BROWN EMERGENCY MEDICINE CDU
CONGESTIVE HEART FAILURE TREATMENT PATHWAY

BACKGROUND

Purpose: This observation unit pathway is designed for stable patients with acute decompensated heart failure. Unstable patients or patients with acute co-morbidities are not candidates for the CDU.

Objective: The CDU management of these patients aims first to initiate timely and appropriate treatment for acute decompensated congestive heart failure and second to provide optimized targeted care to reduce hospitalization and healthcare costs.

THE PATHWAY

Suggested Early Discharge Criteria (patients with all of the following low risk criteria should strongly be considered for discharge from the Emergency Department): Patients with adequate response to ED therapy (>500cc of urine within two hours of receiving IV dose of loop diuretic, normal vitals, and subjective symptom improvement) who have no high-risk markers, no significant acute co-morbidities, or self-care barriers should be considered for discharge from the emergency department with close primary care or cardiology follow up.

Inclusion Criteria:

- Previous history of congestive heart failure
- Evidence of congestive acute decompensated heart failure based on history and confirmed by physical exam, chest x-ray and/or laboratory studies
- Acceptable VS: SBP>100 and <180, RR<32, HR<100, afebrile, pulse ox >92% on room air
- High likelihood of correction to baseline status within 24 hours with good home support
- No acute co-morbidities

Exclusion Criteria:

- New onset congestive heart failure
- Unstable vital signs
- Patient currently requiring vasoactive drips, invasive or noninvasive ventilation
- Evidence of acute cardiac ischemia (ECG changes, rising troponin, ongoing chest pain, unstable angina) or new arrhythmias
- Acute co-morbidities: sepsis, pneumonia, new murmur, altered mental status
- Abnormal labs: Hgb <8, renal failure (Cr>2.75 or BUN>60), Na<130, K <3, Mg <1.1
- Troponin elevation parameters: Follow hs-Troponin algorithm. If trending upward, repeat Troponin at 4 – 6 hours in the CDU. If rising >120 contact cardiology for admission to the cardiology service.

- Patients who require a conversation with cardiology prior to admitting to the CDU: BNP>840, ejection fraction < 30% on last echocardiogram
- Patients with a history of: severe aortic stenosis, cardiac transplant, advanced renal or liver failure
- Evidence of poor perfusion (confusion, cool extremities, generalized weakness, nausea/vomiting)
- Any condition found on the "CDU Universal Exclusion Criteria" list
- Requiring more assistance for ADLs than the CDU is capable of safely providing (one assist/patient for units with 5:1 maximum staff:patient ratio and no assists for units with >5:1 maximum staff:patient ratio)
- Unlikely discharge within 48-hrs. (ED attending discretion)

Admitting to the CDU CHF Pathway:

- From 0700-2300
    - Call the CDU APP to ensure bed availability and give verbal sign-out
    - CDU APP will place the CDU admission orders
- From 2300-0700
    - ED attending is responsible for ensuring CDU bed availability
    - ED attending will place CDU orders (instructions can be found in BEMhelp.org or in hard copy binders in physician work areas)
- Cardiologist Notification (TMH only):
    - CVI patients: no cardiologist notification is required for CDU overnight admissions, please contact during the day
    - For all other cardiology groups (CINE, Southcoast, privates, etc): a call must be placed 24hours/day to notify the cardiologist that they have a patient being admitted to the TMH CDU that will need to be seen in the morning

Potential CDU Interventions (Orderset Components)

Nursing Interventions

- Telemetry
- Vital signs Q4 hours
- Weight on arrival and daily AM
- Strict Intake/Output monitoring:
    - Fluid restriction (<1500mL/24hr)
    - UOP goal: 250-500mL in first 2hr after IV diuretic, goal 500mL -1L/day
- Cardiac diet (+/- diabetic)
- Activity as tolerated
- Smoking cessation education
- Congestive heart failure education

Laboratory Testing

- Initial Hepatic function panel (if not already ordered)
- Troponin I (if initial is negative, no need to repeat)
- BMP with Magnesium QAM (pre-checked)

Other Testing (ordered as needed)

