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# Essential OU Protocols and Pathways Part 1: Cardiovascular Complaints

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# Disclosures

None

# Objectives

The W’s

Why observe?

Who to observe?

When to observe?

What happens in observation?

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# Transient Ischemic Attack

# Background

- Affects ~0.3% of United States population annually
- Risk of subsequent ischemic stroke is up to 5% in first 48 hours and up to 12% in first 30 days
- 75% of patients admitted with transient ischemic attack stay in the hospital for ≥ 2 days
- Longer length of stay is associated with 2- to 5- fold increase in hospitalization charges
- TIA observation protocols can reduce ED length of stay and hospital length of stay without increased adverse outcomes

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# Emergency Department Evaluation

- EKG
- Head CT
- CT angiogram/perfusion
- Thrombolytic evaluation
- Risk stratification
- Neurology input

Table 1. AHA and NSA Recommendations

| Association | Admission Criteria |
|---|---|
| AHA | $ABCD^2$ score of ≥3, $ABCD^2$ score of 0–2 and uncertain follow-up, or $ABCD^2$ score of 0–2 and evidence that focal ischemia occurred. |
| NSA | Consider admission if first TIA within 24–48 h. For recent TIA within one week, hospitalization is needed for crescendo TIA (worsening TIAs), duration of symptoms longer than 1 h, internal carotid stenosis greater than 50% with symptoms, known cardiac source of embolus, or hypercoagulable state. |

AHA = American Heart Association; NSA = National Stroke Association; TIA = transient ischemic attack.

ABCD2 Score:

- Age >= 60
- Elevated BP >= 140/90
- Diabetes
- Unilateral weakness
- Impaired speech
- Symptom duration

# Risk Stratification

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ABCD3-I Score:

- Age >=60
- Elevated BP >= 140/90
- Diabetes
- Unilateral weakness
- Impaired speech
- Symptom duration
- Dual TIA
- Positive imaging

