Furosemide is important in the management of heart failure (HF) symptoms / congestion (e.g. shortness of breath, increase in weight, swelling), but it does not reduce the risk of mortality & can limit titration of HF medications that do (e.g. ACEI / ARB / ARNI, β-blocker, MRA, SGLT2i). As such, furosemide should be reassessed at every visit & titrated to the minimum effective dose to maintain euvolemia – which may include reducing it to PRN use. Several factors influence fluid status (see below), & adjusting furosemide can help reduce the risk of volume depletion (e.g. low blood pressure, decline in renal function) & volume overload (e.g. new or worsening HF symptoms, ER visit or hospital admission). Certain patients may be able to self-adjust their furosemide, after receiving initial guidance from the healthcare team with instructions on when to seek further support.

**Furosemide Oral Sliding Scale for Heart Failure Outpatients**

**Goal: Euvolemia**

At dry weight with no or mild HF symptoms (i.e. NYHA class I to II). Dry weight = ideal weight without extra fluid accumulation / congestion, which can change over time. Furosemide dose required to achieve euvolemia is individualized & can range from no furosemide required → furosemide PRN only → scheduled low daily dose → scheduled high BID dose ± metolazone. Dose required to maintain euvolemia can change over time.

**Considerations for Assessing & Managing Hypovolemia / Volume Depletion, with Goal of Achieving Euvolemia**

- **Is the patient experiencing any signs & symptoms of hypovolemia, without signs / symptoms of worsening heart failure?**
  - Postural hypotension > SBP 20/DBP 10mmHg
  - Postural ↑ in heart rate >30bpm
  - Weight stable or below dry weight
  - Weak, tired
  - Confused
  - Cool, clammy skin
  - Reduced urine output

- **Does their bloodwork suggest they are “dry” / no congestion?**
  - Decline in renal function
    - Was an ACEI, ARB, ARNI, MRA or SGLT2i recently started or titrated?
    - SCR / BUN ratio <12 (or <10)
    - ↑ K⁺ (stop K⁺ supplement, if applicable)
    - NTproBNP / BNP stable or reduced

- **Is the patient taking more diuretic than prescribed?**
  - Explore & address reasons for over-use
  - Re-visit plan for when to contact healthcare provider(s)

- **Is the patient drinking less than 1.5 L / day?**
  - Consider all fluids, including soup
  - Recommend ↑ to 1.5 - 2 L of fluid / day

- **Does the patient have an acute illness with fluid loss?**
  - E.g. fever, diarrhea, vomiting
  - Hold SADMANs medications while ill (e.g. ACEI, ARB, diuretics, SGLT2i); restart when patient is feeling well again

- **Reduce or Hold Diuretic(s)**
  - **If the patient is on metolazone**, reduce or hold for 2 to 3 days prior to adjusting furosemide
  - **If not on metolazone**, reduce furosemide in 20mg to 40mg increments, or hold for 2 to 3 days
    - If the patient is on furosemide BID dosing, use clinical judgement to determine if decreasing one or both doses
  - **If an ARNI or SGLT2i was recently started**, reduce furosemide by 30-50%
  - **If the patient is on spironolactone**, remember it is a weak natriuretic agent; it usually only needs to be held if hyperkalemia

- **Reassess in 2 to 3 days**
  - Reassess signs & symptoms of both hypovolemia & HF, along with bloodwork (e.g. renal function, electrolytes, NTproBNP / BNP); adjust according to clinical scenario, for example:
    - **If still hypovolemic & no HF symptoms**, further reduce furosemide by 20mg to 40mg increments
    - **Euvolemic & no HF symptoms**, continue to hold diuretic & monitor; educate patient to report if / when HF symptoms return
    - **If mild HF symptoms**, consider restarting diuretic at same or lower dose, or monitor & restart if symptoms worsen

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**NEW CONSIDERATIONS FOR ASSESSING & MANAGING HYPERVOLEMA / VOLUME OVERLOAD, WITH GOAL OF ACHIEVING EUVOLEMIA**

