Guidance for the Prescribing of Subcutaneous Furosemide by Bolus or Syringe Driver for Heart Failure (Amber-G)

Introduction

This document sets out guidance for the assessment and treatment of fluid overload due to end-stage heart failure with continuous subcutaneous infusion of furosemide.

Patient suitability and the decision to start subcutaneous furosemide in those with end-stage heart failure should be a multidisciplinary approach – led by a consultant and/or specialist registrar in cardiology and consultant in palliative medicine and will involve heart failure specialist nurses. GP and community nursing staff should be informed of any treatment decisions, if not involved in the decision to initiate.

Recommendation is Amber with Guidance.

Background Information

Furosemide is a loop diuretic that is used to alleviate symptoms of congestive heart failure (CHF) due to left systolic dysfunction. It is the standard first line therapy for the treatment of symptomatic fluid overload in congestive heart failure.

The doses and subcutaneous use were initially based on the clinical experience of the Heart Failure and Specialist Palliative Care teams in Scarborough, in turn based on the evidence referenced. This approach has been undertaken in Doncaster and Bassetlaw since the development of this guidance (around ten years) and many other teams around the country now have similar guidance.

There are a relatively small number of end-of-life heart failure patients in whom starting subcutaneous furosemide is an appropriate option. These will be patients requiring parenteral diuretics for symptom control:

- who want to be cared for at home at the end of life, and or
- in whom hospital admission would not confer additional benefit at the patient's stage of illness, or
- if the patient declines admission after due discussion of the options.

For patients in the last days of life, monitoring of weight and blood tests may not contribute to symptom control. For the patient with a longer prognosis, review every 24 hours aiming for a daily weight loss of at least 1kg/day. The use of telemedicine and self-management is already used in this group of patients by the cardiology and heart failure teams.

A plan for monitoring and advice will be decided for each individual and then supervised by the Heart Failure specialist nurses and team, in collaboration with

specialist teams, where appropriate. Some patients may benefit symptomatically and not achieve a 1kg weight loss and this needs to be assessed individually. Other palliative/symptom control choices will be discussed with the patient and family and at times it will be that subcutaneous furosemide is only part of achieving better symptom control for the patient and family.

Using the subcutaneous route gives the patient the option to stay at home with effective symptom management. It avoids the necessity of intermittent intravenous furosemide and the siting of a cannula. The syringe drivers used are lightweight, allow mobility and continued independence. The continuous infusion reduces intrusion into the patient's privacy and allows community/ward nursing staff to plan care around the timing of the infusion change.

Prescribing

Furosemide ampoules have a concentration of 10mg/ml and are available in 2ml, 5ml and 25ml 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) for mixing with the furosemide for subcutaneous route.

Oral bioavailability 60-70% (but reduced by gastro-intestinal oedema in CHF)

Onset of action 30-60 minutes (oral); 2-5 minutes (intravenous); 30 minutes (subcutaneous)

Peak effect at 1-2 hours (after oral administration)

Plasma half-life 1-6 hours (up to around 10 hours in end-stage renal failure)

Duration of action 4-6 hours

Cautions

Increased risk of hypokalaemia with steroids, B-adrenergic receptor agonists.

Undesirable effects

For full list see manufacturers SPC (via www.medicines.org.uk)
Transient pain at the site of subcutaneous injection
Headaches, dizziness, fever, weakness, restlessness, blurred vision, deafness (usually after rapid intravenous injection)

Calculating the starting dose

1.Use the previous oral 24-hour requirement as a starting dose and titrate 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 driver. This will be reviewed by the community heart failure nurses working with the team at home (District

nurses/GP/cardiology/Specialist palliative care team) or in hospital. Lower initial doses may be given as subcutaneous bolus injections.
2.For severe pulmonary oedema in the terminal patient furosemide 20-40mg subcutaneous/intramuscular every 2 hours can be used. Doses above 50mg should be given by infusion.
3.This shared care arrangement covers doses up to 220mg/24 hours with patients on doses greater than this being retained by the relevant consultant.
4.It should be noted the maximum capacity for a single syringe driver is 220mg. Syringe drivers running over a 24h period can use undiluted furosemide up to a dose of 220mg in 24 hours. If the maximum dose possible via a syringe driver is ineffective with regard to weight loss, then a clinic reassessment and judgement will be required and the future management plan negotiated with the patient and family as appropriate.
5.Oral diuretics being taken by the patient should be stopped for the period of time that subcutaneous furosemide is being administered, but oral metolazone (or bendroflumethiazide) therapy could be considered as part of the clinical management plan to control fluid overload if required.