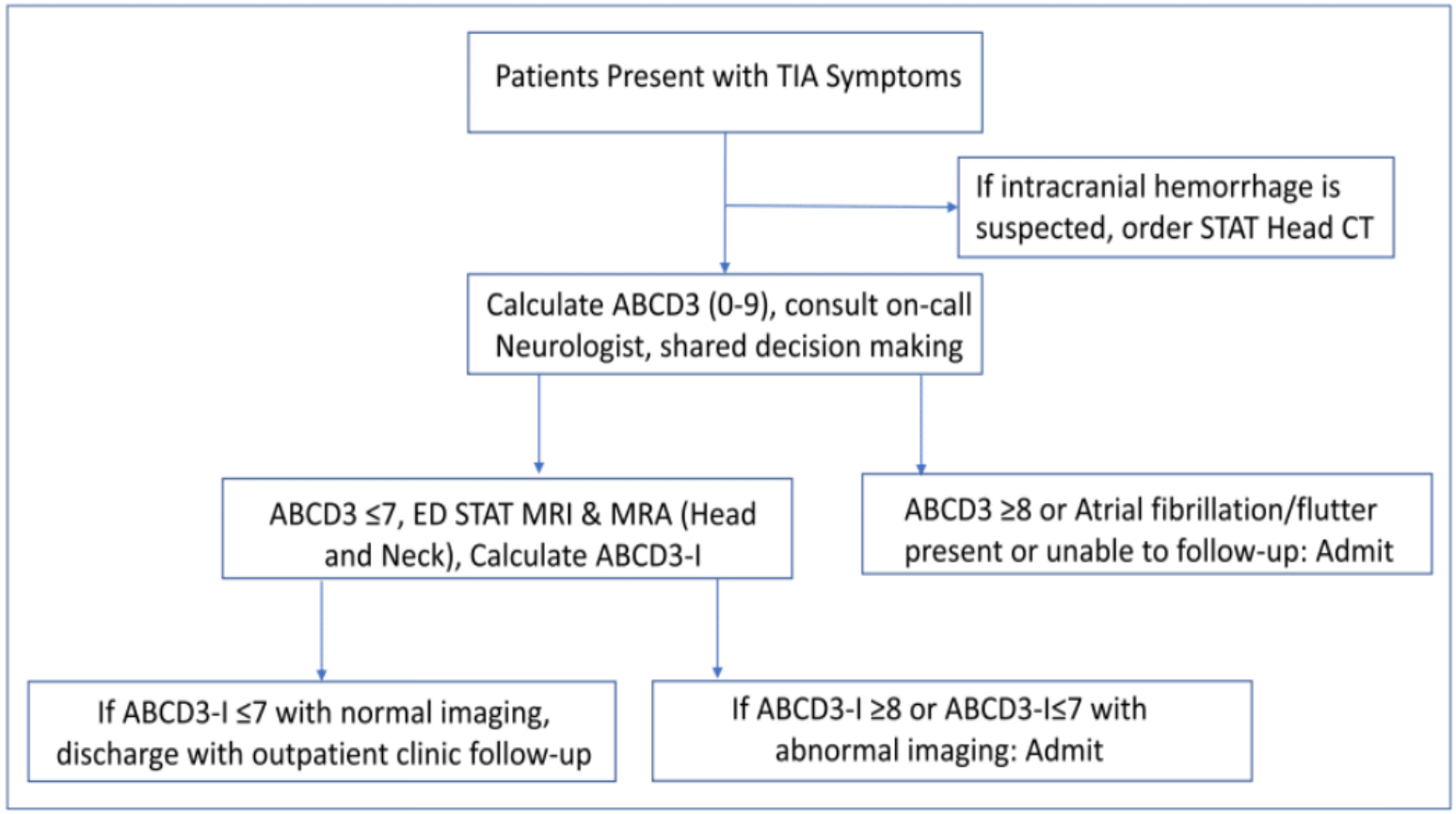


**Fig. 2.** ED ABCD3-I pathway flow diagram during post-intervention phase.

# Risk Stratification

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# Emergency Department Disposition

Be Free:

- Low risk patients
- Social support
- Outpatient MRI negative in ED or outpatient within 24 hours
- Close follow up with neurology in clinic
- Shared decision making

To Observation:

- Intermediate risk
- No social support
- Weekend, holiday, or inability to get stat imaging
- Need for doppler due to renal function
- Shared decision making

To Inpatient:

- High risk patient
- Unable to care for self or ambulate
- Acute neurologic deficit or stroke on imaging
- Hypertensive encephalopathy
- Pregnancy > 20 weeks
- Shared decision making

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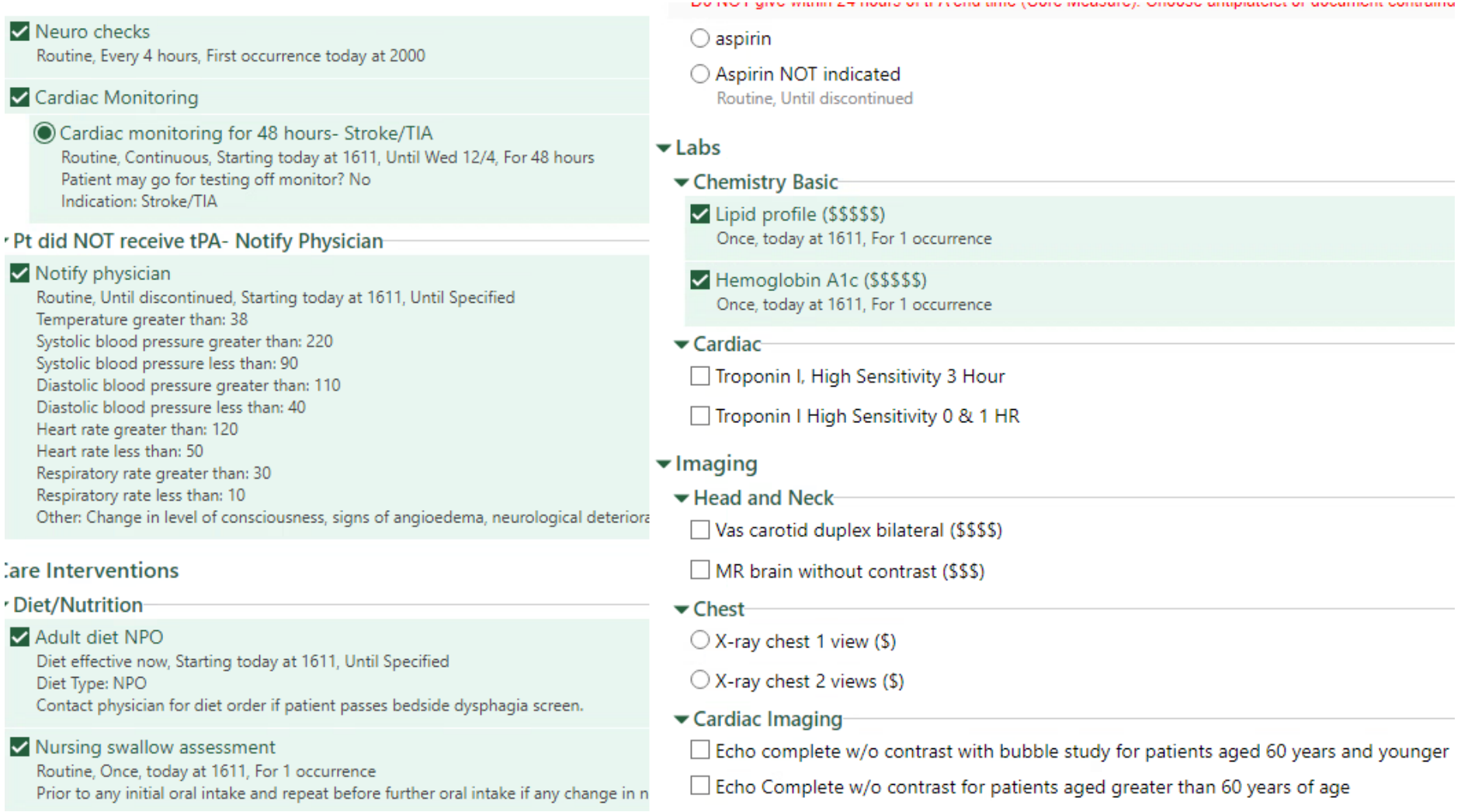
# Observation Criteria

