SESLHD PROCEDURE COVER SHEET

Health
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SUMMARY	This procedure outlines the requirements for the safe administration of subcutaneous medications by Nurses within SESLHD

Feedback about this document can be sent to SESLHD-Policy@health.nsw.gov.au

SESLHD PROCEDURE

Administration of subcutaneous medications in Palliative Care: a) Intermittent b) Via a syringe driver

SESLHDPR/175

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PART B - Medicine Guidelines for Subcutaneous Medications

Subcutaneous Furosemide for end stage heart failure with fluid overload in the dying patient
Subcutaneous Ketamine for Refractory Neuropathic Pain in the Palliative Care Setting
Subcutaneous levetiracetam for seizure management in palliative care patients
Subcutaneous levomepromazine for refractory nausea in the palliative care patient and agitation in the terminal phase
Subcutaneous lidocaine for refractory neuropathic pain in the palliative care setting
Subcutaneous phenobarbital for refractory terminal agitation and uncontrolled seizure (including status epilepticus) in the imminently dying patient

Administration of subcutaneous medications in Palliative Care: a) Intermittent b) Via a syringe driver

SESLHDPR/175

1. POLICY STATEMENT

This procedure outlines the safe administration of subcutaneous medications via intermittent or continuous (via syringe driver) routes in the Palliative Care Setting. The following procedure has been devised for use in SESLHD hospitals.

Administration of intermittent subcutaneous medications is as effective as intramuscular injections and is often better tolerated by the client.

The continuous subcutaneous route of medication administration is utilised due to its improved bioavailability (compared to the oral route), enhanced symptom management and when the oral preparation of the medication is not available or not advised (Client is unable to tolerate oral medications). In addition, consistent medication levels are maintained, eliminating peaks and troughs which can occur with intermittent subcutaneous administration.

Indications for subcutaneous medication administration:

- unable to swallow medication
- lowered or fluctuating levels of consciousness
- dysphagia
- intractable nausea and vomiting
- unable to absorb medication
- bowel obstruction
- severe constipation or faecal impaction

For the purpose of this policy, the BD Saf-T intima™ is the subcutaneous device of choice for the adult setting. Refer to policy SESLHDPR/19 - Subcutaneous Needle Insertion and Management.

The clinical experience of the palliative care team is paramount in helping to provide optimal patient care. For further information or for clarification of concerns please contact your palliative care team.

2. BACKGROUND

The aim of this procedure is to:

- provide staff with evidence-based information and procedures for the management of subcutaneous medications
- reduce medication precipitation in syringes
- ensure safety, stability, compatibility and efficacy of subcutaneous medications
- Promote or maintain the mobility and independence of the patient/carer
- Reduce the need for multiple injections.

2.1 Definitions

- **Breakthrough medication**: medication that is administered between prescribed regular doses for symptom management
- **Niki T34 Syringe driver:** battery operated syringe driver device used to administer a constant dose/s medication over a prescribed period of time
- **Patients/ clients**: in the context of this policy both terms are used interchangeably.

Note: For the purpose of this procedure, the device of choice is the Niki T34 syringe driver. Other infusion pumps may also be used where required e.g., Surefuser & BD BodyGuard™

3. RESPONSIBILITIES

Line Managers will:

- Ensure staff are aware of and adhere to the policy as outlined.
- Ensure staff are competent to use the device.

Nursing Staff will:

- Be familiar with the policies and procedures outlined in this document prior to providing subcutaneous medications to patients.
- Ensure they have completed any competency documents prior to using the device.
- Document all actions and conversations in patients eMR progress notes
- Liaise with nursing staff in the medication management of the patient.

4. SUBCUTANEOUS MEDICATION ADMINISTRATION - INTERMITTENT

4.1 Subcutaneous access considerations

In general, the slower the rate and volume of administration the less discomfort experienced by the patient. Therefore, stinging, discomfort, redness and / or swelling at the BD Saf-T intima™ site may indicate that the:

- subcutaneous cannula has been inserted too superficially or has become displaced.
- rate of administration is too fast.
- medication is a known irritant (e.g. methadone, ketamine)
- Infection may be present.

To prevent discomfort:

- check site prior to and at least every 4 hours during medication administration
- consider greater dilution of the medication if possible.

For insertion and management of subcutaneous cannulas, refer to policy SESLHDPR/19 - Subcutaneous Needle Insertion and Management.

Once the cannula is inserted and placed against the skin, form a loop with the line and secure with tape (to prevent displacement if the tubing is accidentally pulled).

4.2 Subcutaneous medication administration via BD Saf-T intima™ cannula

- Best practice recommends using the minimum number of subcutaneous cannulas to administer subcutaneous medications.
- Medications may be delivered through the same BD Saf-T intima™ cannula, however the cannula must be flushed after each medication
- For PRN breakthrough medication/s required to supplement continuous infusions a second BD Saf-T intima™ should be inserted.

4.3 Flushing between medications

It is recommended that the Saf-T intima™ be flushed with a compatible fluid after each medication is administered to prevent medication remaining in the dead space.

4.4 Prescription Guidelines

For opioid conversion information, refer to local hospital opioids conversion policy for palliative care pain management.

