# End of Life and Palliative Care Medication Prescribing

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This guide provides a summary of information relevant to prescribing and medication administration at the end of life. The purpose is to signpost resources to support consistent care across clinical services and groups.

## Last days of life: Anticipatory prescribing

The NSW Clinical Excellence Commission [Last Days of Life Toolkit](#) provides guidance for clinicians caring for patients in the last days of life.

The toolkit includes:

- **In-patient Anticipatory Prescribing Guide – Adults**: guidance for doctors on how to prescribe anticipatory subcutaneous medications for the symptoms that may be experienced in the last days of life. See Attachment 1.
- **Symptom Management Flowcharts - Adults**: guidance to assist assessment and management of the five symptoms commonly experienced by patients in the last days of life. The pain guide includes a guide to switch to subcutaneous opioids. *Pain, Breathlessness, Nausea and/or vomiting, Respiratory tract secretions, Restlessness and/or agitation*.

## Supporting consistent prescribing

- Where the eMeds system is in use, services should consider building a **Power Plan** for the agreed palliative care medication list if this has not already been attended to.
- Access to medications should be based on patient need. Medications used for end of life care are included on the quarantine list which is being managed as part of the NSW Health pandemic response.
In line with normal business practices, contact your Director of Pharmacy if you have any questions about the availability or supply of medicines.

### Medication administration devices

- The Anticipatory Prescribing Guide includes information about recommended medication administration methods and doses.
- Re-usable syringe drivers should be re-processed after use by a COVID-19 positive patient according to their intended use and manufacturer’s advice.
- Alternative devices and administration methods should be considered if:
  - there is limited availability of syringe drivers
  - there is limited capacity to decontaminate syringe drivers after patient use
  - clinical staff are not accredited to use syringe drivers.
- A commonly used alternate device is the SureFuser+ which is a tamper proof single use balloon infuser.
- NMLHD has developed a resource pack to support use of these devices, see Attachment 2, and an instructional video: “A nurse’s guide to using the Surefuser in the palliative care setting”
- The Covid-19 Palliative Care Community of Practice members can direct questions and requests for advice on local practices to other COP members.

### Core Medications List for Community Pharmacies

The NSW Clinical Excellence Commission recommends community pharmacies in NSW stock the five injectable medicines on the Core Palliative Care Medicines List for NSW Community Pharmacy for use in the last days of life.

<table>
<thead>
<tr>
<th>Core Medicine</th>
<th>Indication/(s) for use in the last days of life</th>
</tr>
</thead>
</table>
| Clonazepam 1 mg/mL Injection           | Anxiety
                                             | Terminal restlessness |
| Haloperidol 5 mg/mL Injection          | Nausea |
| Hyoscine butylbromide 20 mg/mL Injection | Noisy breathing |
| Metoclopramide 10 mg/2mL Injection     | Nausea |
| Morphine 10 mg/mL Injection            | Pain
                                             | Dyspnoea |

### Additional guidance

NSW Health is aware that guidance on prescribing for Covid-19 positive patients is being developed by the Australian and New Zealand Society of Palliative Medicine (ANZSPM). Once available, this will be reviewed and communicated as appropriate.