| | |
|---|---|
| Inclusion Criteria | • Transient focal neurologic deficits that have now resolved without recurrence<br>• NIH of 0 and/or ABCD2 score of < 4<br>• Stable vital signs<br>• Unremarkable CT head and/or CTA head/neck |
| Exclusion Criteria | • Dynamic or fluctuating NIH stroke scales concerning for crescendo TIAs<br>• Unable to ambulate, unable to perform self care, or any new neurologic deficits<br>• Unstable blood pressures requiring IV antihypertensives<br>• Acute/subacute stroke on imaging<br>• Carotid stenosis noted on CTA head/neck (>50%)<br>• Pregnancy > 20 weeks |

# Observation Unit Evaluation

- Telemetry to detect arrhythmias
- MRI +/- MRA head/neck if unable to get CTA head/neck in ED
- Carotid doppler if poor renal function
- Echocardiogram to detect PFO or cardioembolic source
- HbA1c and lipid panel for risk factor reduction
- Medication management (antiplatelet, statin, antihypertensive, insulin) as needed
- Speech/PT/OT evaluation as needed
- Stroke education
- Social work consultation as needed for assistance with discharge planning
- Neurology consultation

# Observation Order Set Example



- [x] Neuro checks
  Routine, Every 4 hours, First occurrence today at 2000
- [x] Cardiac Monitoring
  - (•) Cardiac monitoring for 48 hours- Stroke/TIA
    Routine, Continuous, Starting today at 1611, Until Wed 12/4, For 48 hours
    Patient may go for testing off monitor? No
    Indication: Stroke/TIA

**Pt did NOT receive tPA- Notify Physician**

- [x] Notify physician
  Routine, Until discontinued, Starting today at 1611, Until Specified
  Temperature greater than: 38
  Systolic blood pressure greater than: 220
  Systolic blood pressure less than: 90
  Diastolic blood pressure greater than: 110
  Diastolic blood pressure less than: 40
  Heart rate greater than: 120
  Heart rate less than: 50
  Respiratory rate greater than: 30
  Respiratory rate less than: 10
  Other: Change in level of consciousness, signs of angioedema, neurological deterior

**Care Interventions**

**Diet/Nutrition**

- [x] Adult diet NPO
  Diet effective now, Starting today at 1611, Until Specified
  Diet Type: NPO
  Contact physician for diet order if patient passes bedside dysphagia screen.
- [x] Nursing swallow assessment
  Routine, Once, today at 1611, For 1 occurrence
  Prior to any initial oral intake and repeat before further oral intake if any change in n

Do NOT give within 24 hours of tPA end time (Core Measure). Choose antiplatelet or document contraind