4.5 Prescriber Guidelines

The medical officer must prescribe medications in the approved electronic medication management system prior to administration. The patient must be assessed for pain control and for signs of opioid toxicity prior to altering opioid doses.

4.6 Telephone Orders

Telephone Orders may be used when urgent medication is required and a medical officer is unable to attend the patient in accordance with NSW Ministry of Health Policy Directive PD2022_032 - Medication Handling.

5. COMMENCING A CONTINUOUS SUBCUTANEOUS INFUSION VIA A NIKI T34 SYRINGE DRIVER

5.1 Assessment

- Registered Nurses and Enrolled Nurses (ENs) must be competent to set up and administer medications via a Niki T34 syringe driver.
- Competence to utilise without supervision can be gained by successful completion of:
  - A theoretical learning component as per your clinical area
  - Undertaking supervised practice conducted by a senior nursing staff member until confident in the use of the device.

5.2 General Information

- Niki T34 syringe drivers are calibrated in mL per hour. Syringe drivers should be set to run for a 24 hour period unless otherwise prescribed by the palliative care team

- Compatibility information in Table 1 refers to use in a 24 hour syringe driver. Stability beyond 24 hours must be confirmed on a case by case basis as required.
- Two registered nurses or a registered nurse and an enrolled nurse must check, administer and sign for medications as per NSW Ministry of Health Policy Directive PD2022_032 - Medication Handling. In addition, the administering nurse must check the syringe driver settings (refer to Appendix 1). The pain management assessment chart on patient eMR is to be used in conjunction with the syringe driver management form (Appendix 3)
- A nurse should check the operation of the Niki T34 in the inpatient setting within one hour of set up, then every four hours
- The Niki T 34 syringe driver automatically calibrates the syringe size
- If difficulties are experienced drawing up a syringe, contact your palliative care team.

5.3 Equipment

- Medication/s as per medication order
- 70% v/v isopropyl alcohol swabs
- 10 mL of appropriate diluent (see table 1)
- Appropriate size luer lock syringes (see 5.4)
- 75cm Terumo extension line
- Niki T34 syringe driver
- 2 Volt 9 batteries (one for driver and one spare)
- Drawing up needles
- Non sterile kidney dish
- BD Saf-T intima™ if required.

5.4 Syringe size and type

- Luer lock syringes must be used for subcutaneous medication administration
- REM systems recommend that Plastipak ® and Terumo ® syringes are used in the NikiT34 syringe driver
- The size of the syringe required will depend upon the medication/s to be administered
- 10mL, 20mL, and 30mL syringes can be used in the Niki T34 syringe driver

Note: the 30mL syringe will only hold a total volume of 24mL.The locked box can only lock with syringes up to 20ml. Any larger size syringes used can only hold non S8 and S4D medications.

5.5 Procedure

1. Use 70% Alcohol hand rub or wash hands as per. Infection Prevention and Control in Healthcare Settings PD2023_025 Don gloves
2. Check medication/s as per NSW Ministry of Health Policy Directive PD2022_032 - Medication Handling.

3. Draw up the prescribed medication/s using aseptic technique.

   Note: if using more than one medication ensure compatibility and draw up all medications prior to adding the diluents to the syringe.
4. Dilute the medication with a compatible fluid to the total volume of the syringe. Gently invert the syringe several times to mix the water for injection and medication/s.
5. Manually remove air from the syringe using caution not to spill any solution.
6. Attach the syringe to the extension line.

   Note: loosen cap on the end of the extension line to promote flow of fluid, do not totally remove cap.
7. Label the syringe in accordance with PD2016_058 User-applied Labelling of Injectable Medicines, Fluids and Lines
8. Set up and program the Niki T34 syringe driver (Refer to Appendix 1).
9. Place required equipment in the kidney dish for transport to the patient.
10. Use 70% alcohol hand rub or wash hands as per NSW Health Infection Prevention and Control in Healthcare Settings PD2023_025 Don gloves
11. Explain procedure to patient. Ensure that the environment is conducive to patient privacy, comfort and safety
12. Check the right patient as per NSW Ministry of Health Information Bulletin IB2020_010 - Consent to Medical and Healthcare Treatment Manual
13. If subcutaneous cannula is not insitu, insert a BD Saf-T intima™ as per SESLHDPR/19 - Subcutaneous Needle Insertion and Management.
14. Wipe the side port of the subcutaneous cannula using 70% v/v isopropyl alcohol swabs and a “no touch” technique.

    Note: Keep the port from touching a surface once it has been cleaned.
15. Recheck the prepared medication against the medication order prior to administration using the “Five Rights”
16. Examine the syringe for any signs of precipitation prior to use, nurse witness to perform an independent double check
17. Attach the extension line to the port on the BD Saf-T intima™ cannula. Ensure that connections are secure. Prime the extension line .Label the line in accordance with NSW Ministry of Health Policy Directive PD2022_032 - Medication Handling.
18. Commence the Niki T34 syringe driver (refer to Appendix 1).
19. Use 70% Alcohol hand rub or wash hands as per .NSW Health Policy Directive Infection Prevention and Control in Healthcare Settings PD2023_025

5.6 Documentation

- In patient eMR progress notes

- On MAR in eMR (syringe driver power plan) or in eRIC (ICU) or as per downtime procedures
- Commence the syringe driver management form (Appendix 4).

