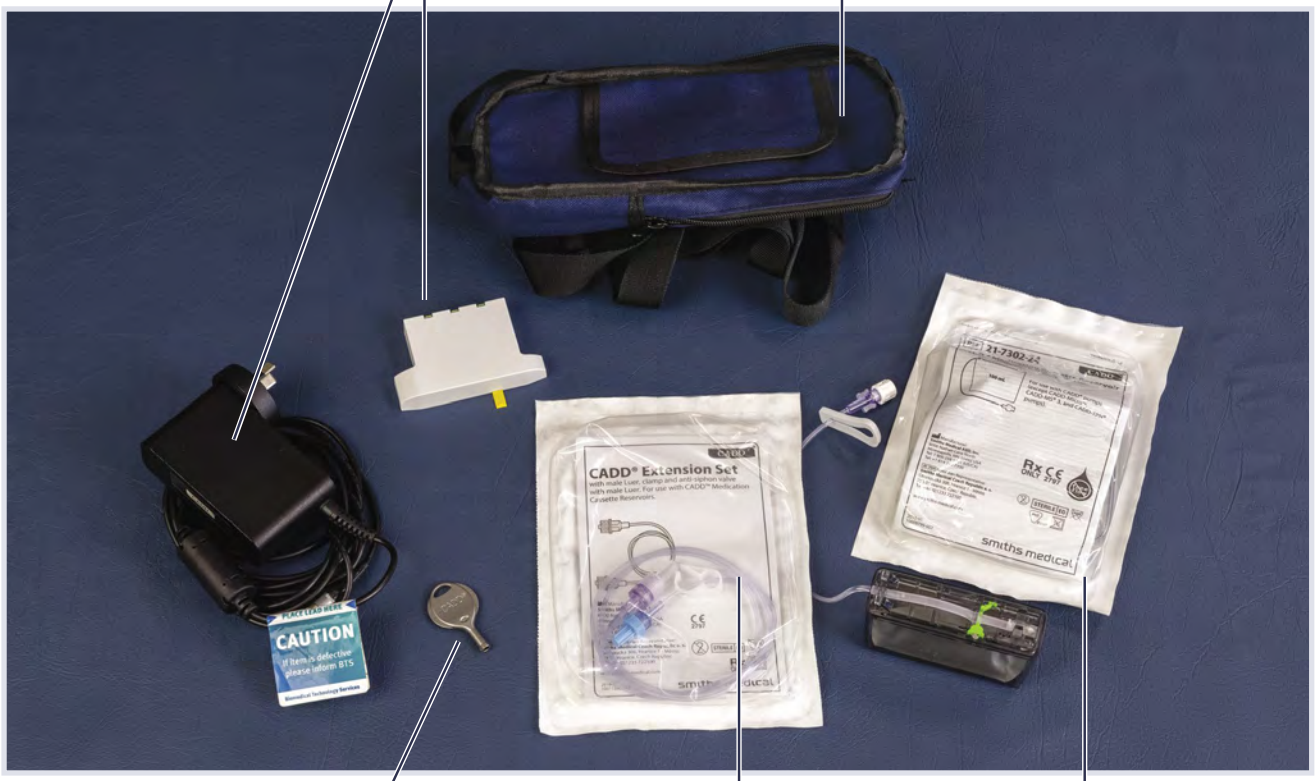
For more information, watch the video *Getting to know the CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps* available at www.pallconsult.com.au

Accessories

The following accessories are available for the CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps:

The rechargeable battery pack with AC adapter is an alternative to using four AA batteries. The rechargeable battery pack can be recharged with the AC adapter, either inside or outside of the pump.

Carry pouches are available as reusable or single use options.



The pump key is used to securely lock a cassette or administration set to the pump. It can also be used to lock and unlock the keypad, if allowed by the protocol setting.

CADD™ extension sets for use with CADD™ medication cassettes to ensure accuracy. All integrated with anti-syphon valves for extra protection against free flow of fluids.

CADD™ medication cassette

There are other accessories available that are not referenced in this handbook. More information is available at www.smiths-medical.com.

Using the CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps

General safety management principles

- Medicine is prepared as per the medicines order specified by a doctor or nurse practitioner
- In palliative care the recommended standard delivery period for a CADD™ infusion pump is 24 hours

Medicines and compatibility in an infusion pump

- Medicines used together in a CADD™ infusion pump should be checked for compatibility.
- Check medicine compatibility using the Syringe driver compatibility (safercare.vic.gov.au)[4] or with your local palliative medicine specialist.
- Medicine combinations may be compatible only at certain concentrations, therefore the concentration of each medicine in the CADD™ medication cassette should be compared with compatibility data.
- Ensure that the diluent is compatible with each of the medicines.
- Check the solution in the cassette regularly for precipitation and/or discolouration and discard the contents if this happens.
- It is not recommended to mix more than three medicines in a CADD™ medication cassette in order to minimise the risk of potential medicine incompatibility, unless on the advice of a palliative medicine specialist

Medication cassette volumes

- It is consensus-based best-practice to make the solution as dilute as possible to reduce the likelihood of medicine incompatibility and minimise site irritation. **A combined volume of 24 mL (diluent and medicine) is recommended**.
- Some medicine may cause irritation at the subcutaneous site.[3] If there is doubt about appropriate cassette volume, check with a palliative medicine specialist, a pharmacist or the clinical supervisor/ manager.
- The total volume of infusion can be increased if necessary due to increased drug volume or dilution requirements, for example, 36 mL at a rate of 1.5 mL/hr or 48 mL at a rate of 2 mL/hr.

Diluents

In Australia, sterile 0.9% sodium chloride is the first choice of diluent, however with some medicines sterile water is the recommended choice. If there is a doubt check with a pharmacist or an evidence-based infusion pump compatibility guide.

Label the medication cassette

The following details are required on the label:

- Patient name
- ID number
- Date of birth
- Medicine added
- Units/mL of medicine added
- Diluent added
- Date
- Time
- Initials of the health professional who prepared the cassette
- Initials of the health professional who checked the cassette.

Batteries

The CADD™-SOLIS and CADD™-SOLIS VIP infusion pumps require four 1.5v AA (non-rechargeable) alkaline batteries (for example, Duracell™ PC1500/MN1500, IEC LR6) or the Smiths Medical rechargeable battery pack.