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<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>INDICATION(S)</th>
<th>STARTING PRN DOSE for PRN medication</th>
<th>STARTING DOSE for REGULAR medication</th>
<th>GUIDANCE NOTES</th>
</tr>
</thead>
</table>
| MORPHINE     | PAIN & 1st line for BREATHLESSNESS | 2.5 mg subcut 1 (one) hourly PRN max PRN dose in 24 hours = 15mg (equivalent to 6 PRN doses) | See pain and/or dyspnoea management flowchart for guidance on recommencing regular subcutaneous morphine | • Morphine is recommended as first line subcut opioid for majority of patients in the last days of life  
• See guidance notes overleaf for prescribing recommendations for patients with pre-existing end stage kidney disease (eGFR <30)  
• Seek advice from local Specialist Palliative Care Team if conversion to alternative subcut opioid is required (see overleaf for contact details) |
|              | If not taking regular opioid (not on regular opioid for previous 7 days) |                                   |                                      |                                                                                                                                                                                                            |
|              | If on regular opioid (regular opioid use during the previous seven days) |                                   |                                      |                                                                                                                                                                                                            |
|              | See PAIN and/or BREATHLESSNESS management flowchart AND opioid chart on reverse of pain flowchart for guidance on conversion of oral/transdermal opioid to equivalent subcutaneous morphine |                                   |                                      |                                                                                                                                                                                                            |
| METOCLOPRAMIDE| 1st line for NAUSEA and/or VOMITING | 10 mg subcut 8 hourly PRN max PRN dose in 24 hours = 30mg (equivalent to 3 PRN doses) | 30 mg subcut in 24 hr syringe driver (plus PRN haloperidol) OR 10 mg subcut 8 hourly regularly (plus PRN haloperidol) | • Seek advice from local specialist palliative care team if recommended antiemetic(s) is contra-indicated:  
Metoclopramide  
• Maximum subcut stat volume = 10mg (2mLs)  
• Caution with abdominal colic  
• Do not use if bowel obstruction suspected  
Haloperidol  
• Preferred antiemetic in renal impairment  
Metoclopramide & Haloperidol  
• Do not use in Parkinson’s Disease or Lewy Body Dementia  
• Watch for extrapyramidal side effects (repetitive and involuntary movements, abnormal restlessness and parkinsonism including tremor, rigidity and bradykinesia) |
|              | & 1st line for RESTLESSNESS and/or AGITATION | 1 mg subcut 4 hourly PRN max PRN dose in 24 hours = 3mg (equivalent to 3 PRN doses) | 2 mg subcut in 24 hr syringe driver (plus PRN haloperidol) OR 1 mg subcut 12 hourly regularly (plus PRN haloperidol) |                                                                                                                                                                                                            |
| HALOPERIDOL  | 2nd line for NAUSEA and/or VOMITING | 1 mg subcut 4 hourly PRN max PRN dose in 24 hours = 3mg (equivalent to 3 PRN doses) | 2 mg subcut in 24 hr syringe driver (plus PRN haloperidol) OR 1 mg subcut 12 hourly regularly (plus PRN haloperidol) |                                                                                                                                                                                                            |
|              | & 1st line for RESTLESSNESS and/or AGITATION | 1 mg subcut 4 hourly PRN max PRN dose in 24 hours = 3mg (equivalent to 3 PRN doses) | 2 mg subcut in 24 hr syringe driver (plus PRN haloperidol) OR 1 mg subcut 12 hourly regularly (plus PRN haloperidol) |                                                                                                                                                                                                            |
|              | 2nd line for BREATHLESSNESS with ANXIETY | 1 mg subcut 4 hourly PRN max PRN dose in 24 hours = 15mg (equivalent to 6 PRN doses) | 1.2 mg subcut in 24 hr syringe driver (plus PRN midazolam) | *Midazolam  
• Is the benzodiazepine of choice for PRN dosing and regular dosing in a syringe driver  
**Clonazepam  
• Due to its long half-life, should be used when regular subcut benzodiazepine is required, but not in a syringe driver  
• Can be given by the SUBLING route as an alternative to SUBCUT route if parenteral access not available  
• If respiratory tract secretions occur, prompt management is required  
• Anticholinergic medications may be ineffective or only partially effective  
• There is no conclusive evidence of superior efficacy between the different anticholinergics  
• Hyoscine hydrobromide HAS NOT BEEN RECOMMENDED as a first line agent as it is contraindicated in renal impairment and may potentiate delirium and sedation |
| BENZODIAZEPINE| RESTLESSNESS and/or AGITATION | 2.5 mg subcut 2 hourly PRN max PRN dose in 24 hours = 15mg (equivalent to 6 PRN doses) | **Clonazepam ** 0.5 mg subcut 12 hourly regularly (plus PRN midazolam) |                                                                                                                                                                                                            |
|              | & 2nd line for BREATHLESSNESS with ANXIETY | 20 mg subcut 4 hourly PRN max PRN dose in 24 hours = 120mg (equivalent to 6 PRN doses) | 0.2 mg subcut 4 hourly regularly (plus PRN glycopyrrolate) |                                                                                                                                                                                                            |
| GLYCOPHYRIONUM / GLYCOPHYRROLATE | RESPIRATORY TRACT SECRETIONS | 0.2 mg subcut 4 hourly PRN max PRN dose in 24 hours = 1.2mg (equivalent to 6 PRN doses) | 1.2 mg subcut in 24 hr syringe driver (plus PRN glycopyrrolate) |                                                                                                                                                                                                            |
| OR           | HYOSCINE BUTYLBROMIDE (BUSCOPAN) | 0.2 mg subcut 4 hourly PRN max PRN dose in 24 hours = 120mg (equivalent to 6 PRN doses) | 0.2 mg subcut 4 hourly regularly (plus PRN glycopyrrolate) |                                                                                                                                                                                                            |
ANTICIPATORY PRESCRIBING IN THE LAST DAYS OF LIFE: Prescribing Information