6. MEDICATION COMPATIBILITY

Note: Refer to Table 1 for full list of compatible mediations for subcutaneous administration via syringe driver

There is limited evidence on the effects of combining three or more medications; therefore, it is preferable to limit the combination to three (3) agents known to be compatible.

Compatibility information in Table 1 refers to use in a 24 hour syringe driver. Stability of medication combinations beyond 24 hours must be confirmed on a case by case basis as required.

6.1 Precipitation

If a combination of medications becomes cloudy, precipitate or crystallise in the syringe or administration line:

- Immediately **stop** administration of the medication
  Note: DO NOT flush the administration line.
- Resite BD Saf-T intima™ cannula as per SESLHDPR/19 - Subcutaneous Needle Insertion and Management Procedure
- Discard all equipment including extension tubing and redraw new medications
- Prepare a new syringe and extension line.
- Restart the syringe driver as per Appendix 1 “Niki T34 General Information and instructions”.
- Contact the Palliative care team and the ward pharmacist to report precipitation
- Document actions in the patient eMR progress notes as per NSW Ministry of Health Policy Directive PD2012_069 - Health Care Records - Documentation and Management and ensure that the incident is recorded in either the Incident Information Management System (IIMS) or via Riskman.

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6.2 Labelling

Nursing staff must:

- Ensure the syringe is labelled before placing the syringe within the syringe driver. Do not place the label over the syringe increments or at the end of the syringe.
- Adhere to NSW Ministry of Health Policy Directive PD2022_032 - Medication Handling.

6.3 Diluents

- Evidence recommends that medications used in a syringe driver are diluted with water for injection where compatible. To ensure consistency of practice in the administration of subcutaneous medications, decrease site irritation and avoid known drug incompatibilities with 0.9% NS
- Refer to Table 1 for full list of compatible medications and the recommended diluents for subcutaneous administration.
- If the total amount of medication required is less than 10mL in volume, make the syringe up to a total volume of 10mL.

6.4 Dosing changes

If medication/s or dose/s are changed, the syringe and extension line must be discarded and a new infusion commenced.

6.5 Extension lines

The Terumo minimum length 75cm (0.75mL) is the recommended extension line. Extension lines are to be changed:

- When medication and/or medication dose/s are altered
- When the subcutaneous cannula is changed.

6.6 Niki T34 syringe driver observations

Observations are attended every four hours and documented on the 'Subcutaneous Syringe Driver Inpatient management form' (form number SES130.021, Appendix 3).

Observations include:

- Syringe driver label matches prescription
- rate of infusion
- volume remaining
- location and condition of subcutaneous BD Saf-T intima™ cannula site
- line connections are secure
- Battery percentage – **If battery status < less than 60% it needs to be changed.**

When the syringe is changed, the remaining medication discarded needs to be recorded and signed by two registered nurses as per NSW Ministry of Health Policy Directive PD2022_032 - Medication Handling.

7. COMPLETION OR CHANGING OF SYRINGE OF A SUBCUTANEOUS INFUSION VIA NIKI T34

7.1 Procedure if the syringe driver is no longer required

1. Explain procedure to patient. Ensure that the environment is conducive to patient privacy, comfort and safety.
2. Check the right patient as per NSW Ministry of Health Information Bulletin IB2020_010 - Consent to Medical and Healthcare Treatment Manual.
3. Use 70% Alcohol hand rub or wash hands as per NSW Health Policy Directive Infection Prevention and Control in Healthcare Settings PD2023_025.
4. Select “YES” to confirm the end of the infusion.
5. Clamp the extension line, disable the driver lock, press and hold the “ON/OFF” to turn the driver off.
6. Discard syringe and extension line into appropriate sharps container
7. Complete ‘syringe driver change /cease’ section on the syringe driver management form (Appendix 3)
8. Remove battery and clean the syringe driver prior to storage.
9. Use 70% Alcohol hand rub or wash hands as per NSW Health Policy Directive Infection Prevention and Control in Healthcare Settings PD2023_025.
10. Document in the patient’s inpatient eMR progress notes and on MAR in eMR (syringe driver PowerPlan) or in eRIC (ICU) NSW Ministry of Health Policy Directive PD2012_069 - Health Care Records - Documentation and Management.

7.2 Procedure If the Niki T34 syringe driver is to continue

1. Use 70% Alcohol hand rub or wash hands as per NSW Health Policy Directive Infection Prevention and Control in Healthcare Settings PD2023_025
2. Explain procedure to patient. Ensure that the environment is conducive to patient privacy, comfort and safety.
3. Check the right patient as per NSW Ministry of Health Information Bulletin IB2020_010 - Consent to Medical and Healthcare Treatment Manual.
4. Place the Niki T34 syringe driver on hold. Clamp line.
5. Remove syringe and extension line from the syringe driver.
6. Disconnect extension line from BD Saf-T intima™.
7. Discard syringe and extension line into appropriate container.
8. Repeat “5.5 Procedure” to continue.