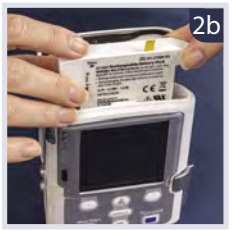
Install the batteries (or rechargeable battery pack)

1. Make sure the pump is stopped or powered off. Using your fingers, turn the dial on the battery door anticlockwise and open the battery door

2a. Place four 1.5v AA batteries in the pump

Or

2b. Insert a rechargeable battery pack into the pump as shown



3. Close the battery door and using your fingers, turn the dial on the battery door clockwise to lock.

- Always have new replacement batteries available

- When the infusion pump is turned on, a battery icon will be displayed the top right-hand corner of the screen. This indicates the approximate life of the battery.

NOTE:
- **The pump will retain all programmed information while batteries are removed.**
- **Pump will not operate without correct batteries installed.**
- **The pump will not deliver with AC power supply only; it requires installed batteries to operate, even in presence of an AC power supply.**

NOTE: DO NOT USE RECHARGEABLE NiCd or nickel metal hydride (NiMH) batteries. DO NOT use carbon zinc ("heavy duty") batteries. They do not provide sufficient power to operate the pump properly

NOTE: If you put the batteries in backwards, the pump will not power up. Check the batteries, making sure to match the + and – markings.

Charge the battery pack

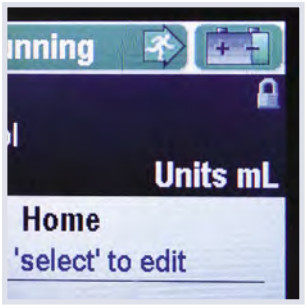
- To charge the battery pack inside the pump, plug the AC adapter into the pump.
- To charge the battery pack outside the pump, plug the AC adapter into the battery pack.

Replace the battery door

If the battery door is removed or needs replacing, simply snap a new battery door onto the bar located on the pump.

Battery life

Check the battery life



When setting up the infusion, always check that there is enough charge in the battery. The home screen shows the battery life remaining on the right-hand side of the display. The pump will alarm if battery has less than 25% of power remaining.

Alkaline battery life with screen backlight intensity set to 3:

These estimates are based on laboratory tests conducted at room temperature using new batteries (Duracell® PC1500 / MN1500, IEC LR6). Actual battery life varies depending on the battery brand, shelf life, temperature conditions, delivery rate, and frequency of screen display and backlighting.

Continuous Delivery		
Continuous Rate (mL/hr)	**Operating Time (hr)**	**Volume Delivered (mL)**
0.4	142	56
1	139	139
5	124	620
10	113	1130
30	69	2070

Rechargeable battery pack life with screen backlight intensity set to 3:

These estimates are based on laboratory tests conducted at room temperature using a new CADD™-SOLIS rechargeable battery pack. Actual battery life varies depending on the temperature conditions, delivery rate, and frequency of screen display and backlighting.

Continuous Delivery		
Continuous Rate (mL/hr)	**Operating Time (hr)**	**Volume Delivered (mL)**
0.4	74	29
1	67	67
5	60	300
10	50	500
30	40	1200

Change the battery mid infusion

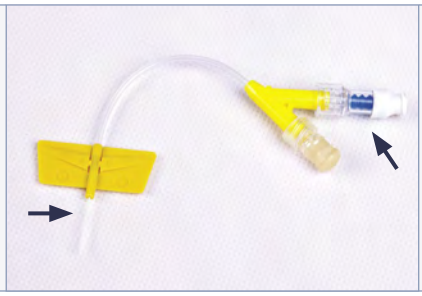
If the battery needs replacing, stop the infusion and replace the batteries. The pump has an internal battery and information will be retained. Press **NO** to start a new patient and press to start the infusion again.

CAUTION: Do not store the pump for prolonged periods with the batteries installed. Battery leakage could damage the pump.

The subcutaneous cannula

What is a subcutaneous cannula?

A thin plastic tube that is inserted by the health professional under the person's skin



A Y-arm that has a needle-free connector where the medicine is given

A subcutaneous cannula is a device that allows medicines to be given under the skin avoiding the need for lots of needles that can be painful. The medicines are then absorbed into the body via the small blood vessels in the fatty layer of the skin.

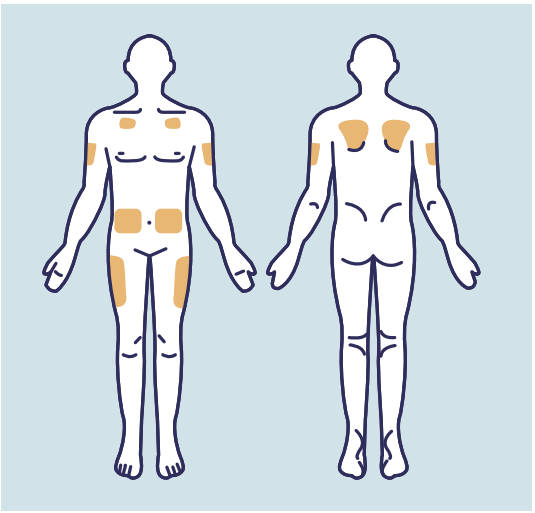
Each cannula has two ends, as shown in the picture.

Selecting a site for subcutaneous cannula insertion

The common sites for subcutaneous cannula insertion are shown in the image.

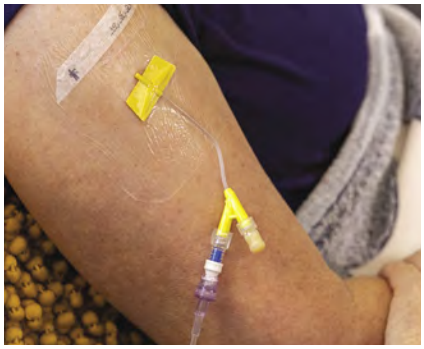
Consider the following when selecting a site:

- Site preference of the person
- The availability of subcutaneous tissue, patient mobility and pressure care needs
- Avoid bony prominences, areas of broken skin or infection, recently irradiated areas, tumour sites, skin folds, scarred areas, joint proximity, areas of poor circulation, ascites, oedema and lymphoedema, or areas of compromised lymph drainage (e.g. mastectomy)
- Whether the patient is ambulatory, agitated and/or distressed
- The chest or the abdomen is generally the preferred site, specifically the upper, anterior chest wall above the breast but away from the axilla. This site is preferred because it is easily accessible, rarely oedematous, and permits easy inspection by the caregiver
- If the patient is cachectic the abdomen may be a more appropriate site. The upper arm can be used, but it makes it difficult for a patient to lie on their side and may lead to problems such as bruising.
- If a patient is distressed or agitated, the area around the scapula may be useful to prevent dislodgement.