- ( ) aspirin
- ( ) Aspirin NOT indicated
  Routine, Until discontinued

**Labs**

**Chemistry Basic**

- [x] Lipid profile ($$$$$)
  Once, today at 1611, For 1 occurrence
- [x] Hemoglobin A1c ($$$$$)
  Once, today at 1611, For 1 occurrence

**Cardiac**

- [ ] Troponin I, High Sensitivity 3 Hour
- [ ] Troponin I High Sensitivity 0 & 1 HR

**Imaging**

**Head and Neck**

- [ ] Vas carotid duplex bilateral ($$$$)
- [ ] MR brain without contrast ($$$)

**Chest**

- ( ) X-ray chest 1 view ($)
- ( ) X-ray chest 2 views ($)

**Cardiac Imaging**

- [ ] Echo complete w/o contrast with bubble study for patients aged 60 years and younger
- [ ] Echo Complete w/o contrast for patients aged greater than 60 years of age

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# Observation Unit Disposition

Be Free:

- Reassuring exam
- Negative workup in observation
- Able to follow up with neurology in outpatient setting
- Shared decision making

To Inpatient:

- Recurrent neurologic deficit
- Acute stroke on imaging
- Vascular disease requiring urgent treatment
- Cardioembolic source requiring urgent treatment
- Shared decision making

# Congestive Heart Failure

# Background

- Affects at least 6 million Americans and results in at least 1 million ED visits each year
- By 2030, it is expected that the annual spend on hospital care for heart failure will be close to $70 billion
- CHF observation protocols can reduce ED length of stay and hospital length of stay without increased adverse outcomes

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# Emergency Department Evaluation

- EKG
- Laboratory analysis (electrolytes, renal function, biomarkers)
- Chest x-ray
- Bedside ultrasound
- Risk stratification
- Cardiology input as needed

# Risk Stratification

Ottawa Score:

- History of stroke/TIA
- History of intubation
- HR on ED arrival >= 100
- SpO2 on ED arrival < 90%
- HR >= 110 during walk test
- New EKG changes
- BUN >= 33
- Serum CO2 >= 35
- Elevated troponin
- NT-pro BNP >= 5000

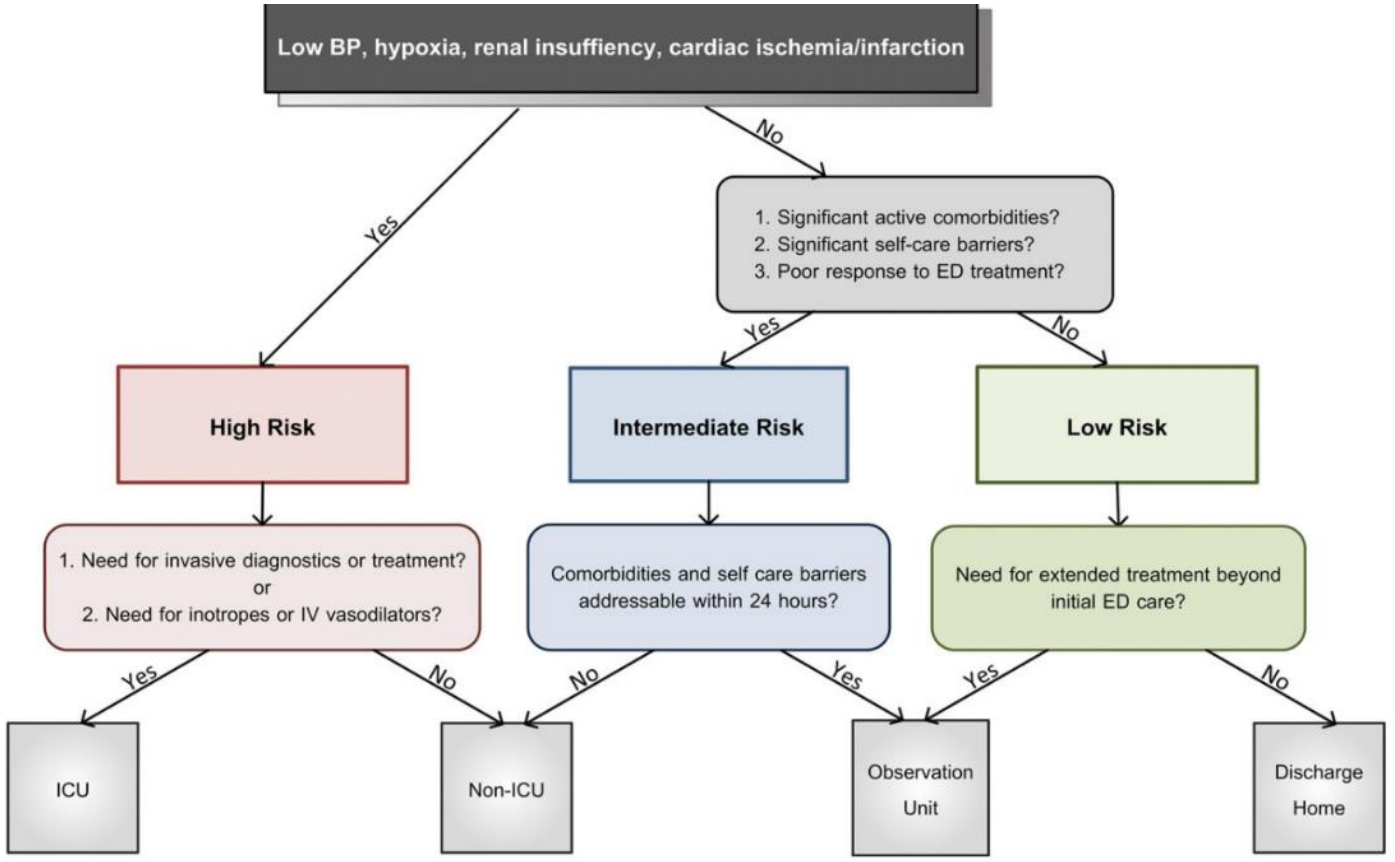


**Figure 1.** A conceptual model of acute heart failure risk stratification in the ED based on known predictors of risk for mortality or serious adverse events, presence of absence of comorbidities, and self-care issues. Such an algorithm may augment clinical judgment in disposition decisions. ICU = intensive care unit.

# Emergency Department Disposition

Be Free:

- Low risk patients
- Social support
- Close follow up with heart failure clinic
- Shared decision making

To Observation:

- Intermediate risk
- Need for further IV treatment
- No social support
- Shared decision making

To Inpatient:

- High risk patient
- Unstable
- Concomitant renal failure and/or cardiac ischemia
- Need for IV diuresis beyond 24 hours
- Shared decision making

# Observation Criteria

| | |
|---|---|
| Inclusion Criteria | • Known history of heart failure<br>• Stable VS<br>• Initial hypoxia easily correctable by nasal cannula<br>• No respiratory distress |
| Exclusion Criteria | • New onset heart failure<br>• Unstable VS<br>• High probability of requiring NPPV or intubation<br>• Vasoactive drips<br>• New onset renal failure or severe anemia<br>• Severe electrolyte disturbance<br>• Acute ischemic EKG changes or arrhythmias<br>• Altered mental status<br>• Inability to ambulate or care for self |

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# Observation Unit Evaluation

- Telemetry to detect arrhythmias, continuous pulse oximetry
- Serial labs (troponins, biomarkers, electrolytes, renal function) as needed
- Decompensated heart failure high dose diuretics per protocol
- Strict monitoring of intake/output along with daily weights
- Echocardiogram if not done within last 6 months
- Medication management (antiplatelet, statin, antihypertensive, insulin) as needed
- Heart failure education
- Social work consultation as needed for assistance with discharge planning
- Cardiology consultation as indicated

# Observation Order Set Example

- [x] Daily Weight
  Routine, Daily, First occurrence today at 1739
- [x] Intake and output
  Routine, Every 4 hours, First occurrence today at 2000
- [ ] Measure post void residual
  Once for 1 occurrence
- [x] Notify prescriber -patient has NOT responded to diuretic with 150
  Routine, Until discontinued, Starting today at 1739, Until Specified
  Other: patient has NOT responded to diuretic with 150 ml/ hour urine output
  -suggest to consider nephrology consult if patient not responding.

## Care Interventions

### Education

- [x] Patient education (Heart Failure)
  Routine, Once, today at 1739, For 1 occurrence
  Other Education? Heart Failure
  When applicable, provide patient with written Heart Failure education which
  symptoms(i.e. increasing shortness of breath, leg swelling, and/or rapid weig
  information regarding the heart failure clinic and available services.