7.3 Documentation

- ‘Subcutaneous Syringe Driver Inpatient management form’ (Appendix 3)
- Patients eMR progress notes

- Pain Management Assessment Chart on eMR
- On MAR in eMR (syringe driver PowerPlan) or in eRIC (ICU) or as per downtime procedures.

8. PATIENT EDUCATION PRIOR TO DISCHARGE

For safe use of syringe drivers, it is essential that patients and their carer are provided with education regarding subcutaneous medication administration via a syringe driver.

Nursing staff must assess the patient/ carer for the appropriateness of self-management.

Best practice suggests:

- Demonstrating the procedure to the client and/ or their carer
- Monitoring a minimum of one demonstration by the client/ carer of the procedure
- Provide written information (Appendix 1 - 'Niki T34 General Information and instructions') to support the education provided
- Refer patient to their local community palliative care team on discharge so they have follow-up and 24 hour contact details for assistance.

9. AUDIT

As required by clinical staff

10. REFERENCES

- Caesarea Medical electronics (CME). Niki T34 Syringe pump instruction manual. June 2008.
- Eastern Metropolitan Region Palliative Care Consortium 'Syringe Driver Drug Compatibilities – Guide to Palliative Care Practice (2016).Victoria
- MacLeod,R and Macfarlane,S (2018) Palliative care handbook "Guidelines for clinical management and symptom control"(9th Ed),Hammond Care Media.Sydney
- NSW Ministry of Health Policy Directive PD2022_032 - Medication Handling
- NSW Health Policy Directive PD2023_025 - Infection Prevention and Control in Healthcare Settings
- NSW Ministry of Health Policy Directive PD2012_069 - Health Care Records - Documentation and Management
- NSW Health Guideline GL2018_013 - Work Health and Safety - Blood and Body Substances Occupational Exposure Prevention
- Palliative care formulary, sixth edition. (2018) Pharmaceutical Press, London.
- SESLHDPR/19 Subcutaneous Needle Insertion and Management
- SESLHDPD/160 Medication: Administration by Enrolled Nurses
- Therapeutic Guidelines: Palliative Care Version 4 2016, Therapeutic Guidelines Limited, Melbourne.

11. VERSION AND APPROVAL HISTORY

Date	Version	Version and approval notes
June 2009	1	Helen Moore, Service Manager, Palliative Care, Calvary Health Care Sydney
November 2011	2	SESIAHS Palliative Care Working party Than Lam and Ada Hon Oncology pharmacists, sterile manufacturing unit, Prince of Wales
December 2011	3	SESLHD/ISLHD Directors of Palliative Care
January 2012	4	Elizabeth Browne rebadged in SESLHD template
August 2015	4	Reviewed by SESLHD Palliative care working party
November 2015	5	Hyperlinks updated. Endorsed by Executive Sponsor
January 2016	5	Sent to Julie Thompson for Drug Committee endorsement
March 2016	6	Ketamine Protocol updated. Endorsed by Executive sponsor
April 2016	6	Endorsed at April QUM
May 2016	6	Approved by Clinical and Quality Council meeting
September 2017	6	Reviewed with no changes and endorsed by Executive Sponsor. Submitted to DQUM for endorsement.
November 2017	6	Endorsed by DQUM for publishing.
December 2019	7	Reviewed and updated by SGH palliative care CNE Sue Morris & CNC Mary Lafferty in consultation with SESLHD palliative care working group, Dr Jan Maree Davis, Medical Director, Palliative Care Service, SESLHD Southern Sector & Dr Caitlin Sheehan, Staff Specialist Palliative Medicine Summary of changes: Index page created Community management of syringe driver removed from this procedure. Policy divided into Part A and Part B *Part A* = Outlines the procedural requirements for intermittent and continuous subcutaneous medications (syringe driver) *Part B* = Prescribing protocols for some medications used in syringe drivers
May 2020	8	Major review endorsed by Executive Sponsor. Draft for Comment.
September 2020	8	Final draft processed by Executive Services and progressed to the Quality Use of Medicines Committee.
November 2020	8	Approved by Quality Use of Medicines Committee.
December 2020	8	Tabled at Clinical and Quality Council for approval to publish.
February 2021	8	Approved by Clinical and Quality Council. Published by Executive Services.

Date	Version	Version and approval notes
July 2021	9	Minor review. Removal of Midazolam with Ondansetron and with Ranitidine as not recommended. Octreotide with Midazolam is already in table of compatibilities. Approved by Executive Sponsor. To be tabled at August Quality Use of Medicines Committee.
August 2021	9.1	Approved by Quality Use of Medicines Committee following amendments. Approved by Executive Sponsor.
October 2022	10	Minor review. Lignocaine prescribing protocol updated and Compatibilities table modified. Approved by Executive Sponsor.
November 2022	10	Approved by Quality Use of Medicines Committee.
December 2022	10.1	Table 1 formatting corrected and republished
13 February 2024	10.2	Minor review: Updates to Table 1: Changed any drugs mixed with Morphine tartrate = no data available Changed Ketamine to preferably be diluted with normal saline. Ranitidine currently only used if available for Terminal malignant bowel obstruction Updates to Prescribing protocols: Ketamine prescribing protocol re-instated / re written as removed in error in previous review. Phenobarbitone doses changed in the prescribing protocol as per PCF 8th edition 2022. Section 5.5 number 17 – added “Prime the extension line”. Hyperlinks updated and minor formatting changes. Approved by SESLHD Drug and Therapeutics Committee.
7 May 2024	10.3	Amendment to correct broken links on page 2 and page 25.
30 August 2024	10.4	Amendment to correct broken links and update naming of prescribing protocols to medicine guidelines. Updated to full title of medicine guideline in table of contents and Part B. Title and link to NSW Health Infection Control Policy on page 11 corrected.