Care of the subcutaneous site

- Assess infusion site every four hours in an inpatient facility and daily in community setting
- Only change subcutaneous sites when required e.g., if red, hard, swollen, bleeding, leaking or painful as these factors hinder absorption
- Review frequency of site changes if patient is at risk of infection due to immunosuppression
- Use new tubing for each re-siting.



Inserting a subcutaneous cannula: *A step-by-step guide*

caring @home
Symptom management for palliative patients

PLEASE NOTE: This step-by-step guide was specifically produced for non-paid carers looking after a person who has chosen to be cared for, and to die at home, if possible. For resolution of detail in the photographs no personal protective equipment (PPE) was worn. Please follow the local policy and procedures regarding the insertion of a subcutaneous cannula and wearing of PPE.

More information is available from **www.caringathomeproject.com.au**

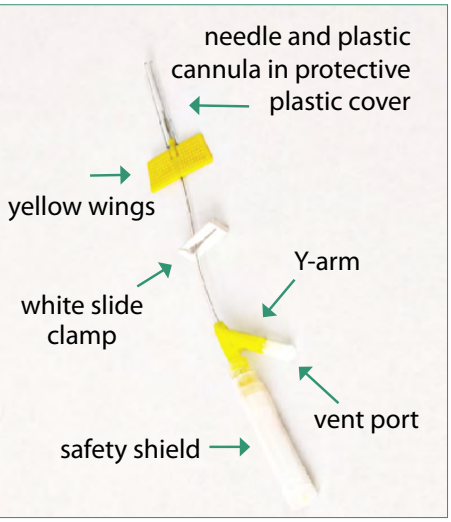
STEP 1
Wash hands with soap and water and dry them well

STEP 2
Collect the following items:

- A clean plastic container to put equipment in
- A subcutaneous cannula
- A transparent waterproof dressing
- An alcohol wipe or similar
- A smart-valve connector
- A sharps container
- A rubbish bag or bin

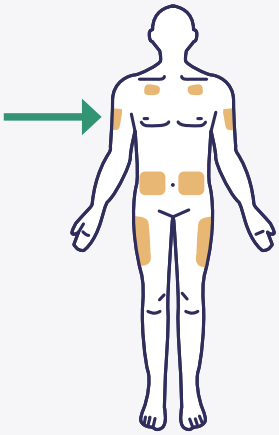
STEP 3
Prepare the cannula

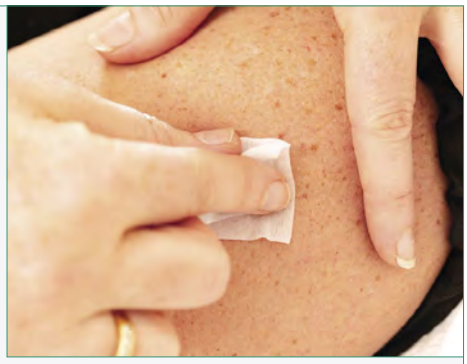
- Open the cannula packet keeping it in its clear case
  - Remove the white slide clamp
  - Rotate the safety shield tube 360 degrees clockwise to make sure that the needle moves freely in its protective plastic cover
  - Remove the plastic vent port from the Y-arm
  - Open the smart-valve connector packet, remove the clear plug and screw the connector onto the Y-arm until it is tight
  - Place the cannula into the plastic container
- Open the transparent waterproof dressing packaging and place the dressing in the plastic container
- Put the alcohol wipe in the plastic container



