Guidance for the Use of Subcutaneous Furosemide by Continuous Infusion for Heart Failure in Community Settings

NHS Highland

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Introduction

This document sets out the guidance for the assessment and treatment of symptomatic fluid overload and end stage heart failure with subcutaneous furosemide via continuous subcutaneous infusion.
The guidance applies to patients requiring subcutaneous furosemide at the near end of life stage of their condition. The decision to change from oral to subcutaneous furosemide would be made by the palliative care team, cardiologist or GP and supported by the heart failure specialist nurses and community nursing team.

Background information

Patients with heart failure are commonly prescribed diuretics as part of their treatment. If they become more symptomatic (e.g. increasing oedema, weight and/or breathlessness) whilst taking oral diuretics, treatment with parental (normally intravenous) furosemide may be helpful. Until now this has usually necessitated admission to an acute hospital.

Subcutaneous furosemide may be an alternative way of managing these patients, especially when admission to hospital may be deemed inappropriate, e.g. in patients nearing the end of life who wish to remain at home. It may also allow discharge from hospital for those patients requiring ongoing treatment with parental diuretics.

There is limited research on the use of subcutaneous furosemide but research produced by the Heart Failure and Specialist Palliative Care teams in Scarborough, is very positive. This team have used subcutaneous furosemide with 43 patients at home in 3 years. Other specialist palliative care, cardiology and heart failure teams around the country use this approach.

There are a 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 are unresponsive to high dose oral diuretics
- with poor or no venous access.
- where care is being delivered at home

For patients in the last days of life, the monitoring of weight and bloods will not contribute to symptom control and should not be undertaken. For patients with a longer prognosis, it is important that they are reviewed every 24 hours aiming for a daily weight loss of no more than 1kg/day. Blood monitoring should be carried out on a twice weekly basis to monitor for renal dysfunction, unless the monitoring of blood chemistry would not change management plans.

Some patients may benefit symptomatically and not achieve a weight loss; this needs to be assessed on an individual basis. Other palliative/symptom control choices will be discussed with the patient and their carer(s) and at times it will be that subcutaneous furosemide is only part of achieving better symptom control for the patient and their carer(s).

Using the subcutaneous route gives the patient the option to stay at home. 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 twenty-four hour infusion reduces intrusion into the patient's life and allows community 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 or 5ml ampoules.

Setting up the syringe driver

Reference should be made to instructions and guidance on the general use of syringe drivers.

An appropriate syringe size, 10 to 30ml, should be used. If a diluent is required, sodium chloride 0.9% should be used. The injection is alkaline and **must not** be mixed or diluted with glucose solutions or other acidic fluids due to risk of precipitation.
Furosemide should not be mixed with other medicines.

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.

Recommended infusion sites

Upper chest
Upper anterior aspect of arms

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

If there is very poor peripheral perfusion in the terminal stage, subcutaneous absorption may be limited. In these circumstances intermittent bolus doses of intramuscular diuretics as well as alternative measures may be needed to alleviate terminal pulmonary oedema.

Calculating the starting dose

1. Use the previous 24 hour oral furosemide requirement as an initial subcutaneous dose and titrate up or down according to response. (For example, if the patient has been taking 120mg oral furosemide in 24 hours, start with 120mg/24 hours subcutaneously in the syringe driver). This will be reviewed by the heart failure nurses working in conjunction with the multidisciplinary team Lower starting doses may be given as subcutaneous bolus.
2. For severe pulmonary oedema in the terminal patient furosemide 20-40mg subcutaneously or intramuscularly every 2 hours can be used. Doses above 50mg should be given by infusion.
3. The maximum capacity for a single syringe driver is 240mg (30ml syringe) in 24 hours. If a higher dose if furosemide is required this could be achieved by having two syringe drivers running simultaneously over a 24h period with up to 240mg in each.
4. If the maximum dose possible via a syringe driver is ineffective with regard to weight loss, then a clinical reassessment and judgement will be required and the future management plan negotiated with the patient and their carer(s) as appropriate.

Key considerations

- **Do not start a patient on subcutaneous furosemide if daily clinical review is not possible.**
- **Review the dose daily, aiming for weight loss of approximately 1kg/day or a dose sufficient to alleviate symptoms.**
- **If this is not achieved then the options are for dose escalation and/or addition of thiazide/aldosterone antagonist. Advice should be sought as appropriate.**
- **If the patient's condition is still not improving, consider if it would be appropriate to switch to a diuretic administered intravenously.**

Decisions to escalate treatment as above, should always be made in discussion with the patient and their carer(s).

Contra-indications and side effects

As listed in the BNF and the Summary of Product Characteristics for the product.

Syringe driver site reactions may occur; most are mild but occasionally can be troublesome. Daily inspection of the site is mandatory and re-siting necessary at the first sign or symptom of a site reaction (redness, swelling, pain).

In situations of symptom management/palliative care the prescriber(s) should always balance the risks and benefits of treatment in discussion with the patient and their carer(s).

NB. If the patient becomes anuric during the terminal phase the furosemide should be stopped

Advantages to the patient

Administration of subcutaneous furosemide 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 twenty-four hour infusion reduces intrusion into the patient's life and allows community staff to plan care around the timing of the infusion change.

Audit and Monitoring

Implementation of this policy requires to be monitored by capturing a minimum dataset for each patient administered subcutaneous furosemide, including assessing:

- Management of fluid overload
- Relief of symptoms such as breathlessness and fatigue
- Patient reported outcomes such as improved sleeping patterns and general comfort
- Complications including infusion site problems, medical devices issues

Additional Reading

Beattie, J M and Johnson, M J (2012)
Subcutaneous furosemide in advanced heart failure: has clinical practice run ahead of the evidence base?
Supportive and Palliative Care; vol 2(1): pp5-6

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Annals of Pharmacotherapy; vol 38 (10): pp1751

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Management of End Stage Cardiac Failure
Post Graduate Medical Journal; vol 83(980): pp395-401

Vernea, Arun K et al (2004)
Diuretic Effects of Subcutaneous Furosemide in Human Volunteer: A Randomised Pilot Study.
The Annals of Pharmacology; vol 38: pp544-549.

Zacharias, H et al (2011)
Is there a role for subcutaneous furosemide in the community and hospice management of end-stage heart failure?
Palliative Medicine; vol 25(6): pp658-663.

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