12. APPENDICES

Table 1: Medication compatibility information
Appendix 1: Niki T34 general information and instructions
Appendix 2: Problem solving the Niki T34 syringe driver
Appendix 3: Subcutaneous Syringe Driver Inpatient management form’ SES 110.145

Table 1: Subcutaneous Medication Compatibility Chart

*Medications are not repeated in reverse order. When assessing compatibility, list in alphabetical order then look the medication up.
**This table is a guide only. All combinations listed are concentration dependant.
*** Compatibility information in this table refers to use in a 24 hour syringe driver. Stability of medication combinations beyond 24 hours must be confirmed on a case by case basis as required.

KEY:

PROCEED	✓	Physically and visually compatible in tests
USE WITH CAUTION		Compatibility may depend on the order of mixing or drug concentrations Seek specialist advice when using in combination
INCOMPATIBLE	✖	Incompatible

Medication / Indication	Compatibility	Diluent –Water For Injection	Precautions
Clonazepam			***Not used in a syringe driver in SESLHD***
Cyclizine *Antihistamine* *- Nausea and vomiting* *- Intestinal obstruction*	*Dexamethasone*		*Cyclizine is incompatible with sodium chloride*
	Glycopyrrolate		
	Haloperidol		
	Hydromorphone		
	*Hyoscine **Butylbromide***		
	Ketamine		
	Ketorolac		
	Levomepromazine		
	Metoclopramide		*Incompatible in higher doses*
	Midazolam		
	Morphine tartrate		
	Morphine sulfate		
	Octreotide		
	Ondansetron		

Medication / Indication	Compatibility	Diluent –Water For Injection	Precautions
Fentanyl *Opioid Analgesic* *-pain management* ***Clinical note:*** *Fentanyl is not generally administered with another opioid.* *The Fentanyl patch preparation is used instead.*	*Glycopyrrolate*		
	Haloperidol		
	*Hyoscine **Butylbromide***		
	Ketorolac	***No data available***	
	Levomepromazine		
	Metoclopramide		
	Midazolam		
	Octreotide	***No data available***	
	Ondansetron		
Furosemide (Frusemide)			***In Normal saline ONLY*** *- use in separate syringe driver from other drugs* ***See medicine guideline-*** ***Subcutaneous furosemide for end stage heart failure with fluid overload in the dying patient***
Glycopyrrolate ***Glycopyrronium bromide*** *Anticholinergic* *-aids in the reduction of secretions*	*Haloperidol*		*Can ↓ the serum concentration of haloperidol when used together*
	Hydromorphone		
	*Hyoscine **Butylbromide***	***No data available***	*Medication from a similar class - seek specialist advice*
	Levomepromazine		
	Metoclopramide		*The prokinetic effect of metoclopramide may be inhibited by glycopyrrolate*
	Midazolam		
	Morphine sulfate		
	Morphine tartrate	***No data available***	
	Octreotide	***No data available***	
	Ondansetron	***No data available***	

Medication / Indication	Compatibility	Diluent –Water For Injection	Precautions
Haloperidol *Antipsychotic* *-Nausea and vomiting* *-Delirium*	*Hydromorphone*		*Can cause respiratory & CNS depression*
	*Hyoscine **Butylbromide***		*Precipitation can occur with concentrations of hyoscine butylbromide > than 0.625mg/mL*
	Ketamine		*Limited data*
	Ketorolac		
	Levomepromazine		
	Metoclopramide		*Can ↑ risk of extrapyramidal effects*
	Midazolam		
	Morphine sulfate		*Reports of crystallisation with greater than 1mg haloperidol*
	Morphine tartrate	***No data available***	
	Octreotide		
	Ondansetron		
Hydromorphone *(Dilaudid ®)** *Opioid analgesic* *-pain control* *-dyspnoea*	*Hyoscine **Butylbromide***		
	Ketorolac		*Reports of precipitation with increase doses*
	Levomepromazine		
	Metoclopramide		
	Midazolam		*Can cause respiratory & CNS depression*
	Octreotide		
	Ondansetron	***No data available***	
Hyoscine Butylbromide *(Buscopan)* *Antispasmodic* *-Used in bowel obstruction;*	*Ketamine*		
	Ketorolac		
	Levomepromazine		
	Metoclopramide		*↓ gastric tract mobility*