STEP 4
Prepare to insert the cannula

- Select a site to insert the cannula
- Use the alcohol wipe to clean the skin

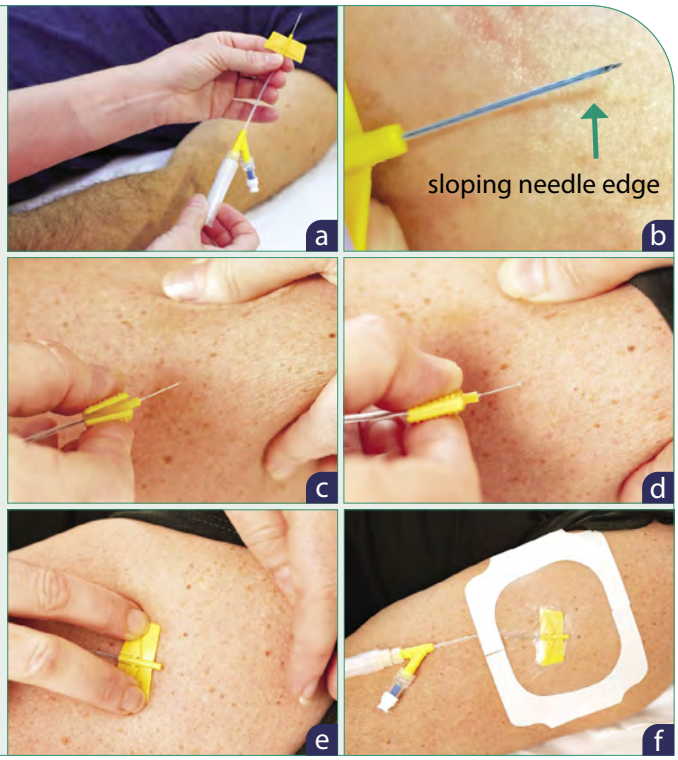




STEP 5

Insert the cannula

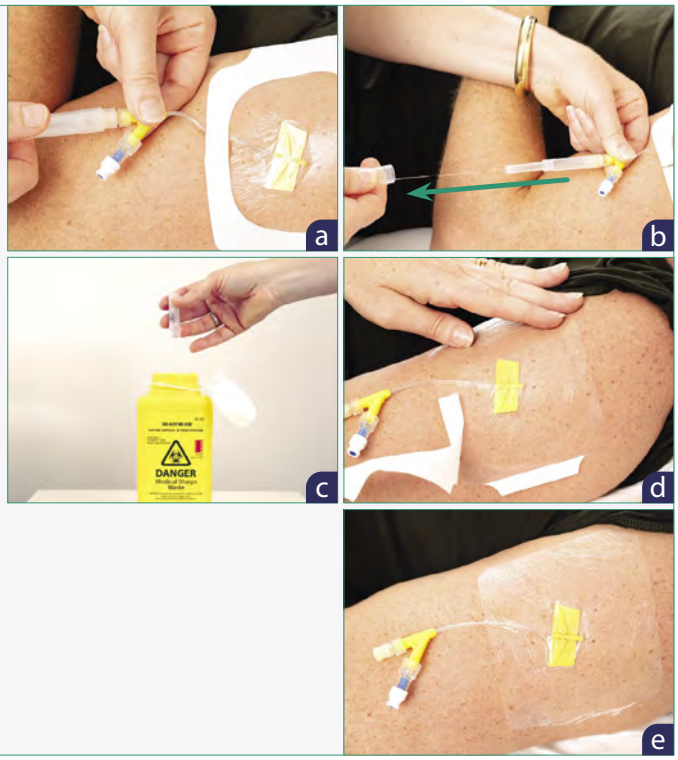
- Peel the printed backing off the transparent waterproof dressing and leave it sticky side up
- Remove the protective plastic cover from the cannula needle and plastic tubing **(a)**
- Use the white safety shield to rotate the needle so that the sloping edge is on top **(b)**
- Gently gather the person's skin between your thumb and fingers and hold it firmly **(c)**
- Using your other hand, lift the edges of the yellow wings of the cannula so that the raised triangles on the wings come together **(c)**
- Hold the wings together and push the needle and plastic tubing into the skin, at a 45-degree angle until the whole needle is under the skin **(d)**
- Flatten the yellow wings against the person's skin **(e)**
- Stick the transparent dressing over the needle entry site, making sure that it also covers the flattened yellow wings of the cannula. **This is important to hold the cannula in place. (f)**



STEP 6

Set up the cannula

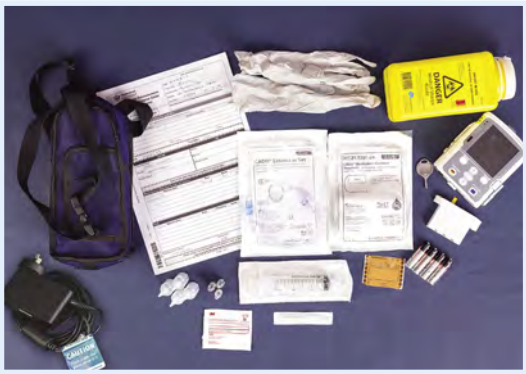
- Hold the yellow Y-arm firmly in one hand. **This is important, otherwise you may pull the plastic tubing out of the person, instead of just the needle**. **(a)**
- With your other hand, pull back **in a straight continuous motion** on the loosened white safety shield until the safety shield and needle separates from the cannula **(b)**
- Discard the safety shield with its needle into the sharps container **(c)**
- Remove the white backing, if present, from the outer edge of the dressing and smooth the edges onto the person's skin **(d)**
- Check the needle entry site to ensure the plastic tubing has stayed under the skin **(e)**
- Write the insertion date on the waterproof dressing.



Setting up and commencing a CADD™-SOLIS or CADD™-SOLIS VIP infusion pump: A step-by-step guide

- This guide assumes that a subcutaneous cannula has already been inserted into the person.
- All volumes and rates shown in this step-by-step guide are examples only.
- This guide is relevant for use with a CADD™-SOLIS or CADD™- SOLIS VIP infusion pump.

Equipment



- CADD™-SOLIS VIP pump
- CADD™ medication cassette 50 mL (single use item – replace every reload)
- CADD™ extension set (replace when medicines order changes)
- 4 x AA batteries or a CADD™ rechargeable battery pack
- 30 mL Luer Lock syringe
- A 'Medicines added' label
- The medicines order from the prescriber
- Medicine ampoules
- Alcohol wipe
- Diluent (30 mL)
- Blunt drawing up needle
- Sharps container
- Gloves and personal protective equipment (PPE) according to local policy and procedures
- A carry pouch or holster for the CADD™-SOLIS VIP infusion pump

Procedure

1. **Install the batteries or rechargeable battery pack**
   - Ensure the pump is either stopped or turned off.
   - Turn the dial on the battery door anticlockwise to open the battery door.
   - Insert 4x AA batteries OR rechargeable battery pack
   - Close battery compartment door and lock by turning dial clockwise

NOTE: The pump will retain all programmed information while batteries are removed. Pump will not operate without correct batteries installed. Pump will not deliver with AC power supply only; it requires batteries installed to operate, even in presence of an AC power supply.

2. Complete a 'Medicines added' label

3. Prepare the medicine

- Attach the blunt drawing up needle to the Luer Lock syringe and draw up medicine, as per the medicines order
- Fill the syringe to 24 mL total volume of medicine and diluent
- Replace the needle cap

CAUTION: DO NOT attach extension set to the subcutaneous cannula yet.

4. Fill the CADD™ medication cassette

NOTE: This should be a clean/aseptic technique.

- Open the cassette packet
- Leave the blue clip on the cassette until ready to latch it to the pump
- Remove the white protective cap from end of tubing
- Connect the Luer Lock syringe containing the medicine to the end of the tubing
- Tilt the cassette and fill slowly with the medicine diluent mix. When all the fluid is inserted, clamp the line. Gently tap the cassette to collect air at the outlet point (circled)
- Open the clamp and suck out any air bubble with the syringe
- Re-clamp the line

5. Attach the extension set

- Disconnect the Luer Lock syringe and attach CADD™ extension set using the end with the blue cap
- Label the medication cassette clearly with the completed 'Medicines added' label
- Dispose of all rubbish

NOTE: Pump will not prime the line if tubing is incorrectly attached, as it contains an anti-syphon valve. Correct configuration is blue end to the medication cassette and purple end to the patient.

6. Turn on the infusion pump

Press and hold the power switch to turn the pump on.