- **Physical assessment considerations:** elevated jugular venous pressure, pulmonary crackles, edema, S3 heart sounds
  - ↑ weight of > 2lbs (1kg) over 2 days, or 5lbs (2.5kg) over a week
  - daily weight should be recorded & taken first thing in the morning, after emptying the bladder, & without clothes on or similar amount of clothes every day
  - a patient can be congested without an ↑ in weight
  - new or worsening:
    - edema *
    - shortness of breath at rest or on exertion
    - reduced energy
    - orthopnea (difficulty breathing lying down or reclined)
    - paroxysmal nocturnal dyspnea (waking up short of breath)
    - cough

  * Some ankle edema at the end of the day is normal; elevate the legs for 30 to 60 minutes before bed if the patient experiences nighttime shortness of breath. Compression stockings may be helpful for some; caution in symptomatic heart failure.

- **Does their bloodwork suggest congestion? Concurrent illness with similar symptoms?**
  - ↑ NTproBNP / BNP > 30% (ARNI can ↑ BNP initially)
  - atrial fibrillation, pneumonia, anemia, COPD, etc

- **Is the patient taking less diuretic than prescribed?**
  - explore & address reasons for under-use
  - if concerned about incontinence / urgency during outings: suggest taking diuretic when they return home
  - if concerned about nocturia: dose diuretic no later than mid-afternoon

- **Is the patient drinking more than 2L / day? Consuming too much salt?**
  - consider all fluids, including soup; recommend decreasing to 2L of fluid / day
  - recommend ≤2g of salt / day when hypervolemic; 20% of ER HF exacerbations are due to sodium indiscretions

- **Is the patient taking medications that can exacerbate HF?**
  - e.g. NaCl tablets, NSAIDs, COXIB, corticosteroids, androgens, estrogens: stop or ↓, if possible
  - recently started / ↑ β-blocker (transient fluid retention)

**FUROSEMIDE ORAL SLIDING SCALE FOR HEART FAILURE OUTPATIENTS**

At dry weight with no or mild HF symptoms (i.e. NYHA class I to II). Dry weight = ideal weight without extra fluid accumulation / congestion, which can change over time. Furosemide dose required to achieve euvoolemia is individualized & can range from no furosemide required → furosemide PRN only → scheduled low daily dose → scheduled high BID dose ± metolazone. Dose required to maintain euvoolemia can change over time.

<table>
<thead>
<tr>
<th><strong>Start or Increase Diuretic</strong></th>
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<tbody>
<tr>
<td>- if no, start furosemide 20mg to 40mg po once daily</td>
</tr>
<tr>
<td>- if yes, ↑ oral dose by 20mg to 40mg; for example:</td>
</tr>
</tbody>
</table>
  - furosemide 20mg po daily → 40mg po daily |
  - furosemide 40mg BID → 60mg in am & 40mg noon |
  - furosemide 100mg po BID → 120mg po BID |

<table>
<thead>
<tr>
<th><strong>Reassess in 2 to 7 days</strong></th>
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<tr>
<td>- reassess HF symptoms &amp; bloodwork (renal panel, electrolytes, NTproBNP/BNP); adjust to clinical scenario; e.g.:</td>
</tr>
</tbody>
</table>
  - if dry weight not achieved or HF symptoms continue → ↑ by another 20mg to 40mg increments (oral) |
  - BID may provide additional benefit, if the extra dose can be remembered & it does not ↓ QoL e.g. housebound |
  - if ≥2 increases in furosemide does not provide relief, consider adding metolazone 2.5mg daily x 3 days; some patients will require longer use |
  - if dry weight achieved & HF symptoms resolved, consider reducing to previous dose |
  - some patients may only need a few days of extra furosemide, especially if cause of hypervolemia corrected (e.g. sodium indiscretions, drinking >2L/day) |
  - if hypervolemia recurs, may need to maintain the higher furosemide dose; reassess in the future |
  - higher doses of furosemide may be required in CKD in order to reach the site of action in the nephron |
  - if hypokalemia or K+ trending towards lower limit, consider starting / titrating an ACEI, ARB, ARNI or MRA if possible, or starting a K+ supplement (reassess K+ regularly) |

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References: