

GUIDELINES FOR THE INITIATION AND TITRATION OF LOOP DIURETICS IN ADULTS WITH LEFT VENTRICULAR SYSTOLIC DYSFUNCTION



South London Cardiac and Stroke Network

South East & South West London Cardiac and Stroke Network

The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Guideline rational: Diuretic therapy provides the mainstay of symptomatic management of heart failure. However, evidence is lacking demonstrating morbidity and mortality benefits. Generally monotherapy with loop diuretics (known as high ceiling agents as response increases with increasing dose) or thiazide diuretics (known as low ceiling agents as optimum response is reached at low dose) is preferred. Patients with refractory oedema may require combination therapy, although this increases the risk of provoking biochemical disturbances. Generally loop diuretics are first line therapy when treating decompensation. The loop of choice would be furosemide with bumetanide reserved for those patients unresponsive to furosemide. **NB. 1mg of bumetanide is equivalent to a 40mg dose of furosemide.**

Indications: Loop diuretics should routinely be used for the relief of congestive symptoms and fluid retention in patients with heart failure, and titrated (up and down) according to need following the initiation of subsequent heart failure treatments. Some patients will require diuretics as maintenance therapy.

Contra-indications	Cautions
<ul style="list-style-type: none"> - Hypersensitivity to these compounds - Hypovolaemia - Dehydration - Severe hypokalaemia $K^+ < 3.3\text{mmol/L}$ - Severe hyponatraemia $Na^+ < 130\text{mmol/L}$ - Comatose or precomatose states associated with liver cirrhosis - Anuria - Renal failure due to nephrotoxic or hepatotoxic drugs 	<ul style="list-style-type: none"> - Hypotension - Prostatic enlargement or impaired micturition - Gout - Diabetes - Hepatic impairment* - Renal Impairment* - Pregnancy* - Breast feeding* - Drug interactions*

* See relevant section of the BNF

Initiation of loop diuretics

- Start with a low dosage of furosemide and increase slowly until clinical improvement of signs and symptoms of congestion.
- Dose must be adjusted, particularly after restoration of dry weight, to avoid the risk of renal dysfunction and dehydration. Aim to achieve dry weight with lowest achievable dose.

The following checks should be carried out before initiating/increasing/decreasing loop diuretics: Patient weight, fluid status, heart rate, BP, JVP and baseline blood chemistry. (e.g. serum creatinine, urea, potassium, sodium and eGFR)

Monitoring response to therapy / increasing doses

If the patient presents with signs of worsening heart failure with either:

- an increase of weight of 1.5-2kg in 2-3 days;
- increasing peripheral or sacral oedema

Consider the following:

- Does the patient have features indicating severe decompensated heart failure that may warrant hospital admission?
- Is the peripheral oedema above knee level? If so contact the heart failure team to discuss management
- Is the patient taking $\geq 80\text{mg}$ of furosemide twice daily, or the equivalent dose of bumetanide? If so advice should be sought from the heart failure specialist team or hospital physician before increasing the dose

If not:

- Where possible ascertain & treat the cause of fluid retention e.g. non compliance with medicines, infection of any cause, atrial fibrillation and fluid or salt excess.
- Patients should be advised to limit their salt and fluid intake (1.5 -2litres per day). Ask patient to record daily weights
- The patient's diuretic dose should be increased or initiated initially for 3 days. Furosemide should generally be increased in 40mg increments, bumetanide in 1mg increments.

Frusemide: (dose may be split am/pm)		Bumetanide: (dose may be split am/pm)	
Current Dose	Increase to	Current Dose	Increase to
40mgs od	80mgs od.	1mg od	2mgs od
80mgs od	80mgs & 40mgs	2mg od	2mgs & 1mg
80mgs & 40mgs	80mgs bd	2mgs & 1mg	2mgs bd

- The patient should be reviewed again after 3 days. An adequate response to treatment would be improved symptoms and weight reduction of 0.5 kg/day. The dose increment should be maintained and advice sought from the heart failure team if the dry weight is not regained after 3 days of increased diuretic therapy.

It may be worth considering increasing ACEI dose or adding in spironolactone if BP and renal function permits.

