

STANDARD OPERATING PROCEDURE FOR THE USE OF SUBCUTANEOUS FUROSEMIDE IN CHRONIC HEART FAILURE

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Author/Lead Job Title	Sharon Parsons, Heart Failure Specialist Nurse Janet Raw, Heart Failure Specialist Nurse
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VALIDITY – All local SOPS should be accessed via the Trust Intranet

CHANGE RECORD

Version	Date	Change details
1.0	August 2016	New SOP
1.1	January 2019	Minor changes. Standalone SOP supported by the Infusion Therapy Policy. No longer an appendix to the IV and SC policy which has been replaced by the Infusion Therapy Policy.
1.2	April 2022	Full review. Minor changes. Reference to LCAT and PADR removed and reference to Humber Competency Assessment Tool and Appraisal added. Link to safe and securing handling of medicines procedure updated. Titles updated in roles and responsibilities section Approved at DTG 21-Mar-22 and PHMD 28-Apr-22

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1. INTRODUCTION

The purpose of this document is to provide a standard operating procedure for the assessment and treatment of a patient with fluid overload, due to decompensated heart failure, with continuous subcutaneous (SC) furosemide. The document provides clear guidance for Humber Teaching NHS Foundation Trust nurses who include:

- Specialist nurses in heart failure that are non-medical prescribers and will prescribe the SC furosemide in agreement with the patient and their general practitioner (GP).
- Specialist nurses in heart failure that are not prescribers, but who will work with the GP who will prescribe the SC furosemide.
- The community nurse and ward nurse who will be competent to administer furosemide via a syringe pump, in the patient's own home or the community hospital's ward.

Chronic heart failure (CHF) is a common condition in the UK. Despite significant advances in management of the disease, patients will develop progressive end-stage CHF with its recognised symptom burden for patients and carers. As the disease progresses fluid balance can become precarious and is complicated by worsening renal function and increasing diuretic resistance. This results in "revolving door" admissions to hospital for parenteral diuretics, when time at home is precious. "Unlike cancer, where disease-specific treatment tends to become increasingly burdensome and futile (and possibly counter-productive), the continued disease specific treatment of CHF continues to be essential for symptom management even when end-stage."(Palliative care formulary September 2014 page 113).

Continuous Subcutaneous Infusion of Furosemide (CSCI-F) for selected patients with advanced CHF appears to be an effective route of parenteral diuretics. It gives the patient the option to stay at home with effective symptom management. The syringe pumps used are relatively lightweight, allow mobility and continued independence. A 24-hour infusion reduces intrusion on the patient's privacy and the patient can make plans around the timing of the infusion change (Zacharius et al, 2011).

Furthermore, this may offer a new option for patients who require more diuresis than oral medication alone may provide (JACC, 2016).

2. SCOPE

This standard operating procedure applies to patients over the age of 18 years with a diagnosis of heart failure, confirmed by echocardiogram, who need treatment for fluid overload due to deterioration of their condition when the oral route for diuretics is no longer effective. It can be delivered to patients in their own homes (including patients in care homes) and Trust community hospitals. Patients must be registered with a local GP.

For the purpose of this standard operating procedure the indications for use are as follows:

- Patients require parenteral diuretics for symptom control
- Patients wish to be cared for at home at the end of life and/or □ In whom hospital admission would provide additional benefit and/or
- Who decline the offer of admission after due discussion.

CSCI-F therapy can only be practiced by clinical practitioners who can evidence the necessary skills and competencies.

3. DUTIES AND RESPONSIBILITIES

Divisional Clinical Leads

To ensure that this SOP is acted on through a process of dissemination and implementation

Chief Pharmacist

To ensure the medication used in infusion is implemented and monitored as stated in the safe and secure handling of medicines procedures.

Team Leaders, Charge Nurses, Modern Matrons and Community Matrons

These roles are responsible for maintaining compliance with this standard operating procedure, ensuring practitioners receive appropriate training and support.

The Heart Failure Specialist Nurse (HFSN)

The patient will usually be under the care of an HFSN. If this is not possible, the situation should be discussed with the patient's GP and the registered nurse's manager to ensure furosemide can be administered safely.

- The HFSN will review the patient's CHF and symptoms and communicate with the prescriber and GP, if subcutaneous furosemide needs to be considered. If the HFSN is the prescriber they must also discuss and agree the treatment with the patient and their GP.
- The HFSN will monitor the response to treatment. If the dose needs adjustment they will inform the prescriber, who will adjust the diuretic dose dependant on the patient's response. Renal function should be monitored appropriately and, in accordance with the patient's individual care plan.
- If the HFSN is the prescriber they must also inform the GP in writing any changes made to the prescription
- The HFSN will liaise and support the community nursing team with the management of the patient's care and ensure there is an agreed written patient management plan

Independent Prescriber

Independent prescribers are responsible for maintaining and been able to evidence their competence in chronic heart failure and prescribing subcutaneous furosemide.

The prescriber will calculate the starting dose, usually the previous oral 24-hour requirement is used as a starting dose and titrated up or down according to response. For example, if the patient has been taking 120mg oral furosemide in 24 hours, start on 120mg/24 hours in the syringe pump. The prescriber should regularly review the effectiveness of the SC furosemide treatment.

Furosemide ampoules have a concentration of furosemide 10mg/ml in 2ml or 5ml ampoules. The injection is alkaline and it should not be mixed or diluted with glucose solutions or other acidic fluids. Prescribe sodium chloride 0.9% (10ml amps) as the diluent for mixing with the furosemide for subcutaneous route.