There is no good evidence for the combination of furosemide with other subcutaneous drugs. Any admixture of drugs in a syringe driver should be with the agreement of the consultant in palliative medicine. A mixture of midazolam and furosemide in ITU settings has caused cloudiness.

Setting up the syringe driver

Follow the policies and procedures for syringe driver and subcutaneous medicines in the patients setting.

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^{o}C in normal light for 24 hours. Ensure that the driver is not exposed to light, by covering or using a holder.

Choose the appropriate syringe size (eg. 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.

Recommended Infusion Sites

Upper chest
Upper anterior aspect of arms

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

If there is very poor peripheral perfusion in the terminal stage, subcutaneous absorption may be limited and stat doses of intramuscular diuretics or alternative measures such as opioids (e.g. morphine subcutaneously), anti-muscarinics, buccal nitrates or sedation may be needed to alleviate terminal pulmonary oedema.

Consultant in Cardiology or Palliative Medicine Responsibilities, with clinical input and support from the Heart Failure Specialist nursing team:

- Assess heart failure patient symptoms with regard to appropriateness of subcutaneous furosemide use, considering any contraindications.
- Initiate and titrate the dosage regimen for subcutaneous furosemide either as an inpatient in the hospital or hospice, or on an outpatient/home visit assessment.
- Assess response and side effects.
- Arrange shared care with the GP when the patient is managed on a stable regimen.
- Provide clear instructions to the GP, heart failure nurses, district nurses, community specialist palliative care nurses and other consultants involved in the patients care. The patient will have a copy of this letter and advice.
- Provide a copy of these letters to the Out of Hours services in case of deterioration or if the patient requires additional medications.
- The consultant on call for palliative medicine can be contacted through Doncaster Royal Infirmary switchboard for these patients and advice on symptoms and issuing prescriptions out of hours.
- Provide patient/carer with relevant plan, information on use, side effects and need for monitoring of medication.
- Ensure the prescription is written for an appropriate quantity to vials for subcutaneous use to ensure continuity of supply in the community.
- Review the patient's response and continuing appropriateness of subcutaneous furosemide at specified intervals, sending a written summary to the GP. This may be facilitated by the Heart Failure team.
- Provide any other advice or information for the GP and district nursing, hospital teams or hospice teams if required.
- Provide clear advice for pre-emptive prescribing of subcutaneous furosemide and any syringe driver use.
- Stop the treatment when no longer considered to be appropriate.

GPs can undertake

- Once stable, prescribe subcutaneous furosemide and arrange ongoing monitoring as agreed with the specialist (this is usually between *twice weekly* and *alternate days*).
- Refer to specialists when symptoms fail to respond to the subcutaneous furosemide or when change of administration route may be indicated.
- Review the patient at regular agreed intervals to monitor control of symptoms.
- Identify adverse drug reactions and report to Specialists and CSM.
- Liaise with community and specialist nurses, as appropriate to provide ongoing patient care and monitoring.

District nursing team/community specialist palliative care nurses/ward nursing teams/hospital specialist palliative care nurses

- Should ensure that they have this advice and an understanding of the use of furosemide by subcutaneous routes when admitting the patient/completing a care plan or first assessment and reviews.
- Understand that the subcutaneous route will use vials of 10mg/ml in the form of 2ml, 5ml or 25ml vials prescribed.
- Understand the time that it may take to obtain furosemide vials for subcutaneous use in the community and work with the team and the patient to plan that the medication does not run out.
- Be aware of the potential side effects and beneficial effects of subcutaneous furosemide from this advice.
- Have the contact details for the GP, Heart Failure nurses and or consultants in palliative medicine or cardiology in the patient's care plan to ensure adequate patient monitoring and understand who to contact if problems arise.
- Follow the usual policies for syringe drivers, “Dear Sister” instructions and care plans as for any syringe driver or subcutaneous medications prescribed as per policy within the organization in which the nursing staff are employed.

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

The Consultants in Palliative Medicine are available during working hours through their secretaries and out of hours there is a consultant in Palliative medicine available through DRI switchboard.

References

Management of End Stage Cardiac Failure
M J Johnson
PostGraduate Medical Journal June 2007; 83(980): 395-401

Examples of Other Local Guidance

Hull & East Yorkshire:
https://www.hey.nhs.uk/wp/wp-content/uploads/2019/12/furosemideCommunityAdultsEndStageHF.pdf

York & Scarborough:
http://www.yorkandscarboroughformulary.nhs.uk/docs/BNF/02/Guidelines%20for%20subcutaneous%20Furosemide%20in%20the%20community.pdf

West Midlands:
http://www.wmcares.org.uk/wp-content/uploads/CSCI-furosemide-new-format.pdf

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