- ECG
- CXR 1 view
- CXR PA/Lat

Disease Specific Medication Options in the Orderset

- Aspirin table 81mg Qday
- Acetaminophen 650mg Q6h (pre-check order, PRN mild pain)
- Nitroglycerin SL tablet 0.4mg PRN chest pain, Q5min up to 3 doses, hold for SBP<90, notify ED physician
- Docusate Sodium 100mg BID (unchecked)
- Nitroglycerin 2% ointment, 0.5 inch topical, Q8hr chest pain (unchecked)
- Intravenous furosemide/bumetanide guidelines (tables 1, 2) (unchecked panel)
- Potassium and Magnesium repletion guidelines (tables 3, 4) (unchecked panel)
- Nicotine replacement guideline (unchecked panel)

Inpatient Consultations

- Cardiology (pre-check order)
- Palliative Care (unchecked)
- Respiratory Care (unchecked)
- Case Management (unchecked)
- Social Work (unchecked)

Disposition Criteria

Home

- Subjective improvement (no chest pain, orthopnea or dyspnea on exertion above baseline)
- Acceptable VS (O2 sat at baseline or >94%, RR<20, HR<100, SBP>100)
- If done: negative serial ECGs, static cardiac biomarkers, normal range electrolytes, acceptable echocardiogram
- Evidence of adequate diuresis (>1L urine output, decrease in weight, decrease in JVD)
- CHF discharge education complete (HF diet, smoking cessation, adequate follow up plan)

Hospital

- Persistent or unimproved symptoms of acute decompensated congestive heart failure (hypoxia, rales, dyspnea, orthopnea)

- New ischemic ECG changes, arrhythmia, or rising cardiac biomarkers
- Failure to adequately diurese
- Persistent electrolyte abnormalities
- Poor outpatient support
- Emergency medicine attending discretion

Table 1: Intravenous Furosemide Dosing Guideline

Time	Dose
0hr	Give IV furosemide mg equivalent to home PO dose up to 80mg, if not on furosemide, give furosemide 40mg IV
3hr	If adequate urine output response, make no changes, enter this IV dose as a Q12hr scheduled dose until clinically improved; monitor and replete electrolytes per protocol
	If inadequate urine output response, double the initial IV furosemide dose and recheck response at 6hr mark
6hr	If adequate urine output response, enter the last IV dose as standing Q12h scheduled dose until clinically improved; monitor and replete electrolytes per protocol
	If inadequate response significantly deranged electrolytes/renal function, discuss cardiology admission with EM attending
N.B. Adequate urine output response is approximately 250-500mL of urine in the 2hrs after the IV dose; ultimate goal is approximately 0.5-1L of urine output per day (equivalent to 0.5-1kg body weight)	

Table 2: Intravenous Bumetanide Dosing Guideline

Time	Dose
0hr	Give IV bumetanide mg equivalent to home PO dose up to 2mg
3hr	If adequate urine output response, make no changes, enter this IV dose as a Q12hr scheduled dose until clinically improved; monitor and replete electrolytes per protocol
	If inadequate urine output response, double the IV bumetanide dose to a maximum of 3mg IV and recheck response at 6hr mark
6hr	If adequate urine output response, enter the last IV dose as standing Q12h scheduled dose until clinically improved; monitor and replete electrolytes per protocol
	If inadequate response significantly deranged electrolytes/renal function, discuss cardiology admission with EM attending
N.B. Adequate urine output response is approximately 250-500mL of urine in the 2hrs after the IV dose; ultimate goal is approximately 0.5-1L of urine output per day (equivalent to 0.5-1kg body weight)	

Table 3: Potassium Repletion Dosing Guideline (Normal Range 3.6-5.2 mEq/L)

Potassium Level (mEq/dL)	PO Dose*	IV Dose*
3.7-3.9	20 mEq	---
3.3-3.6	40 mEq	10mEq
3.0-3.2	40 mEq x2 doses, 4hr apart	10meQ x 4 doses
<3.0, Notify ED MD/DO	---	10mEq x 6 doses
*If Cr >2.5mg/dL, decrease the potassium dose by half *N.B.* PO route generally preferred over IV. If administering IV, give no more than 10mEq/hr through peripheral IV.		

Table 4: Magnesium Repletion Dosing Guideline (Normal Range 1.5-2.6mg/dL)

Serum Magnesium	IV Dose
1.5-1.9	2g Magnesium sulfate x 1 dose
1.2-1.4	2g Magnesium sulfate x 2 doses
0.8-1.1, Notify ED MD/DO	2g Magnesium sulfate x 3 doses
N.B. Administer no more than 2g/hr	

Last Update: 12/18/22, EEG