- All patients in the last days of life should have subcutaneous PRN medications prescribed pre-emptively to ensure that there is no delay in treating the common symptoms that may be experienced in the last days of life if they occur.

Recommendations for STARTING doses – Last Days of Life

- This guide includes the recommended starting dose for first line medications to be pre-emptively prescribed for patients.
- Doses should be adjusted up or down to take into account the needs of the individual patient, including frailty and co-morbidities.
- Lower starting doses and/or PRN frequencies should be considered in the elderly or in patients with severe renal or hepatic impairment.
- Higher starting doses and/or PRN frequencies can be used if appropriate.

Recommendations for dose TITRATION

- Patients should be assessed regularly, at least every 4 hours or more often if symptomatic.
- Response to non-pharmacological interventions and/or PRN medication doses must be assessed following intervention; further management should be instigated if symptom remains despite initial intervention.
- Symptom control should be reviewed at least daily, or more often if symptoms are uncontrolled, and background medication doses titrated upwards accordingly.
- If >3 PRN doses are required in previous 24 hours and/or symptoms persist, regular medications should be commenced or regular doses increased: see symptom management flowcharts for specific guidance on dose titration for each of the common symptoms.

For patients with pre-existing end stage kidney disease (eGFR <30):

- All of the starting medications recommended overleaf can be used in renal impairment.
- For specific prescribing guidelines: seek advice from local Specialist Palliative Care teams.

For patients dying in ICU:

- The existing intravenous route may be preferred over the subcutaneous route for patients dying in the ICU setting: all last days of life anticipatory medication recommendations in these guidelines can be given intravenously in the ICU setting.

Syringe Driver Drug Combinations and Compatibility

- Compatibility data supports the combination of life anticipatory medications in a single syringe driver when diluted to maximum volume with 0.9% sodium chloride.
- When using alternative medications for symptom control advice regarding drug compatibility combinations should be sought from a medical officer or specialist nurse with appropriate knowledge and experience prior to administration.
- LHD policy and procedure must be followed when prescribing and administering medications via a subcutaneous syringe driver.

If required, seek advice from local Specialist Palliative Care team with regard to any of the above.

See Palliative Care Therapeutic Guidelines (http://www.tg.org.au) for further advice on drug compatibilities.

CONTACT DETAILS FOR LOCAL SPECIALIST PALLIATIVE CARE ADVICE

Telephone: [Contact information]

Available hours: [Contact hours]

For further symptom management and prescribing advice, see CEC Last Days of Life Toolkit Symptom Management Flowcharts and Palliative Care Therapeutic Guidelines (http://www.tg.org.au)

SYMPTOM MANAGEMENT IN THE LAST DAYS OF LIFE: Supporting Information

PRINCIPLES OF SYMPTOM MANAGEMENT IN THE LAST DAYS OF LIFE

- Assess patient at least every four hours: to allow existing and emerging symptoms to be detected, assessed and treated effectively.
- If symptom(s) present:
  1. Instigate non-pharmacological measures in the first instance.
  2. If non-pharmacological measures ineffective, give PRN medication and review to assess effectiveness.
  3. If medication ineffective, reassess and instigate further intervention to manage symptom.
- Communicate: explain likely cause and management of symptom to patient and family.