- The pump starts the power sequence during which it performs various self-tests and tests for alarm conditions
- After the power up is completed, listen for the Morse Code "OK" sound (a series of six audible beeps). If you do not hear this sound, there may be a problem with the audible alarms. Contact the manufacturer
- If any issues are found while the pump is starting, alarms will sound. Read the *Practical Handbook for Health Professionals* for more information about alerts and alarms

7. Attach the CADD™ medication cassette to the infusion pump

a. Remove the blue clip from the top of the cassette

b. Check that the tubing is clamped

c. Ensure the pump is unlocked (using the pump key) and open the cassette latch

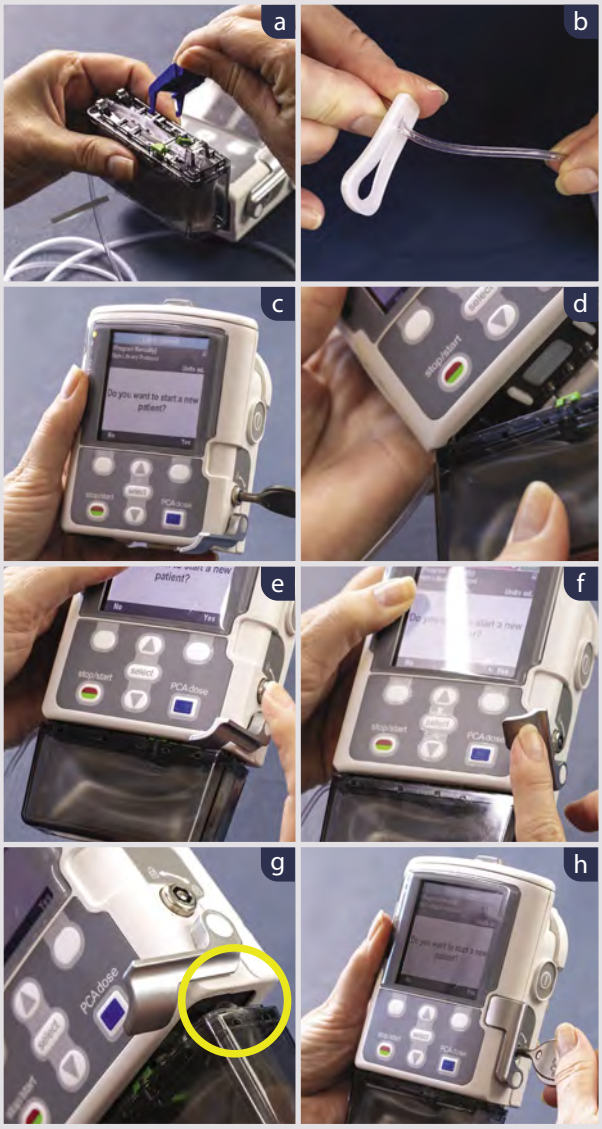
d. Insert the cassette hooks into the hinge pins on the underside of the pump

e. Place the pump upright on a firm, flat surface, and then press down on the latch side of the pump until the cassette firmly clicks into place

f. Lift the cassette latch into the closed position. You should be able to move the latch into the closed position with minimal to no resistance

g. Verify the cassette is attached correctly. The top of the cassette should line up evenly with the bottom of the pump and be securely attached. A message will appear in the status bar to confirm proper attachment

h. To lock the cassette, insert the pump key into the cassette/keypad lock and turn it clockwise into the locked position. 'Cassette Locked' appears briefly in the status bar



NOTE: The cassette must be locked to prime the extension tubing and to start the pump

TROUBLESHOOTING

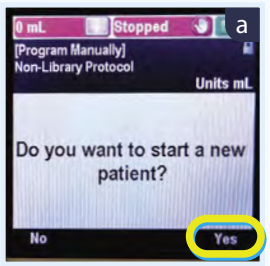
- If you experience resistance when lifting the cassette latch, DO NOT FORCE the latch as this can damage the pump.
- If the cassette is attached incorrectly, there will be an uneven gap between the cassette and the pump, with the gap appearing on the latch side of the pump. If an uneven gap exists, unlatch the cassette, and repeat the process.
- If you are unable to attach the cassette to the pump with minimal to no resistance, the cassette is not in the proper latching position; unlatch the cassette and repeat the process. If you are unsuccessful, do not use the pump and contact the manufacturer for further assistance.

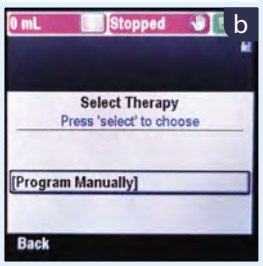
8. Program the infusion pump and review the infusion settings

WARNING: This step-by-step guide refers to the **MANUAL OPERATION MODE ONLY** of the CADD™-SOLIS VIP infusion pump. The manual operation mode does not contain programming limits. Carefully review each parameter to ensure it accurately matches the medicines order.

a. Once powered-up the pump displays **Do you want to start a new patient?**
– Confirm by pressing the soft key under **YES**

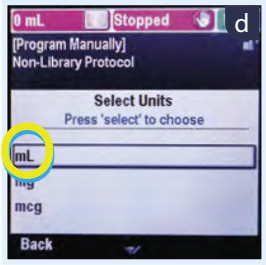
b. From the Select Therapy menu select **[Program Manually]** and press select



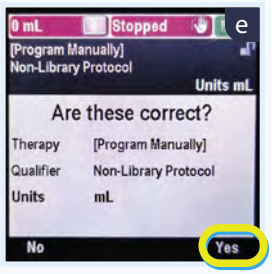


c. Enter the manual code 921 by pressing ▲ or ▼
– Press select to advance to 2nd and 3rd digits
– Once the 3rd digit is entered, press select

d. From the **Select Units** menu select **mL** and press select

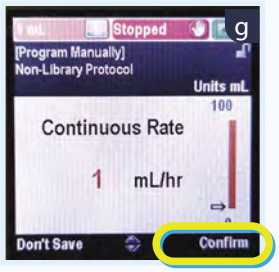


e. The pump screen will display
Are these correct?
Therapy **[Program Manually]**
Qualifier **Non-Library Protocol**
Units **mL**
– Verify the chosen protocol by pressing **YES**

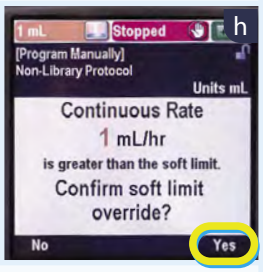


f. Once the pump has programmed this information, the pump will then prompt you to review the settings. Select **REVIEW**

g. The screen displays **Continuous Rate**
– Press select to change the rate
– Press ▲ until the rate shows 1 mL/hr –
– Press **Confirm**