Medication / Indication	Compatibility	Diluent –Water For Injection	Precautions
reduces gastric secretions and colic pain.	*Midazolam*		
	Morphine sulfate		
	Morphine tartrate		
	Octreotide		
	Ondansetron		
Ketamine Hydrochloride *General anaesthetic* *-used in pain management*			***In Normal saline (preferred)*** ***In Water (appears compatible -no data)*** It should be given via a separate infusion ***See medicine guideline*** *-* ***Subcutaneous Ketamine for Refractory Neuropathic Pain in the Palliative Care Setting***
Ketorolac *NSAID* *-Bone pain*	*Levomepromazine*		
	Metoclopramide		
	Midazolam		
	Morphine sulfate		
	Octreotide	***No data available***	
	Ondansetron	***No data available***	
Levetiracetam			It should be given via a separate syringe driver ***See medicine guideline -*** ***Subcutaneous levetiracetam for seizure management in palliative care patients***
Levomepromazine *Phenothiazine* *-antipsychotic* *-anti emetic* *-delirium*	*Metoclopramide*		*Seek Specialist advice for this combination- may ↑ extrapyramidal side effect*
	Midazolam		***See medicine guideline –*** ***Subcutaneous levomepromazine for refractory nausea in the palliative care***
	Morphine sulfate		

Medication / Indication	Compatibility	Diluent –Water For Injection	Precautions
-terminal agitation	*Morphine tartrate*		***patient and agitation in the terminal phase***
	Octreotide		
	Ondansetron		
Lidocaine (lignocaine) *Local anaesthetic*			To be used in separate syringe driver ***See medicine guideline - Subcutaneous lidocaine for refractory neuropathic pain in the palliative care setting***
Methadone - *Opioid analgesic -pain control*			**Discuss with a Palliative Care Consultant as this is not often used in a syringe driver due to methadone's long half life**
Metoclopramide *pH: 4.5-6.5* *Prokinetic anti emetic -nausea, vomiting -gastric squash*	*Midazolam*		
	Octreotide		
	Ondansetron		
	Morphine sulfate		*Can ↓ respiratory rate*
	Morphine tartrate	***No data available***	*Can ↓ respiratory rate, Limited data*
	Ranitidine	***No data available***	
Midazolam *Benzodiazepine -terminal restlessness -myoclonic jerking, seizures*	*Morphine*		*Can ↓ respiratory rate*
	Morphine sulfate		*Can ↓ respiratory rate*
	Morphine tartrate		*Can ↓ respiratory rate*
	Octreotide		
Morphine *(Sulfate/ Tartrate) Opioid analgesic -pain control -dyspnoea -cough*	**See other listed medications for compatibilities**		
Octreotide	*Morphine sulfate*		

Medication / Indication	Compatibility	Diluent –Water For Injection	Precautions
	Morphine tartrate	***No data available***	
	Ondansetron		
Ondansetron *pH: 3.3-4* *Anti-emetic* *-nausea and vomiting*	*Morphine sulfate*		
	Morphine tartrate	***No data available***	
Phenobarbital *(Phenobarbitone)*			Phenobarbital has an alkaline pH and can cause tissue necrosis when administered as subcutaneous bolus injection. ***See medicine guideline - Subcutaneous phenobarbital for refractory terminal agitation and uncontrolled seizures (includes status epilepticus) in the imminently dying patient***
Ranitidine *Histamine H2-receptor antagonist* *-Gastric ulcer, reflux oesphagitis, gastric secretions*			Ranitidine should not be mixed in a syringe with any other diluent due to lack of data availability. Ranitidine currently only used if available for Terminal malignant bowel obstruction

References

1. Dickman A, Schneider J.The Syringe Driver. Continuous subcutaneous infusions in palliative care 4th Ed. Oxford: Oxford University Press; 2016. Available via CIAP: https://academic.oup.com/book/24439

2. Syringe Driver Survey Database available at www.palliativedrugs.org

3. Safer Care Victoria. Syringe Driver Compatibility Guidance Document. https://www.safercare.vic.gov.au/clinical-guidance/palliative/syringe-driver-compatibility

4. Twycross R, Wilcock A, Howard P. Palliative Care Formulary [Internet]. Nottingham. Medicines Complete. Compatibility charts updated May 2017. Available via CIAP: https://www.medicinescomplete.com.acs.hcn.com.au/#/content/palliative/compatibility-charts

5. Destro M, Ottolini L, Vicentini L, Boschetti S. Physical compatibility of binary and ternary mixtures of morphine and methadone with other drugs for parenteral administration in palliative care. Support Care Cancer. 2012; 20:2501–250911.

6. Guidelines for Subcutaneous Infusion Device Management in Palliative Care –second edition 2010 available at https://www.health.qld.gov.au/cpcre/publicns.asp

7.HosgoodJR, Kimbrel JM, Protus BM, Grauer PA, Evaluation of subcutaneous phenobarbital in hospice patients. Am J Hosp Palliat Care 2014
MacLeod, R., Vella-Brincat, J. and Macleod, S. (2014). The Palliative Care Handbook. 7th ed. Sydney: HammondPress

8. Palliative Care 4. eTG Complete, Therapeutic Guidelines, Melbourne . Accessed via CIAP: https://tgldcdp.tg.org.au.acs.hcn.com.au/etgAccess?acc=36422

9. Snow EK, McEvoy GK eds. 2015. Handbook on Injectable Drugs -18th Ed. Bethesda, MD. American Society of Health-System Pharmacists.
Trissels™ Clinical Pharmaceutics Database (Parenteral Compatibility) MicromedexR Solutions

Appendix 1: Niki T34 General Information and Instructions

Niki T34 Maintenance/ care

- The Niki T34 must receive an annual calibration by either the service provider (at time of writing REM systems) or by biomedical engineering.
- Do not allow Niki T34 to come into contact with steam.

Storage

- Always remove battery and clean driver prior to storage.
- When not in use store driver in cool dry area out of direct sunlight.

Batteries

- Only use size nine volt alkaline battery (6LR61) in the Niki T34.
- Do not use rechargeable or non-alkaline batteries.
- If the syringe driver is for use in the home, ensure that the patient has two extra batteries.
- When setting up a driver always check the battery life that is remaining on the driver:
  - Switch driver “ON”
  - Press the “INFO” key
  - Use the “UP/ DOWN” arrow keys to select “BATTERY LIFE” from the menu and press “YES/ START” to confirm
- Verify sufficient battery charge is available to complete the current infusion. If not, change the battery.
- As a warning the driver will alarm when 60% of the battery has been used.

Cleaning

- ***Do not*** soak or immerse any part of the Niki T34 in water or any other solution.
- Always turn pump off and remove battery prior to cleaning
- Clean the Niki T34 before and after patient use using a Rediwipe detergent (neutral detergent wipe)

Occlusions

At the time of an occlusion alarm the Niki T34 is programmed to “wind back”. In this instance the infusion will be delayed and the expected infusion end time will be later. If there are any more than two occlusion alarms in a row:

- Investigate. See table on page 6 for potential issues and solutions.
- If unresolved;
  - resite subcutaneous cannula
  - commence new syringe

If Niki T34 continues to occlude change driver and have driver checked by Medical Engineering

Security

The Niki T34 has safety features that allow the key pad to be locked using a code (do not share with persons other than staff) to prevent any accidental tampering by the patient or carer. To activate the lock:

- Press and hold the INFO key until a bar appears:
- Hold the INFO key until the bar moves to the required mode. The bar will move and a “Beep” will sound when in the correct position- the bar will move left for OFF and right for ON.

To prevent tampering of the syringe driver locked boxes available for security from the supplier (at the time of writing REM systems). Please note that the locked boxes will only fit 10mL and 20mL syringes.

Infusion set up and programming

- Ensure that the syringe is labelled prior to placing in the driver.
- Check the battery prior to driver set up.
- Prime the extension line with the medication prior to placing in the syringe.

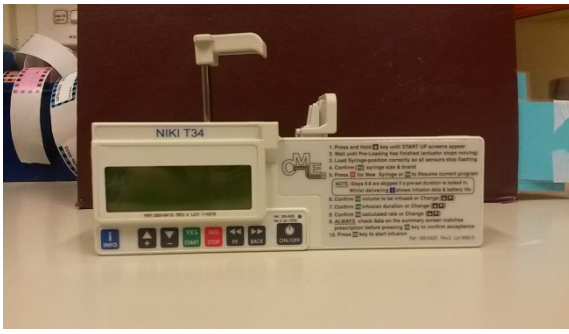
Niki T34 Instructions

1. Press and hold the “On/Off” button until start up screen appears and automatically the “Arm” and “Carriage” gets ready to accept the loaded syringe

2. Screen reads “Load syringe”

3. Line up the loaded syringe and using the “FF” and “Back” button move the Carriage backwards or forward to line up with two positions (Syringe collar and prongs of the plunger)

4. Once aligned then lift the “Arm” firmly up and turn to one side (It will not let you move “carriage” unless the “Arm” in place*)



5. Load the primed syringe into the Syringe Driver BUT make sure the plunger is secure between the prongs of the plunger and the Carriage. You will feel a click(Do not force the syringe into place)

6. The screen will indicate the size and type of syringe loaded as guided by instructions select “Yes” or “No” (you can select the correct syringe if not identified by the scrolling up and down buttons)

7. Review screen will read syringe volume/ 24 hour duration/ rate per hour (calculated by the volume divided by 24)

8. Confirm “Yes” to proceed if correct, it will double check and asks “start infusion?”

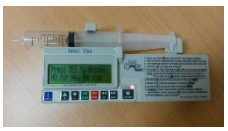
9. The syringe will alarm if “Pump paused too long” and you just confirm as indicated “Yes” if you wish to proceed

10. The “near end alarm” goes off 15 minutes pre the end of the infusion so you can prepare the next one to load

11. If you want to stop the Syringe Driver press “stop” and then press the “off” button and hold until Syringe Driver is off

12. Do not remove the Syringe from the Driver while connected to the patient. The company advises to disconnect the infusion to prevent free flow to the patient