A thiazide diuretic (bendroflumethazide or metolazone) can be used in combination with a loop diuretic, in cases of severe fluid overload. This will result in a powerful diuresis and should be initiated only on advice from the **specialist heart failure service**

Monitoring response to therapy / decreasing doses

- This should only be undertaken cautiously. The dose should only be reduced from the usual maintenance only if there are signs of volume depletion and hypoperfusion i.e. evidence of significant weight loss from dry weight (≥ 1 kg) rising blood urea (≥ 5 mmol/L or ≥ 25 per cent) and/or symptoms of dizziness (e.g. postural hypotension) or feeling "dried out".
- The dose of diuretic should not be reduced if there is peripheral oedema or if the JVP is elevated. If the patient has a rising blood urea, falling weight and/or symptoms of dizziness/dehydration but peripheral oedema consider seeking advice from a cardiologist.
- Dose reduction should be carried out by 40mg furosemide or 1mg bumetanide increments that are the reverse of the up-titration guidelines outlined above.
- The patient should be contacted 48 hours later to assess his/her response to the dose reduction.

Problem Solving

- **Symptomatic hypotension (<100mmHg associated with dizziness, fainting and confusion):** Discuss with cardiologist regarding fluid and electrolyte replacement with careful monitoring of serum electrolytes:
 - Check blood chemistry
 - Encourage fluid intake
 - Withhold one to three diuretic doses and lower doses by one step (as per table overleaf).
 - Counsel patients to avoid abrupt postural changes.
 - Reassess BP and hypotensive symptoms in 3 days
 - If patient remains symptomatic, review vasodilators and if taking ramipril once a day, consider splitting dose to twice a day. Reassess BP and hypotensive symptoms in 3 days if symptoms persist consult specialist.
- **Electrolyte disturbances:** May be manifested by weakness, dizziness, mental confusion, anorexia, lethargy, vomiting, and cramps.
- **Hypokalaemia:** The serum potassium level may overestimate total body potassium stores.
 - For hypokalaemia consider increasing ACEI/ARB if possible or replace with Sando K usual dose 2 tds for 3 days.
 - Consider addition of spironolactone if clinically indicated.
- **Hypomagnesaemia:** Discuss with Consultant Cardiologist
- **Hyponatraemia**
 - Fluid restriction
 - Reduce or stop diuretics if possible
 - Seek advice if serum sodium falls below 130mmol/L (this is a poor prognostic indicator)
- **Insufficient response or diuretic resistance**
 - Check compliance and fluid intake
 - Increase dose of diuretic as detailed above
 - Consider switching from furosemide to bumetanide
 - Administer loop diuretic twice daily or on an empty stomach
 - Discuss with the heart failure team for other options for management
- **Hypovolaemia/dehydration**
 - Assess volume status
 - Consider diuretic dose reduction as documented above
- **Hyperuricaemia/gout**
 - For acute gout attacks, physician to treat with colchicine and **avoid NSAIDs**.
 - For frequent gout attacks, consider prophylaxis with allopurinol.
- **Increased fasting blood sugar:** review for new diagnosis of diabetes
- **Renal Failure**
 - Check for hypovolaemia/dehydration
 - Exclude other nephrotoxic agents e.g. NSAIDs, Trimethoprim
 - Withhold aldosterone antagonist
 - Consider a reduction of ACEI/ARB in line with individual drug guidelines
 - Discuss with renal team or heart failure team at the hospital with regards to deteriorating renal function
- **Rash/allergy to furosemide:** Bumetanide can be used in patients allergic to furosemide. 1mg of bumetanide is equivalent to 40mg of furosemide.
- **Photosensitivity:** Take protective measure (sunscreen, protective clothing) against exposure to UV light or sunlight.

Patient information

- Time of the taking the loop diuretic is not fixed, however it is better to avoid taking after 4pm as this can lead to nocturia
- Report dizziness/light-headedness as this may be indicative of over treatment
- Encourage patient to self weigh daily (after waking and voiding but before breakfast and dressing) and an action plan if sudden weight gain.
- Report sudden or sustained weight increase or decrease (more than 1kg over 3 days) to a specialist nurse or GP
- Report any symptoms of fluid overload i.e. increased breathlessness, frothy sputum, peripheral oedema to a specialist nurse or GP
- Diarrhoea, vomiting, hot weather and poor fluid intake exacerbate dehydration. Contact GP if persists for > 2-3 days
- Gout can occur

References

- Chronic Heart Failure. NICE clinical Guideline CG108. Issued Aug 2010 Available from <http://guidance.nice.org.uk/CG108/Guidance>
- ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2008. Available from <http://www.escardio.org/guidelines-surveys/esc-guidelines/GuidelinesDocuments/guidelines-HF-FT.pdf>
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- Acknowledgments to Northampton General Hospital, Kings College Hospital and St George's Hospital & Gloucestershire Countrywide Primary Care Heart Failure Guidelines