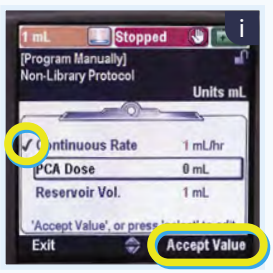


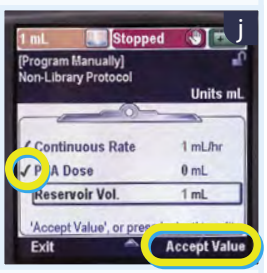
h. The Screen will display **Confirm soft limit override?** Press **YES**
– The pump will save this information



i. Press **ACCEPT VALUE** to confirm the rate. A green tick will appear

j. The pump automatically moves to **PCA Dose 0 ml**. This function is not used in this guide
– Press **ACCEPT VALUE** to confirm. A green tick will appear

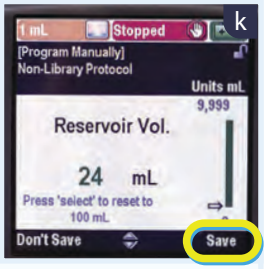




k. The pump automatically moves to **Reservoir Vol**. Press (select) to edit the volume

– Change the volume to 24 mL by pressing (▲), then press **SAVE**
The pump will save this information

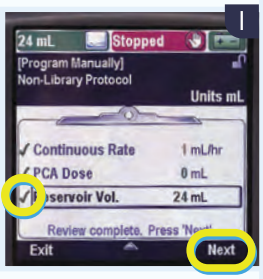
– Press **ACCEPT VALUE** to confirm. A green tick will appear



l. The pump screen will display:

Continuous Rate	**1 mL/hr**
PCA Dose	**0 mL**
Reservoir Vol.	**24 mL**

– The review is complete; select **Next** to continue

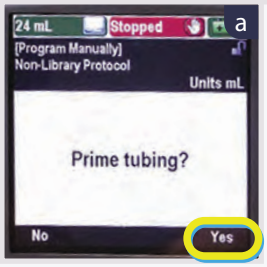


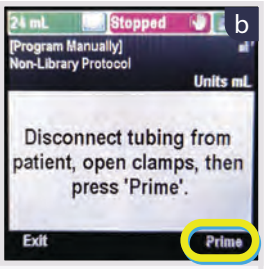
NOTE: Once the pump is programmed, if the cassette is not attached a prompt on the screen will display:
'Cassette not attached. Attach the cassette before starting pump'.
Attach a filled medication cassette and lock the pump using the key.

9. Prime the extension set tubing

Priming fills the tubing downstream of the pump with fluid, removing any air bubbles.

- Prime the tubing before connecting it to the patient's subcutaneous cannula
- The pump must be stopped and the clamp open





To prime the extension set tubing:

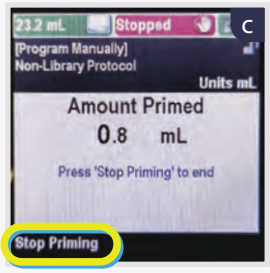
The pump displays the screen: **Prime tubing?**

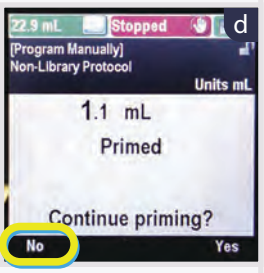
a. Select **YES**

b. Pump screen prompts-:

Disconnect tubing from patient, open clamps, then press 'Prime'

– Select **PRIME**





c. The pump will start priming the extension set tube. Prime the tube with approx. 1 mL of medicine or until some drops of fluid come out of the extension tube. Once this occurs, select **STOP PRIMING**

d. When pump prompts **Continue Priming?** select **NO** if the priming is complete and re-clamp the line.

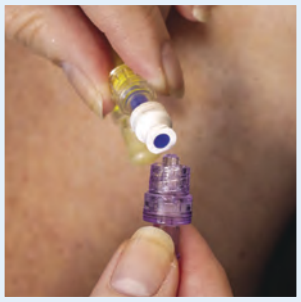
NOTE: If the cassette is not locked the screen will display:
Cassette not locked. Lock cassette before starting pump
Lock the cassette using the pump key

NOTE: Because you have primed the extension set with approximately 1 mL of volume, the pump will not run for a full 24 hours. It will finish approximately one hour early. This will only occur on day 1 of the infusion. On subsequent days, the pump will run for the full 24 hours.

NOTE: On subsequent days, the extension set will not need to be primed

10. Take the pump to the person's bedside

- Wash hands and don PPE as required
- Use an alcohol wipe to swab the end of the subcutaneous cannula
- Remove the cap from the purple end of the extension set and connect it to the person via the subcutaneous cannula

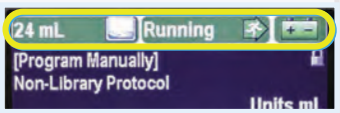


NOTE: Use a separate subcutaneous cannula for breakthrough doses

11. Start the pump

NOTE: Before starting the pump:

- Ensure correct protocol and patient specific parameters are displayed.
- Check that the clamp is open, the extension tubing is primed, and the pump is connected to the patient according to your facility's policy and procedures.



- Pump will prompt **Start pump?** If ready to start the pump, select **YES**
- The pump will start delivering medicine to the person
  - When the pump is running, **Running** appears with green highlighting on the centre of the status bar and the green indicator light flashes
  - Left-hand side of screen will display **[Volume to be Infused]** in mLs
  - Right-hand side of screen will display **[Battery Remaining]**

- If you are not ready to start the infusion, press stop/start and the pump will remain on standby until you are ready to start
- Press to start the infusion
- If the pump does not start, a message appears on the display. Refer to the *Practical Handbook for Health Professionals* for more information

12. Place the infusion pump in a holster (or lockbox) if needed

The pump can be stored beside the person or carried in the holster if the person is ambulatory.

13. Complete documentation according to local policy and procedures

14. Monitor the infusion pump

Monitor the infusion over time as per your facility's policy and procedures.

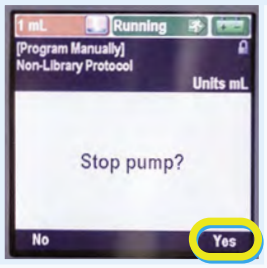
- Check the status bar to confirm correct volume is in the cassette reservoir, the pump is running and sufficient battery life remaining
- Check the screen to confirm the pump is still running at the same infusion rate as originally set
- Check for signs of physical damage to the infusion pump and accessories

a. When a medication cassette is nearly empty:
The pump will sound an alarm

b. When a mediciation cassette is empty:
The pump will stop automatically and an alarm will sound

Subsequent infusions

Follow this procedure to remove the empty medication cassette, attach a new medication cassette and start a subsequent infusion.