PAIN – see symptom management flowchart for dosage guidance and conversion tables

- Non-pharmacological measures:
  - Ensure comfortable position; consider repositioning and/or alternative mattress.
  - Exclude other causes of pain and distress (e.g. urinary retention, anxiety, fear); manage appropriately if present.
- If patients demonstrate opioid side effects or show clinical features of opioid toxicity:
  - Do NOT give an opioid antagonist (such as naloxone), as this will precipitate uncontrolled pain and/or opioid withdrawal symptoms.

NAUSEA AND/OR VOMITING – see symptom management flowchart

- Non-pharmacological measures:
  - Regular and effective mouth care.
  - Spits of water and ice chips.
  - Provision of tissues and vomit bag within easy reach.
- Nausea and/or vomiting can have multiple causes (i.e. gastrointestinal, central nervous, intracranial, vestibular and psychological).
  - See Palliative Care Therapeutic Guidelines (http://www.tg.org.au) for more detailed information and medication recommendations for specific causes.

RESTLESSNESS AND/OR AGITATION – see symptom management flowchart

- Agitated delirium and terminal restlessness is a COMMON symptom that occurs in the last days of life.
- Non-pharmacological measures should be considered before medications are introduced:
  - Exclude urinary retention; manage catheterisation if present.
  - Exclude constipation; consider management with rectal laxatives if present.
  - Consider nicotine replacement therapy if the patient is a smoker.
  - Assess for emotional, psychological and existential distress; address appropriately if present.

RESPIRATORY TRACT SECRETIONS – see symptom management flowchart

- Respiratory tract secretions are a normal part of dying process; they are not distressing to the patient, but often are for family and carers.
- Non-pharmacological measures:
  - Use a fan and/or an open window.
  - Maintain a calm environment.
- Suction is NOT RECOMMENDED and can be distressing to the patient.

BREATHELESSNESS – see symptom management flowchart

- Non-pharmacological measures:
  - Use a fan and/or an open window.
  - Maintain a calm environment.

If required, seek advice from local Specialist Palliative Care team with regard to any of the above.
A NURSE’S GUIDE TO USING THE SUREFUSER+™ IN THE PALLIATIVE CARE SETTING

Prepared by the Nepean Blue Mountains LHD Supportive and Palliative Care Nursing Team
April 2020
What is a SUREFUSER+™?

The Surefuser is an Elastomeric Infusion System available in a variety of flow rates and sizes, which can be pre-filled by a nurse, with a range of common medications used to manage symptoms in the palliative care setting.

The Surefuser is:

• Portable, lightweight
• Single use only and disposable
• Easy to load and prime
• Appropriate for subcutaneous use
• Available in 50ml, 100ml, 150ml, 250ml and 300ml sizes; 30min to 7 day duration
Why use a SUREFUSER+™ in the palliative care setting?

► An alternative way to provide a continuous background infusion of medications to control symptoms, other than a battery operated, reusable syringe driver

► Replace NIKI T34 with Surefuser on discharge to reduce the need to return NIKI T34 drivers to their place of origin

► To supplement the use of NIKI T34 Syringe Driver devices when demand for infusions is high such as during the COVID-19 pandemic crisis

► To reduce exposure of a nurse to an infectious patient by using a Surefuser that runs over 1, 2, 3, 5 or 7 days
Practice Points for the SUREFUSER+™

► Check compatibility and stability data of medications, particularly prior to opting for longer infusion times (eg. 48 hours or more)

► Doctors should prescribe clearly on a paper-based infusion chart in the same way as for other Continuous SubCutaneous Infusions (CSCIs). Orders will vary depending on the medication dose and which device you use:
  - eg: Morphine 20 mg CSCI over 48 hours
  - eg: Morphine 70mg CSCI over 7 days
  - The words ‘via Surefuser’ can be added by the doctor to the order to be safe

► PRN medication should still be given in the usual way via a separate subcutaneous ‘butterfly’ line
A NURSE’S GUIDE TO USING THE SUREFUSER+TM IN THE PALLIATIVE CARE SETTING

https://vimeo.com/403504780
Troubleshooting Key Points for the SUREFUSER+™

► Ensure the flow regulator is attached firmly to the patient’s skin as the flow is calibrated at skin temperature

► If the patient has a high fever for an extended period, the infusion may run up to 20% faster so monitor the infusion and the patient

► Gravity (too high or too low) may affect the flow so keep it in line with the patient

► Check the infusion regularly – see draft check sheet attached in education package
Troubleshooting Guide for the SUREFUSER+™

**NO FLOW**
- Is the clamp opened?
  - Yes → Is air trap found at the filter?
    - Yes → Tap/flick the filter and flow regulator to remove
    - No → Stop Using
  - No → Open the clamp
- Is crystalized drug found in the line?
  - Yes → Connect a luer lock syringe and pull/absorb air with the syringe.
  - No → Still no flow

**SLOW FLOW**
- Is the flow regulator in contact with patient's skin?
  - Yes → Is crystallized drug found in the line?
    - Yes → Attached the flow regulator on the patient's skin
    - No → Stop Using
  - No → Is the drug high viscosity?
    - Yes → Use with arterial injection
    - No → Stop Using
- Consult with the practitioner or supplier

**FAST FLOW**
- Did patient use an electric blanket?
  - Yes → Stop using an electric blanket
  - No → Is patient's skin temperature considerably higher than 32 degree? (ex: fever)
    - Yes → Consult with the practitioner or supplier
    - No → No

**LEAKAGE**
Check and record the leakage point, the condition after filling medicinal solution (Temp & Period), and when leakage is found

Contact to the Supplier

*Please keep the actual sample for investigations*
## Sizes and flow rates for the SUREFUSER+™

<table>
<thead>
<tr>
<th>Infusion time</th>
<th>Infusion Type</th>
<th>Volume</th>
<th>Reference code</th>
<th>Flow regulator (color-code)</th>
<th>MEAN Flow rate * ml/h</th>
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<tbody>
<tr>
<td>1 Day</td>
<td>Long Continuous infusion</td>
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<tr>
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<td>100 ml</td>
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<tr>
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<td>Long Continuous infusion</td>
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<td>1.5</td>
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</tbody>
</table>
Ordering information

- 50mL and 100mL Surefusers seem the most practical in the palliative care setting
- Surefusers cost $35 each 10 pcs in one box = $350 per box
- Clarify when ordering: one outer box of 50/100ml Surefuser+ contains 3 inner boxes (30 pcs)
- You will need to ensure adequate supplies of 50mL luer lock syringes and normal saline ampoules to load the infusers
- Call 1300 720 274 to order. Request a quote and submit through your local approval and procurement processes
- If bulk ordering for COVID-19 positive patient care, inquire about covering the cost under your local COVID-19 cost centre
Advice about the SUREFUSER+ ™

► Rep Details
  ► Alex McMichael  Market Manager – Hospital
  ► Nipro Australia Pty Ltd  Level 2.02, 657 Pacific Hwy, St Leonards NSW 2065
  ► P 1800 451 737 M 0417 565 830  F 02 9437 0860
  E alex@niproaustralia.com.au

► For any nursing questions, please call:
  ► Linda Ora, CNC Supportive and Palliative Care, NBMLHD
  ► 0437 810 954
  ► Please feel free to use or adapt these slides in anyway to suit your own workplace 😊
# SUREFUSER™ NURSING CHECK CHART - CHECK INFUSION AT A MINIMUM OF EVERY 4 HOURS

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Duration hours/days</th>
<th>Volume of device 50mL or 100mL</th>
<th>Rate mLs/hour</th>
<th>Subcut Site</th>
<th>VTBI 0 - 5 50mL device 0 - 10 100mL device</th>
<th>Clamp check off/on</th>
<th>Signature</th>
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<tr>
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<td>Infusion time (in days) located on the flow regulator</td>
<td>Rate located on flow regular</td>
<td>Document condition in progress notes</td>
<td>Note where the blue line is on the numbered scale</td>
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<td>Blue - 1 day Green - 2 days Cream - 3 days Orange - 7 days</td>
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<th>Rate mLs/hour</th>
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<td>0 - 5 50mL device</td>
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<tr>
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<td></td>
<td>Blue - 1 day</td>
<td>Green - 2 days</td>
<td>Cream - 3 days</td>
<td>Orange - 7 days</td>
<td>0 - 10 100mL device</td>
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PATIENT GUIDE

SUREFUSER™+
PORTABLE INFUSION SYSTEM

NIPRO
MEDICAL EUROPE
## CONTENTS

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Nipro’s Surefuser+ has been prescribed for your home infusion therapy and is designed to deliver your medication according to your personal treatment schedule as determined by your physician. This patient guide will help you become familiar with Surefuser+ and how it works.

This patient guide is intended as general information only and does not replace the information provided to you by your healthcare provider. Please ask your healthcare provider if you have any questions about this patient guide.

WHAT IS SUREFUSER+?

Surefuser+ allows patients to receive intravenous (IV) treatment in the comfort of home without being confined to bed. It is a disposable and portable elastomeric infusion pump, also called an ambulatory balloon infuser.

Simply stated, Surefuser+...

• is a self-powered pump that uses the force of a deflating medical-grade isoprene balloon to infuse medication via catheter
• does not require batteries or electricity
• ensures a silent operation without confusing alarms
HOW DOES IT WORK?

Before starting your treatment, always discuss with your healthcare provider the possible side effects of your treatment and what to do in case of complications or emergencies. Also make sure that you are aware of the safety precautions concerning the medication administered by Surefuser+.

Preparation

The hospital prepares the device for your therapy treatment. They load the prescribed medication by connecting a syringe to the pump. As they inject the medication, the balloon inflates, just like you would inflate a normal balloon.

Administration

As the balloon inflates, it stores energy that is used to push out the medication from the balloon into the infusion line. To ensure the medication flows at a constant rate, a flow regulator is integrated in the infusion line. It is the flow regulator that determines how fast your medication will be administered.

Based on the pump volume and speed of the flow regulator, your nurse will indicate to you when the balloon is expected to be empty. Connecting and disconnecting the device from your catheter should always be performed by a trained healthcare professional.

Disposal

Ask your healthcare provider regarding your country’s disposal guidelines. The pump should never be disposed of in your regular waste bin at home.
WHAT ARE THE DIFFERENT PARTS OF A SUREFUSER+?

- **Balloon pump**: Contains the medication for your therapy
- **Housing**: Protects the balloon containing your medication
- **Balloon volume**: The volume of the balloon pump at 100% filling grade
- **Scaling**: Allows you to monitor infusion progress
- **Clamp**: Allows you to stop infusion if you must pause or cease treatment
- **Infusion line**: Carries the medication from the balloon pump to your catheter
- **Dual filter**: Removes air from the infusion line and prevents particles larger than 0.2 µm from passing through
- **Flow regulator**: Determines the speed of infusion
  - Your doctor will have provided you a Surefuser+ with the correct flow rate for your therapy
- **Port cap**: Protects the port for filling the balloon with medication
- **Hydrophobic filter**: Allows air to pass, but stops liquids.
WHAT FACTORS MAY AFFECT INFUSION?

Although Surefuser+ does not require any intervention during the treatment duration, there are some external factors that can influence the infusion speed. It is best to keep these external factors as constant as possible to ensure a predictable treatment duration.

**Temperature**

The flow regulator, which regulates how fast the medication flows, is calibrated at skin temperature. Therefore, it is important to keep the flow regulator attached to your skin at all times.

The device itself is best kept at room temperature. When inside, keep it away from heat sources, such as radiators or the stove. When going outside, keep it out of direct sunlight (especially in the summer) and protect it under your clothes when going outside during colder periods. We recommend using the Surefuser+ carrying bag, as this bag is thermo-insulated.

**Balloon pump position**

The height position of the pump relative to the infusion point (your catheter location) also affects the infusion speed. For the medication to flow at a normal flow rate, the pump should be positioned at the same level of height as the infusion point. If the pump is kept in a higher position than the infusion point, the flow increases because of gravity. On the other hand, if the pump is below the position of the infusion point, the flow decreases.