13. When changing syringe, the screen will appear “Press YES to RESUME or NO for new syringe”



14. Always press ‘no’ to begin a new infusion

Appendix 2 - Problem solving the Niki T34 syringe driver

Issue	Possible Cause	Action	Prevention
Driver won't start	1. No battery in driver 2. Battery: -incorrectly placed in driver -near depleted 3. Pump is faulty	1 and 2. Check battery and restart as appropriate 3. Send driver for service	□ Check battery prior to driver set up □ Annual service required for Niki T 34
Infusion won't start	1. Incorrect position of the battery. 2. Battery flat or has expired	1. Remove battery from driver 2. Change battery	□ Check battery life during syringe driver set up and syringe changes
Infusion not running at the correct rate (i.e. too slow/ fast)	1. Wrong syringe brand confirmed at set up 2. Dislodged syringe 3. Tubing kinked 4. Blocked needle 5. Needle site red/ swollen 6. Infusion rate not correctly set 7. Driver exposed to water (i.e. from shower) 8. Driver accidentally dropped 9. Pump faulty	1 and 2.Check syringe. -Place driver on hold and reattach syringe. 3. Check tubing. -If tubing is unable to be unkinked replace syringe/ tubing as per protocol. 4 and 5. Replace subcutaneous cannula and tubing. -Re-check medication doses and compatibilities 7. Change driver. Send driver for maintenance. 8 and 9. Send driver for service	□ Educate patient re driver: -keep in pouch when transferring -keep tubing free of clothing and bedding. -keep out of water. Place in water proof plastic prior to shower. -alert staff if any pain/ discomfort at subcutaneous site. □ Annual service required for Niki T 34
The driver has stopped before the empting the syringe	1. Exhausted battery 2. Blocked/ kinked tubing	1. Change battery 2. Check tubing and fix issue. -If unable to correct change syringe/ tubing as per protocol.	

Problem solving the Niki T34 syringe driver

Niki T34 Alarms	Possible Cause	Action
-On insertion of battery -On start of infusion -Infusion complete	Normal alert for Niki T34	
Check collar sensor	Syringe is not correctly loaded	Ensure that the “wings” on the syringe are facing upwards.
-Occlusion/ syringe empty -Check line and syringe -Press YES to confirm	1. Subcutaneous cannula may be blocked/ tissued 2. Clamp on the infusion line 3. Blockage/ kink in tubing	1. Resite subcutaneous cannula. 2. Release clamp 3. Check tubing for kinks or crystallisation. -Resite cannula and prepare new syringe and tubing. 4. Turn pump off
-Syringe displaced check syringe -Press YES to confirm	The syringe is incorrectly placed in the driver and therefore the syringe detection sensors are registering the driver as empty.	Check syringe and reload if required
-Pump Paused Too Long	Driver has been left in STOP mode with no keypad presses detected for 2 minutes	Start the driver, continue programming or if the driver is no longer need turn off the driver.
Near End*	15 minutes from the end of the infusion	-
-End program -Press YES to confirm	Infusion is complete	Driver will turn itself off
-Low Battery -End Battery	Battery is also depleted.	Change the battery

Appendix 3: Syringe driver observation form

BINDING MARGIN - NO WRITING

BARCODE

Health
South Eastern Sydney
Local Health District

Facility:

SUBCUTANEOUS SYRINGE DRIVER INPATIENT MANAGEMENT FORM *(Pg1)*

Infusion Details: *(circle appropriate answer)*
Syringe size: 10mL 20mL 30mL
Primary Reason for Driver: *(tick or detail)*
Pain mgmt [ ] Anti-emetics [ ] Other: _____
Pain Assessment:
If applicable, this form should be used in conjunction with SESIAHS Pain Management Assessment Chart (**S0258**) for the documentation of pain scores and butterfly needle insertion/ changes.

FAMILY NAME	MRN
GIVEN NAMES	☐ MALE ☐ FEMALE
D.O.B. ____/____/____	M.O.
ADDRESS	
LOCATION / WARD	

COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE

SYRINGE DRIVER OBSERVATION: SYRINGE DRIVER No: _____ **Inpatient setting:** attend 4th hourly

Date	Time	Syringe label matches prescription? (Yes/No)	Rate of Infusion?	Volume remaining in syringe (mLs)	Location of sub-cutaneous needle	Site assessment#	Line & connections checked? (Yes/No)	% of Battery life left?	Given by	Syringe change/ ceased		
										Reason	Volume left in syringe	Given by

This space for form information, notations, trial dates, Etc...

#Injection Site Assessment

Score	0	1	2
Condition of site	Healthy	Slight pain or slight erythema	Pain + erythema, swelling or leaking
Action	Continue regular observation	Close observation of site	Replace subcutaneous needle

P.T.O →

Page 1 of 2

FORM SES110.145 SUBCUTANEOUS SYRINGE DRIVER MANAGEMENT FORM

PART B – Medicine Guidelines for Subcutaneous Medications

Subcutaneous Furosemide for end stage heart failure with fluid overload in the dying patient
Subcutaneous Ketamine for Refractory Neuropathic Pain in the Palliative Care Setting
Subcutaneous levetiracetam for seizure management in palliative care patients
Subcutaneous levomepromazine for refractory nausea in the palliative care patient and agitation in the terminal phase
Subcutaneous lidocaine for refractory neuropathic pain in the palliative care setting
Subcutaneous phenobarbital for refractory terminal agitation and uncontrolled seizure (including status epilepticus) in the imminently dying patient