Furosemide by continuous subcutaneous infusion

Amber–for medicines normally initiated by a specialist but may be used by generalists.

Introduction

This guide is intended for use in primary and secondary care to support the management of patients receiving furosemide by furosemide by continuous subcutaneous infusion (CSCI) for the treatment of fluid overload in conditions such as end stage chronic heart failure or end stage renal failure, to alleviate the symptoms of breathlessness and oedema.

Furosemide CSCI should normally be initiated by a specialist familiar with its subcutaneous administration, this would include palliative care, cardiology and renal, but may be used by experienced generalists. Patients require ongoing specialist supervision.

Description

Furosemide is a potent loop diuretic which inhibits the reabsorption of sodium and chloride in the ascending loop of Henle in the kidney, resulting in increased urinary excretion of water and sodium. Urinary excretion of potassium, magnesium, hydrogen and chloride is also increased.

Preparations

Note: Administration via the subcutaneous (SC) route is unlicensed.

Furosemide	10 mg/ml injection	2 ml, 4 ml, 5 ml and 25 ml ampoules

ALKALINE PH 8.0–9.3: do not mix in CSCI with other drugs

DILUENT: 0.9% sodium chloride

Indications

Management of symptomatic fluid overload in patients with chronic heart failure or end stage renal failure (ESRF) who require parental diuretics as a result of:

- minimal or no response to high dose oral diuretics
- or no longer able to swallow oral diuretics, and
- no venous access possible or appropriate.

Cautions

Furosemide should be used with caution in:

- severe electrolyte disturbances
- elderly patients (lower dose)
- renal and hepatic impairment
- diabetes mellitus (may cause hyperglycaemia), or
- partial obstruction of urinary outflow, for example, prostatic hypertrophy.

Contraindications

There are no absolute contraindications to the use of furosemide in palliative care. However, the prescriber must carefully consider the following conditions before prescribing furosemide and the dose should be carefully titrated:

- anuria
- renal failure because of nephrotoxic or hepatotoxic drugs
- hepatic encephalopathy
- severe hypokalaemia or severe hyponatraemia, and
- dehydration/hypovolaemia.

Patients allergic to sulphonamides may show cross-sensitivity to furosemide.

Drug interactions

For full list see manufacturers summary of product characteristics (SPC) www.medicines.org.uk/emc/ or refer to the current edition of the BNF (British National Formulary (NICE))

- Concurrent use of furosemide with risperidone in elderly patients with dementia is associated with increased risk of death.
- Furosemide-induced electrolyte disturbances can increase the risk of:
    - cardiac arrhythmia and death with drugs known to prolong the QT interval, such as, citalopram or methadone, and
    - digoxin toxicity.
- Furosemide can decrease vancomycin levels by up to 50 %.
- Furosemide can affect glucose tolerance necessitating increases in the dose of insulin required.

Liver impairment: Use with caution

Renal impairment: Monitor during use

Monitoring:

Patients require close monitoring.

- Monitor clinical symptoms and signs of breathlessness, weight, oedema, as normal. Adjust the dosage accordingly.

- Measuring serum urea and electrolytes only if worsening renal function would change your management.
- Monitor the injection site for signs of irritation or infection.
- Consider blood glucose monitoring.

For patients in the last days of life:

Blood tests are not routinely required in the last days of life.

For patents with a longer prognosis, not considered to be in the last days of life:

It is important that patients are reviewed every 24 hours aiming for a daily weight loss of no more than 1 kg/day. Blood monitoring should be carried out on a regular basis to monitor for renal dysfunction, unless the monitoring of blood chemistry would not change management plans.

Side effects

For full list see manufacturers SPC www.medicines.org.uk/emc/ or refer to the current edition of the BNF https://www.medicinescomplete.com/

- Transient pain at site of subcutaneous injection.
- Mild gastrointestinal disturbances.
- Biochemical disturbances.
- Tinnitus and deafness.

Dose and administration

CSCI Use the previous oral (PO) 24-hour requirement as a start dose for CSCI in a syringe pump. Titrate up or down according to response.

A PO: intravenous (IV):SC conversion ratio of 1:1:1 is generally used (based on bioavailability this represents an increase in dose when switching from oral dosing).

Infuse subcutaneously over 24 hours.

Usual maximum daily oral dose is 160 mg. Higher doses may be initiated by specialists.

As furosemide injection is 10 mg/ml the practical dose limit for a syringe pump is 200 mg/24 hours for a 30 mL syringe. Higher doses may need two syringe pumps or consideration of use of a 50 ml syringe (dependent on lock box availability and risk assessment) caused by infusion volume.

Diluent: If remaining syringe volume allows for diluent, dilute with 0.9% saline for injection a diluent may not be necessary. Do not mix or dilute with glucose solutions.

Compatibility: Do not mix with any other drugs. Furosemide injection is alkaline and there is a high risk of incompatibility when mixed with acidic drugs.

Subcutaneous bolus 20 mg (2 mL) subcutaneously as required.

The concentration of available formulations makes doses greater than 20 mg (2 mL) at a single injection site impractical. If a 40 mg injection is needed, the dose can be split into 2x 20 mg (2 mL) injections given at separate sites.

Diuresis will be stimulated within 30 mins and last for approximately 4 hours.

Consider 'rescue' bolus doses of subcutaneous furosemide in cases of more acute decompensation or where pulmonary oedema is suspected.

Discontinuing treatment: seek specialist advice

This may be needed if:

- treatment is ineffective
- the patient is experiencing side effects, or
- the patient is in the last days of life and it is no longer felt to be necessary or appropriate.

Practice points

- Recommended infusion sites are the upper chest and upper anterior of arms. Infusion sites are restricted in patients with heart failure due to probable oedema.
- Syringe pump site reactions may occur; most are mild but occasionally can be more troublesome. The cannula should be re-sited at the first sign or symptom of a site reaction (redness, swelling, pain).
- Oral bumetanide 1 mg is equivalent to oral furosemide 40 mg.
- Exposure to light may cause degradation and discolouration. Do not administer if the solution is discoloured.
- Do not start a patient on SC furosemide without regular assessment.
- Inform patient/carers that treatment will provide symptomatic relief only.

References

Furosemide 10mg/ml Injection BP (Hameln). Summary of Product Characteristics (SPC). Accessed 03 Feb 2025 https://www.medicines.org.uk/emc/

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