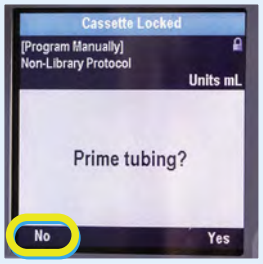


a. Press (Stop) Pump displays **Stop pump?**

b. Press **YES**. Pump displays **Pump is stopping**

c. Clamp the medication cassette tubing

d. Unlock the pump with the pump key, pull down the cassette latch and remove the empty cassette from the pump. **Cassette Unlocked** briefly appears in the status bar



e. Disconnect the empty medication cassette from the person's subcutaneous cannula extension set. Attach a new, filled medication cassette to the extension set and un-clamp the tubing

f. Attach the new medication cassette to the pump. Lock with the pump key

g. Once the new cassette is attached and locked, the pump displays **Prime tubing**

NOTE: If the extension set is already primed, select NO. The infusion will now run for 24 hours because the extension set is already primed.

NOTE: If the extension set is not primed, follow the procedure to prime the tubing.

CAUTION: If the medicines order has changed, connect a new extension set and prime it before connecting to the person's subcutaneous cannula.

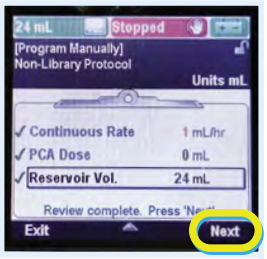
h. The pump will display **Reservoir volume low. Set Reservoir Volume?** Press **YES**

i. The screen displays a reservoir volume. Use (▼) or (▲) to adjust the volume to 24 mL

j. When the reservoir volume is correct, press **SAVE**. The Pump displays **Reservoir volume…..saving**, then **Review pump settings**

k. Press **REVIEW**, then check the patient specific parameters and **Accept Value** on each parameter

l. When you have finished the review, press **NEXT** to continue



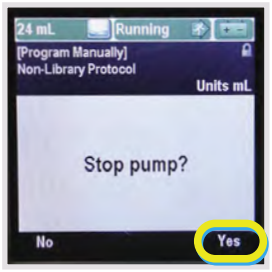
m. The pump displays **Start pump?** Press **YES**. The pump will start delivering medicine to the person

n. Monitor the infusion and pump as per your local policy and procedures

Stop an infusion

If the infusion needs to be stopped for any reason:

- Press
- **"Stop Pump?"** appears on the screen, select **YES**
- The pump then stops the infusion
- The status bar indicates the pump is stopped
- The indicator light changes from green to amber



Alerts and alarms

The alarm volume can be adjusted to low, medium or high.

Alerts – an alarm will sound intermittently, the infusion will continue, a message appears on the display screen indicating the cause. This message then alternates with the normal Infusion Running screen.

Alarms – *alarms are differentiated by colour, sound, and text*
An alarm will sound continuously, the infusion will stop, the LED light turns red, and a message appears on display screen indicating the cause. The CADD™-SOLIS pump has four categories of alarms:

- **High priority (red) alarm** – if the pump is running, it will always stop when this alarm is activated. The screen will appear red. When an alarm occurs, select **SILENCE** to quiet the alarm or **Stop pump?**. Alarm will sound again after two minutes if condition not corrected.

  The alarm will continue until it is acknowledged or until the problem is resolved.
- **Medium priority (amber) alarm** – the pump will continue to run when activated. The screen will appear amber. When an alarm occurs, select **SILENCE** to quiet the alarm or **ACKNOWLEDGE**. Alarm will sound again after two minutes if the condition is not corrected. This alarm will continue until it is acknowledged or until the problem is resolved.
- **Low priority (blue) alarm** – the pump will continue to run when activated. The screen will appear blue. This alarm will automatically clear after 5 seconds or until the problem that triggered it is resolved.
- **Informational** – the pump does not stop if it is running. The message appears blue in the status bar. Generally silent, the message will persist for five seconds, requiring no acknowledgement.

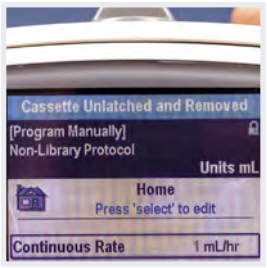
Examples of alarms

High priority
red

Medium priority
amber

Low priority
blue

Informational



Alarm help screens

Additional information may be displayed when certain alarms occur:

- When an alarm occurs, select **SILENCE** to quiet the alarm or **ACKNOWLEDGE**
- If help screens are available for the alarm, **HELP** appears above the right soft key. To view the help screens, select **HELP**
- When the issue is cleared, an informational alarm will appear in the status bar

Alert and alarm troubleshooting

Issue	Possible solution
A continuous two-tone alarm is sounding, and the amber light is flashing	The infusion has stopped. Read the message on the display and refer to the list of messages in the table below. If the display is blank or contains random characters, the AA batteries or the rechargeable battery pack may be depleted. Install 4 new AA batteries, a fully charged battery pack, or attach an AC adaptor to charge a rechargeable battery pack.
The pump is sounding persistent audible beeps, and the amber light is flashing	Look at the message on the display and refer to the list of messages in the table below.
Three beeps sound every 5 minutes	This may be a reminder that the pump is stopped.
After installing 4 new AA batteries and powering up the pump, no screen appears and no beep sounds	The batteries may be installed incorrectly. Review the procedure for installing batteries. Be sure to match the polarity (+ and –) markings inside the battery door with the markings on the batteries. If there is still no power, the batteries may be completey depleted. Install 4 new AA batteries.

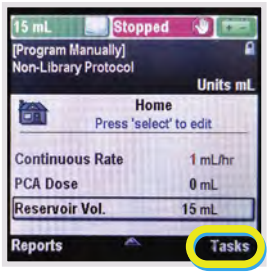
Screen message alert	Alarm priority	Implication/Action
Screen: 'Air in line detected'. Alarm and amber light.	high	Press **ACKNOWLEDGE** to silence the alarm Before clearing the air from the tubing, clamp the tubing and disconnect from patient Remove the air using **Prime Tubing** on the **Tasks** menu, then reconnect to the patient
Screen: blank Alarm is sounding.	high	The pump has lost power and is no longer delivering, because the batteries were removed or the battery door was opened. Clear alarm by replacing batteries or closing the battery door, then turn pump back on. Note: alarm will stop after the power has been off for two minutes

Screen message alert	Alarm priority	Implication/Action
Screen: 'Battery depleted. Pump stopped'. Alarm and amber light.	high	If AC adapter is attached, select ACKNOWLEDGE to clear the alarm. Remove the batteries and install four new AA batteries or a fully charged battery pack. To start delivery, good batteries must always be installed even when an external source of power is connected. If appropriate, restart the pump.
Screen: 'Reservoir volume is zero. Pump stopped'. Alarm and amber light.	high	The cassette reservoir is empty. The pump will stop and not run. Select ACKNOWLEDGE to clear the alarm. Attach a new cassette and reset or edit the value of the reservoir volume, if appropriate. Start the pump.
Screen: 'Downstream occlusion. Clear occlusion between pump and patient'. Alarm and amber light.	high	The pump has detected high pressure due to a downstream blockage, a kink in the line or closed tubing clamp. Remove the obstruction to resume operation without stopping the pump, or select STOP PUMP to silence the alarm for two minutes, remove obstruction, review the program settings then restart the pump
Screen: 'Upstream occlusion. Clear occlusion between pump and reservoir.' Alarm and amber light.	high	Fluid is not flowing from the medication cassette to the pump. Upstream occlusion may be caused by a kink, a closed clamp, or an air bubble in the extension set tubing between container and pump. Remove obstruction. Alarm will clear when occlusion is removed. You must acknowledge this alarm after it clears if it has occurred and cleared more than three times within 15 minutes.
Screen: 'Reservoir volume low'. Alarm and amber light.	medium or low	Select ACKNOWLEDGE to clear the alarm and prepare to install a new medication cassette, if appropriate.
Screen: 'Battery low, Replace battery'. Alarm and amber light	low	The pump will continue to run. Press ACKNOWLEDGE to silence the alarm, or it will automatically clear after five seconds. Change the batteries or recharge the battery pack as soon as possible.

Reports

Reports can be reviewed at any time, with the pump running or stopped.

- In the **Tasks** menu, press ▲ or ▼ to highlight View Reports and press SELECT
- Press ▲ or ▼ to highlight the desired report and press SELECT
- Press BACK to return to the **Select Report** menu and then BACK again to return to the **Tasks** menu.



Documentation

- For patient safety, documentation must always accompany the use of the CADD™-SOLIS infusion pump
- Documentation will vary according to clinical setting and local policy and procedures
- Organisations may use their own documentation, or a Queensland Health-approved form can be downloaded from www.pallconsult.com.au.

Cleaning, storage and maintenance

- Always turn the pump off and remove the battery before cleaning
- Dampen a soft, lint-free cloth with warm water and mild detergent, disinfectant or 10% bleach solution. Apply to the exterior surface of the pump
- Check battery compartment for fluid or debris; this could damage the battery contacts and compromise the pump. Do not allow fluid or debris into the battery compartment
- Do not store the pump for prolonged periods with batteries installed. Battery leakage may damage the pump
- The CADD™ pump must be calibrated/serviced annually
- The CADD™ pump is NOT waterproof, it should not be immersed in water or cleaning solution
- If the pump becomes wet, it should be removed from service immediately and sent for maintenance
- Do not expose the pump directly to ultrasound, ionising radiation or magnetic fields produced by MRI. The pump should be removed from the patient at these times to avoid permanent damage to the pump

CAUTION:

- **DO NOT soak or immerse any part of the CADD™ pump in water or any other solution.**
- **DO NOT clean the pump with chemicals such as xylene, acetone or similar solvents.**

Acceptable disinfecting solutions for the CADD™-SOLIS pump and its accessories are listed below.

Note: For the CADD™-SOLIS LockBox, use only the Sani-Cloth® Bleach product listed below as other products may affect the transparency of the lockbox.

Product	Manufacturer	EPA registration number	Active ingredients	Contact / Kill time
CaviWipes® *(Do not use with CADD™-SOLIS LockBox)*	Metrex	46781-8	17.2% Isopropanol	3 minutes
Sani-Cloth® Super (Do not use with *CADD™-SOLIS LockBox)*	PDI	9480-4	Dimethyl benzyl Ammonium chloride Dimethyl ethyl benzyl Ammonium chloride	2 minutes
Sani-Cloth® Bleach	PDI	9480-8	0.60% Sodium hypochlorite	4 minutes

Educating the person and their family

Using the principles of adult education, the person and their family need to know:

- Why a CADD™-SOLIS infusion pump is used
- What the CADD™-SOLIS infusion pump does
- How the CADD™-SOLIS infusion pump and the subcutaneous cannula insertion site should be cared for
- How to seek assistance if a pump alarm sounds
- How to protect the pump from water splashes when a person is showering/bathing

The education should be tailored to the individual and their circumstances.

Please provide relevant information according to your local policy and procedures.

PallConsult has developed an *Information Sheet for families* that can be used to educate patients and their families. Visit pallconsult.com.au for more information.

References

1. Contact - Customer Support | ICU Medical (smiths-medical.com)
   Customer Services Australia
   Postal Address - PO Box 1048 Dundas NSW 2117
   Tel: +61 (2) 9466 5300
   Fax: +61 (2) 9899 7172
   Email: sma.sales@smiths-medical.com
2. Centre for Palliative Care Research and Education 2021. *Guidelines for Subcutaneous Infusion Device Management in Palliative Care*. Third Edition, Queensland Health, Herston QLD available at Guidelines for Subcutaneous Infusion in Palliative Care (health.qld.gov.au)
3. Dickman, A., Schneider, J.,2016. The Syringe Driver. *Continuous Subcutaneous infusions in Palliative Care*. (4th Edition), Oxford. Oxford University Press.
4. Safer Care Victoria. February 2021. Syringe driver compatibility guidance document. Available from: Syringe driver compatibility (safercare.vic.gov.au) accessed 29/11/2022
5. The National Standards for User-applied Labelling of Injectable Medicines, Fluids and Lines National Standard for User-applied Labelling of Injectable Medicines Fluids and Lines | Australian Commission on Safety and Quality in Health Care

Notes

PallConsult

Support for clinicians
delivering end-of-life care