## Medications

### Diuretics

**Lab Results**

| Component | Value |
|---|---|
| Creatinine | 0.72 |

@LASTFLOWDRYWEIGHT@

**Please select a STAT dose and a MAINTENANCE dose**

| Recommendations for Diuretics | | |
|---|---|---|
| **Creatinine Level** | **Furosemide (Lasix) Initiation Dose** | **Bumet Dose** |
| Less than 1.6 mg/dL | Lasix 40 mg or 60 mg IV STAT | Bumex |
| 1.6 – 2.5 mg/dL | Lasix 60 mg or 80 mg IV STAT | Bumex |
| 2.6 – 3.5 mg/dL | Lasix 100 mg IV STAT | Bumex |
| 3.6 or greater mg/dL | Lasix 120 mg IV STAT | Bumex |

### Chemistry Basic

- [x] Basic Metabolic Panel ($$$$$)
  Daily, First occurrence today at 1739, Last occurrence on Wed 12/4 at 0500, For 3 occurrences
- [x] Magnesium
  Once, today at 1739, For 1 occurrence

### Cardiac

- [x] B-type natriuretic peptide ($$$$$)
  Once, today at 1739, For 1 occurrence
- [x] B-type natriuretic peptide ($$$$$)
  Once, On Fri 12/6 at 0500, For 1 occurrence
- [ ] Troponin I High Sensitivity 0 & 1 HR

### For patients currently on Entresto patients

- [ ] N-Terminal Pro BNP
  Once

### Coagulation

- [x] Protime & INR ($$$$)
  Once, today at 1739, For 1 occurrence

### Hematology

- [x] CBC auto differential ($$$$$)
  Once, today at 1739, For 1 occurrence

### Urine

- [ ] Urinalysis
  Once

## Imaging

### Chest

- [ ] X-ray chest 1 view ($)
- [ ] X-ray chest 2 views ($)

### Cardiology

- [ ] Echo complete w/ contrast
- [ ] Echo Complete w/o contrast

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# Observation Unit Disposition

Be Free:

- Subjective improvement
- Reassuring exam
- Negative workup in observation
- Evidence of adequate diuresis
- Optimized medication list
- Shared decision making

To Inpatient:

- Persistent or recurring symptoms
- Respiratory distress
- Abnormal VS
- New EKG changes or telemetry events
- Poor response to IV diuresis
- Shared decision making

# Conclusions

Risk stratification is important to appropriately disposition patients from the emergency department

An observation unit can decrease cost while managing intermediate risk patients appropriately

Further testing in the observation unit should be highly protocolized and driven by clinical picture and serial assessments

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# References
(ordered by appearance)


Jarhult, S. J; Howell, M. L; Barnaure-Nachbar, I.; Chang, Y.; White, B. A; Amatangelo, M., et al. (2018). Implementation of a Rapid, Protocol-based TIA Management Pathway. Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health, 19(2).

Qureshi AI, Adil MM, Zacharatos H, Suri MF. Factors associated with length of hospitalization in patients admitted with transient ischemic attack in United States. Stroke. 2013 Jun;44(6):1601-5.

Long B, Koyfman A. Best Clinical Practice: Controversies in Transient Ischemic Attack Evaluation and Disposition in the Emergency Department. J Emerg Med. 2017 Mar;52(3):299-310.

Dahlquist RT, Young JM, Reyner K, Farzad A, Moleno RB, Gandham G, Ho AF, Wang H. Initiation of the ABCD3-I algorithm for expediated evaluation of transient ischemic attack patients in an emergency department. Am J Emerg Med. 2020 Apr;38(4):741-745.

Mace, S., & Thallner, E. (2017). Metrics and Performance Improvement: Patient Quality, Safety, and Experience. In S. Mace (Ed.), Observation Medicine: Principles and Protocols. Cambridge: Cambridge University Press.

Collins S, Storrow AB, Albert NM, Butler J, Ezekowitz J, Felker GM, Fermann GJ, et al. SAEM/HFSA Acute Heart Failure Working Group. Early management of patients with acute heart failure: state of the art and future directions. A consensus document from the society for academic emergency medicine/heart failure society of America acute heart failure working group. J Card Fail. 2015 Jan;21(1):27-43.

Stiell IG, Clement CM, Brison RJ, Rowe BH, Borgundvaag B, Aaron SD, Lang E, Calder LA, Perry JJ, Forster AJ, Wells GA. A risk scoring system to identify emergency department patients with heart failure at high risk for serious adverse events. Acad Emerg Med. 2013 Jan;20(1):17-26.