

Intravenous Diuretic Regimen for Ambulatory Patients with Congestive Heart Failure
Providence VA Medical Center

1. Initial visit by member of the Cardiology Service (Pharm D, RN and/or MD). Completion of a problem focused history and physical including documentation of central venous pressure and degree of edema. Review of home medication profile, diet, activity level, presenting heart failure symptoms, NYHA class and daily weights. Patient will be instructed to take his/her medications with them to 4B.
2. Assess vital signs including Weight, EKG, chem-7, heparanized Potassium, BNP, digoxin (if indicated) and magnesium levels (blood work to be ordered as STAT)
3. If systolic BP <90 mm Hg or HR < 50 bpm and symptomatic, patient should be assessed for ER/hospitalization. If patient is asymptomatic or SBP >90 mmHg and HR >50, IV diuretic regimen should be initiated:
 - a) In patients not taking oral diuretic therapy at home, the initial IV furosemide bolus should be 40 mg IV for patients with serum creatinine levels <1.5 mg/dL and 80 mg IV for patients with serum creatinine levels >1.5 mg/dL.
 - b) In patients already taking oral diuretics at home, an IV bolus of furosemide equivalent of the patient's total daily dose of furosemide (e.g. 40 mg bid = 80 mg bolus) should be given up to a maximum of 160 mg IV.
4. Vitals and urine output should be checked and recorded at least hourly.
5. Patient should have a fluid restriction of a maximum of 500 ml in 12 h and should also have a low salt diet while in station.
6. CHF team should be notified in 2 hours by the 4B staff to assess the response to IV diuretic therapy. In the first two hours, the initial goal of urine output is > 500mL for patients with creatinine levels <1.5 mg/dL. For patients with creatinine levels >1.5 mg/dL, an acceptable urine output is > 250mL in the first two hours.
7. If the patient attains the initial goal diuresis 2 hours after the initial IV bolus, the previous dose should be repeated every 2 hours until a total goal urine output of 1-2 liters is attained.
8. If the patient fails to attain the goal diuresis 2 hours after the initial IV bolus, the previous dose may be increased by 50%. The dose increase should be repeated every 2 hours until a maximum dose of 160 mg is reached or 1 liter of urine output is attained. If diuretic goals have not been attained by 6 hours of the stay or if maximum dose of furosemide has been reached, Zaroxolyn 2.5 mg P.O. 30 minutes prior to the IV diuretic dose should be given. If diuretic goals have not been attained by 8 hours of the stay or if maximum dose of furosemide has been reached in addition to Zaroxolyn 2.5 mg P.O., Zaroxolyn 5 mg P.O. 30 minutes prior to the IV diuretic dose should be given.
9. Electrolyte deficiencies, particularly hypokalemia and hypomagnesemia, are the most common adverse effects experienced with IV diuretic therapy, although hypotension is also possible.

10. A management strategy for electrolyte disturbances in this setting is included in the appendix. If electrolytes were replaced, a repeat chem-7, Heparanized Potassium, and Mg levels when applicable should be drawn and results reviewed prior to patient's discharge.
11. Notify CHF team if the following is noted:
 - a) Symptomatic systolic BP > 180 mmHg on two consecutive measurements
 - b) Symptomatic systolic BP <90 mmHg on two consecutive measurements
12. For symptomatic hypotension, give 0 .9% NS 250 ml bolus. With resolution of symptoms or systolic BP increased to > 90 mmHg, continue vital sign monitoring every 15 min x 1h, then resume standard monitoring and protocol if no further abnormalities. If hypotension and symptoms persist, give another 0 .9% NS 250 ml bolus at least 15 min apart from the first bolus. If hypotension and symptoms persist 30 min after second bolus – cardiologist should be called to assess patient and make recommendations.
13. Patient disposition should be assessed by the CHF team prior to 4 pm. A decision for discharge or admission to observation status will then be determined based on patient's clinical status.
14. If patient needs to be admitted to observation status, the CHF team needs to contact bed control for a direct admission for stable patients. If patients are unstable, ER should be alerted and patients should be sent to the ER for immediate evaluation.

15. Appendix

Potassium replacement P.O. as follows:

Serum Creatinine	Potassium (K+) Level				
	< 3.0 meq/l	3.0 – 3.2 meq/L	3.3 – 3.9 meq/L	4.0 – 5.0 meq/L	>5.0/meq/L
<1.4 mg/dl	Notify CHF team	60 mEq	40 mEq	No Rx	Notify CHF team
1.4 – 2.0 mg/dl	Notify CHF team	40 mEq	20 mEq	No Rx	Notify CHF team
2.0 – 2.8 mg/dl	Notify CHF team	20 mEq	20 mEq	No Rx	Notify CHF team
>2.9 mg/dl	Notify CHF team	Notify CHF team	Notify CHF team	No Rx	Notify CHF team

4. Magnesium replacement P.O. as follows

Serum Creatinine	Magnesium Level			
	<1.0 meq/L	1.0 – 1.6 meq/L	1.7 – 1.9 meq/L	>2.0 meq/L
<3.0 mg/dl	Notify CHF team	MagOx 800 mg	MagOx 400 mg	No Rx
>3.0 mg/dl	Notify CHF team	MagOx 400 mg	No Rx	No Rx