**Dual filter**

The particle and air filter integrated into the infusion line is hydrophobic (tends to repel water). This cellulose filter allows air to ventilate from the infusion line as medication passes through. In order to maintain this ventilation, it is important to keep the dual filter dry at all times. Do not clean or disinfect the filter with soap, detergent, or alcohol. Note that perfume contains alcohol, so avoid spraying perfume near the filter.

MUST I DO ANYTHING DURING TREATMENT?

Surefuser+ is self-powered, but we advise that you regularly verify that the medication is being infused at the expected speed. Surefuser+ does not require any programming or adjusting once the therapy has begun. However, as explained above, infusion can be influenced by external factors. Checking if the balloon deflates as expected will give you a good indication of infusion progress. As the balloon deflates, the blue progression line moves along the scale, indicating the infusion progress.
Depending on the volume of the pump, the scaling goes from 0 – 3, 0 – 5 or 0 – 10 with intervals of 1.

- For volumes of 50 ml and 100 ml, each interval of 1 corresponds approximately to 10 ml.
- For volumes of 150 ml and 250 ml, each interval of 1 corresponds approximately to 50 ml.
- For the largest pump of 300 ml, each interval of 1 corresponds approximately to 100 ml.

Some examples of infusion progression:

<table>
<thead>
<tr>
<th>Infusion time</th>
<th>Blue line position</th>
<th>Infusion time</th>
<th>Blue line position</th>
<th>Infusion time</th>
<th>Blue line position</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 hr (start)</td>
<td>10</td>
<td>0 hr (start)</td>
<td>5</td>
<td>0 hr (start)</td>
<td>3</td>
</tr>
<tr>
<td>6 hrs</td>
<td>7-8</td>
<td>12 hrs</td>
<td>3-4</td>
<td>12 hrs</td>
<td>2-3</td>
</tr>
<tr>
<td>12 hrs</td>
<td>4-6</td>
<td>24 hrs</td>
<td>2-3</td>
<td>24 hrs</td>
<td>1-2</td>
</tr>
<tr>
<td>18 hrs</td>
<td>1-4</td>
<td>36 hrs</td>
<td>1-2</td>
<td>48 hrs</td>
<td>0-1</td>
</tr>
<tr>
<td>24 hrs</td>
<td>0-1</td>
<td>50 hrs</td>
<td>0-1</td>
<td>60 hrs</td>
<td>0-1</td>
</tr>
</tbody>
</table>

100 ml pump with 4.2 ml/hr flow rate

250 ml pump with 5 ml/hr flow rate

300 ml pump with 5 ml/hr flow rate

(Infusion end)
IS TREATMENT WITH SUREFUSER+ SAFE?

Yes! Your health and safety are of primary importance at Nipro. Therefore, we incorporated a number of safety mechanisms into Surefuser+ to ensure that you can receive your therapy safely and worry-free.

**Solid protection**

The light, but sturdy housing protects the balloon that contains your medication. It also keeps the medication safely contained within the device in the unlikely event that the balloon would leak. The filter on the bottom of the pump allows air to pass through, which allows the balloon to expand and deflate without additional pressure, while preventing liquid from passing through. Remember, this filter should be kept dry.

**Built-in “emergency brake”**

The clamp on the infusion line will allow you to stop the infusion at any time if you must pause or cease treatment. Just press firmly on the clamp and it will close the infusion line. Since the clamp is integrated into the infusion line, you will always have it handy if needed.

**Particle and air filtration**

The filter allows air to escape from the infusion line while also preventing any particles larger than 0.2 µm from passing through. As a reference, the bacteria *Staphylococcus aureus*, a strain that most commonly causes hospital-acquired infections, is 0.5 – 1.5 µm in size and cannot pass the filter.\(^1\)\(^2\) Remember, this filter should be kept dry.

**Carefully chosen materials**

Nipro’s strong focus on safety and health is also reflected in our choice of materials. The materials used to produce Surefuser+ are free of DEHP and latex. DEHP is a plasticizer that is known to be an endocrine disruptor, meaning this molecule can cause a disruption of normal hormonal balance.\(^3\) Latex is known to induce latex allergies after repeated exposure to products containing natural rubbers.\(^4\) Surefuser+ does not contain either material.
WHAT TO DO IN CASE OF...?

