Heart Disease Managed Clinical Network Clinical Guidelines
The Management of Subcutaneous (sc) Furosemide by Syringe Driver

Introduction
This guideline provides guidance for the use of subcutaneous furosemide for patients with distressing symptoms of breathlessness and peripheral oedema associated with end stage heart failure.

Subcutaneous furosemide should be considered for patients who have become unresponsive to, or are unable to take any oral medication. The main aim of this treatment is to relieve the symptoms of breathlessness and oedema that can be both distressing and debilitating to patients with end stage heart failure. These symptoms can have an acute or progressive onset and may continue throughout the illness trajectory until death.

NB: Patients should be reviewed by a Cardiologist to ensure that optimal cardiological treatment has been prescribed.

Indications for Subcutaneous Furosemide
- Patients, who are NYHA III/IV, have distressing and debilitating symptoms of breathlessness and/or oedema that have become unresponsive to, or are unable to take oral diuretics.
- Where the preferred place of care setting is home, hospice or nursing home.
- It may also be considered within a hospital care setting if venous access is either poor or felt not to be appropriate.

Recommended Infusion Sites
- Sites may be restricted in heart failure patients due to oedema
- Upper chest or anterior aspect of the arms may be suitable choices.
Infusion Dose and Administration

Dose should be decided by the Cardiologist/Hospital@Home Physician/GP.

<table>
<thead>
<tr>
<th>Name of Drug</th>
<th>Strength</th>
<th>Duration of Infusion</th>
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<tbody>
<tr>
<td>*Furosemide:</td>
<td>10mg/1ml</td>
<td>To be infused subcutaneously over 24hrs via McKinley pump.</td>
</tr>
<tr>
<td>Ampoule Size:</td>
<td>20mgs/2ml</td>
<td>Unlicensed route of commercially available preparations.</td>
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<tr>
<td>50mgs/5ml</td>
<td></td>
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<tr>
<td>250mgs/25ml</td>
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*Furosemide is approximately 60-70% bioavailable (but may be less in heart failure due to gastro-intestinal oedema).

Recommended Dosing Schedule

- Use the previous 24hr oral furosemide dose as a starting dose and titrate up or down according to the patients response. For example 120mgs/24hrs of oral furosemide should be converted to 120mgs/24hrs of subcutaneous infusion. Patients are often on high dose oral diuretics and would usually require to have an initial high starting dose of SC furosemide.

- If symptoms have not improved within 24hrs discuss with appropriate Cardiologist/Clinician and consider increasing the furosemide dose by 50%.

- If patient is able to take oral medications in addition to s/c furosemide consider adding a thiazide diuretic:
  - If eGFR > 30 add bendroflumethiazide (2.5mgs to 5mgs once daily/or alternate days or once weekly) OR
  - If eGFR < 30 add metolazone* (2.5mgs to 5mgs once daily/or alternate days or once weekly).

*Metolazone is unlicensed.

- Any changes to the furosemide and/or thiazide dose should always be discussed with the appropriate Cardiologist/Clinician.

Bolus Dose and Administration

- A subcutaneous bolus dose can be given as an alternative to a Subcutaneous Infusion
- Maximum dose per site should be no more than 2ml (20mgs). If larger doses are required, then give very slowly or consider using more than 1 site.
- A butterfly should be left in situ to facilitate subcutaneous boluses.
**Administration**

- Furosemide for continuous infusion will be prescribed on NHS Fife chart for subcutaneous infusion.
- Two pumps may be required, bearing in mind that the maximum volume that will fit into a 30ml BD Plastipak syringe is 22ml.
- Dilution may not be required; if a dilution is indicated then **Sodium Chloride 0.9% must** be used.

**Stability and compatibility**

- If unsure seek specialist palliative care/pharmacy advice.
- Exposure to light may cause degradation and discolouration. **(Do not use if the solution is a yellow colour)** and protect from light.
- **Should not be mixed with any other medication.**
- Furosemide 10mg/ml in polypropylene syringes (e.g. BD Plastipak) is stable at 25°C in normal light for 24 hours.

**Monitoring**

- Daily assessment and consultation with the appropriate Cardiologist/Consultant to review patient’s response to the prescribed furosemide dose. Consider recording daily weight, FEWS and bloods for U&E’s if appropriate.
- If symptoms have improved consider continuing with the current dose or a dose reduction in consultation with the appropriate clinician.
- If symptoms remain distressing consider titration of the dose in consultation with the appropriate Cardiologist/Clinician.
- Renal function **should not** be routinely monitored unless specifically requested or clinically indicated.
- Regular inspection of the infusion site is mandatory to detect early signs of irritation (redness, swelling and/or pain). Re-siting of the butterfly is necessary if either of the aforementioned symptoms are identified.
- The patient should be assessed for any continence problems that may develop as a consequence of improved urine output.
- If the patient becomes anuric the treatment should be stopped.
Other pharmacological interventions for optimal palliation of breathlessness

- Consider other pharmacological interventions if SC furosemide is not effective i.e. oral opioids:
  - morphine sulphate oral solution 2mgs as required (max. 6 doses in 24hrs)
  - oxycodone oral solution 1mg as required (max. 6 doses in 24hrs)
- SC morphine should be considered for patients who are unable to take any oral medications
- Sublingual lorazepam for anxiety induced breathlessness (0.5-1mg prn max. of 4mgs in 24hrs).
- GTN patches 10 to 20mg for patients who are unable to take any oral tablets and/or have distressing symptoms of breathlessness during the night (PND).
  (NB: It is important to provide at least 8 hours of nitrate-free period in each 24 hours).

Patient and Caregiver Information

- A full explanation of the benefits of treatment should be given to both the patient and their caregivers.
- A list of contact telephone numbers should be provided to address promptly any issues that develop with the McKinley Pump or Infusion and provide a patient information leaflet for the pump.

As there is very little published evidence to help guide the clinician, it is important to recognise that the content of this document is based on experiential observation/practice from different clinical teams across the UK.

References

1. South West London Palliative Care Group and Cardiac Network ‘Symptom Control Guidelines and Key Information in End-Stage Heart Failure’, 2007/08
2. Merseyside and Chesire Cancer Network ‘Symptom Control Guidelines for Patients with End-stage Heart Failure and Criteria for Referral to Specialist Palliative Care’, 2005
3. West Yorkshire Cardiac Network ‘Symptom Management Guidelines for patients in the later stages of heart failure and criteria for referral to Specialist Palliative Care’ 2008