Furosemide is unlicensed for subcutaneous administration; however it is widely accepted in practice (See the "Palliative Care Formulary" cardiovascular section). The patient must be made aware the medication is to be used unlicensed and the appropriate leaflet should be provided.

Furosemide Information:

- Bioavailability 60-70% by mouth, but reduced by gastro-intestinal oedema in CHF Onset of action 30-60 minutes by mouth; two to five minutes intravenously (IV); 30 minutes subcutaneously (SC)
- Peak effect at 1-2 hours by mouth
- Plasma half-life 50 minutes-six hours in heart failure, 10 hours in end-stage renal failure. Duration of action four to six by mouth; four hours SC

Cautions: Increased risk of hypokalaemia, with steroids and β -adrenergic receptor agonists.

Undesirable effects:

- Site reactions soreness and erythema occur in some patients and can be managed by changing the site
- Transient pain at needle site
- Headaches
- Dizziness
- Fever
- Weakness
- Restlessness
- Blurred vision
- Deafness (more common in rapid IV administration)

NB: This information is not inclusive of all prescribing information and potential adverse effects. Please refer to the full prescribing data Summary of Product Characteristics (SPC), the BNF and the current Palliative Care Formulary (PCF). Information is also available at www.palliativedrugs.com.

The Administering Nurse

The administering nurse is responsible for maintaining their competency, to ensure they safely administer SC furosemide and work within the agreed written patient management plan.

4. PROCEDURES

4.1. T34 Syringe Pump Protocol and Patient Information

Ensure the patient has the information leaflet as per the T34 Syringe Pump Protocol and ensure urgent numbers are written on the leaflet so the patient can contact if they have any concerns.

4.2. The use of CSCI-F with other Subcutaneous Drugs

There is no firm evidence for the combination of furosemide with other subcutaneous drugs. A mixture of midazolam and furosemide in intensive care settings has caused cloudiness. If other medications are required, a separate pump should be used.

4.3. Drug Stability

Exposure to light may cause degradation and discolouration; the solution should not be used if a yellow colour is present. Furosemide 10mg/ml in polypropylene syringes is stable at 25°C in normal light for 24 hours. Ensure that the pump is not exposed to light, by covering or using a holder.

Choose the appropriate syringe size – 10ml, 20ml or 30ml for the volume to be infused; a diluent may or may not be necessary. The furosemide can be diluted with sodium chloride 0.9%. Furosemide must **not** be diluted in glucose solutions.

4.4. Chronic Heart Failure Management Plan

The patient must have an agreed written management plan which includes:

- The patient's current presentation and treatment
- What needs to be monitored and frequency of monitoring
- Clear guidance as to what to do if the patient's presentation changes

4.5. For Administration Implement

- T34 Syringe Pump Protocol
- The patient's management plan

- Only use the recommended infusion sites. Change the site every two to three days to minimise the risk of reaction
- Monitor the standards for diuretic management and weigh the patient daily (unless not appropriate), documenting in the patient's record
- Inform the HFSN or GP of any changes in weight (increase or decrease) and any concerns about the patient's condition.

4.6. Recommended Infusion Sites

- Upper chest
- Upper anterior aspect of arms

Sites are restricted in heart failure patients due to oedema. Sites to be avoided are bony prominences and areas where tissue is damaged, thus decreasing absorption.

4.7. Training

All Trust staff involved in prescribing and administering SC furosemide will have evidence of their competency. Training in the management of heart failure including the use of subcutaneous furosemide can be provided by the HFSN to the administering nurses. Other training and competency related to the procedures will also need to be in date, i.e. medicine optimisation training, syringe pump training, anaphylaxis and life support and infection control. The practitioner must have knowledge of the patient's condition and the current treatment including the medication and any specific monitoring requirements. The RN should be able to evidence their competency at their yearly appraisal using the approved Humber Competency Assessment Tools.

5. REFERENCES

- Arun K Vernea; Jack H Da Silva ; David R Kuhl (2004)
- Diuretic Effects of Subcutaneous Furosemide in Human Volunteer: A Randomised Pilot Study. The Annals of Pharmacology
- M J Johnson (2007) Management of End Stage Cardiac Failure
- Post Graduate Medical Journal June 2007 83(980): 395-401
- Zachar ias H, Raw J, Nunn Anne, Parsons, S, Johnson MJ (2011)
- Is there a role for subcutaneous furosemide in the community and hospice management of end- stage heart failure? Palliative Medicine. 2011; 25:658 - 663
- M A Goenaga; M Millett; E Sanchez; C Gorde; JA Carrera; E Arzellus (2004)
- Subcutaneous Furosemide Annals of Pharmacotherapy October 1 2004, 38 (10), p1751.
- Palliative care formulary September 2014 www.palliativedrugs.com
- De Boer R, A Maaten J, Damman K, Muntendam P, Sica D, A Veldhuisen D,V Pitt, B (2016) Pharmacokinetic and Pharmacodynamics Response to Oral and Subcutaneous Furosemide Administration: First Experiences With a Novel Buffered Furosemide Formulation In Patients With Chronic Heart Failure Journal of American Cardiology 2016 Vol 67 issue 13.
- Safe and Secure handling of medicines procedures:
[Safe and Secure Handling of Medicines Procedures Proc431.pdf \(humber.nhs.uk\)](#)