Nipro developed Surefuser+ with the utmost care, making patient safety our number one priority. In rare cases, you may encounter an unexpected scenario during treatment. We present the following situations for general reference. Always follow the guidelines provided by your HCP.

Air in the infusion line

The air filter will remove any air that may be present in the medication. In case there is still air in the infusion line after the air filter, call your hospital to determine if it is safe to continue treatment. If treatment should be stopped, close the clamp immediately to stop the infusion.

Medication that no longer flows

Verify that the clamp on the infusion line is open. Check the infusion line to make sure it is not twisted or kinked. If the clamp and infusion line are fine, try tapping the flow regulator with your fingertips while holding the filter vertically (see drawing). If the infusion still does not start, close the clamp and call your hospital to understand how to proceed.

Leakage

Close the clamp immediately. If leaking from the infusion line, close the clamp above the point where the leakage occurs. If leaking from one of the connections, check if they are closed tight. Remember to wear protective gloves while doing so. If leaking from the pump housing, place it in a plastic bag. Report all leakages to your hospital and follow their advice. If the medication came into contact with your skin, follow the guidelines provided by your hospital. In case of severe complications, call emergency services.

Infusion progression that is slower or faster than expected:

Call your hospital to determine if treatment can be continued or if it should be stopped. In the event treatment should be stopped, close the clamp on the infusion line and follow the guidelines provided to you by the hospital. In case of severe complications, call emergency services.

Bursting of the balloon

Close the clamp to stop treatment. Place the pump housing in a plastic bag. Call your hospital to understand how to proceed. Do not disconnect the infusion line from your catheter unless advised by your healthcare provider.
FAQ

Can I go outside with Surefuser+?
Yes, however, please remember that SureFuser+ must stay out of direct sunlight and should not be exposed to high temperatures. Please ensure the flow regulator is securely attached to your skin. The pump should be kept in its carrying bag, as the device must remain at room temperature.

Can I take a shower/bath while receiving treatment with Surefuser+?
Please check with your healthcare provider if it is ok for you to shower or take a bath. Please make sure that the pump housing and the infusion line are not submerged or exposed to a direct stream of water. Surefuser+ is water resistant, but not waterproof. The filter on the bottom of the pump and in the infusion line should not come into contact with water or soap.

Can I swim with Surefuser+?
No. Swimming is not allowed because Surefuser+ should not be submerged in water. Sauna or steam room visits are also not allowed.

Can I sleep with Surefuser+?
Yes. We recommend that you keep Surefuser+ in a secured place on or near your bed and at the same head height as your sleeping position. Do not keep it under your bed covers, as the pump needs to stay at room temperature.

Can I exercise with Surefuser+?
If your healthcare provider allows you to, it is acceptable to perform light exercise with Surefuser+ as long as it remains close to room temperature and is not exposed to water. Try to avoid heavy vibrations, as this might influence the flow rate. Always follow the guidelines of your healthcare provider.

Can I travel by air with Surefuser+?
We have not performed any tests that simulate the conditions of air travel, therefore we cannot ensure that the flow rate will stay within its claimed accuracy level. We recommend that you follow the advice of your healthcare provider.

Can Surefuser+ be worn in an MRI scanner?
Surefuser+ does not contain any metal parts and may therefore be worn safely while undergoing an MRI. Consult your HCP to ensure that your infusion port and/or catheter is suitable for an MRI.

Nipro Hospital Products division is part of Nipro Corporation Japan, a leading global healthcare company established in 1954. With over 28,000 employees worldwide, Nipro serves the Medical Device, Pharmaceutical, and Pharmaceutical Packaging industries.

From preparation to administration, Nipro Hospital Products has a comprehensive portfolio of disposable medical equipment for hospital and ambulatory use.

Nipro Hospital Products is one of the world’s largest manufacturers of high quality needles and infusion products, producing over 11 billion needles annually. With a global network of 6 manufacturing plants, Nipro Hospital Products continues to advance high quality products known for their safety and ease of use.

BECAUSE EVERY LIFE DESERVES AFFORDABLE CARE