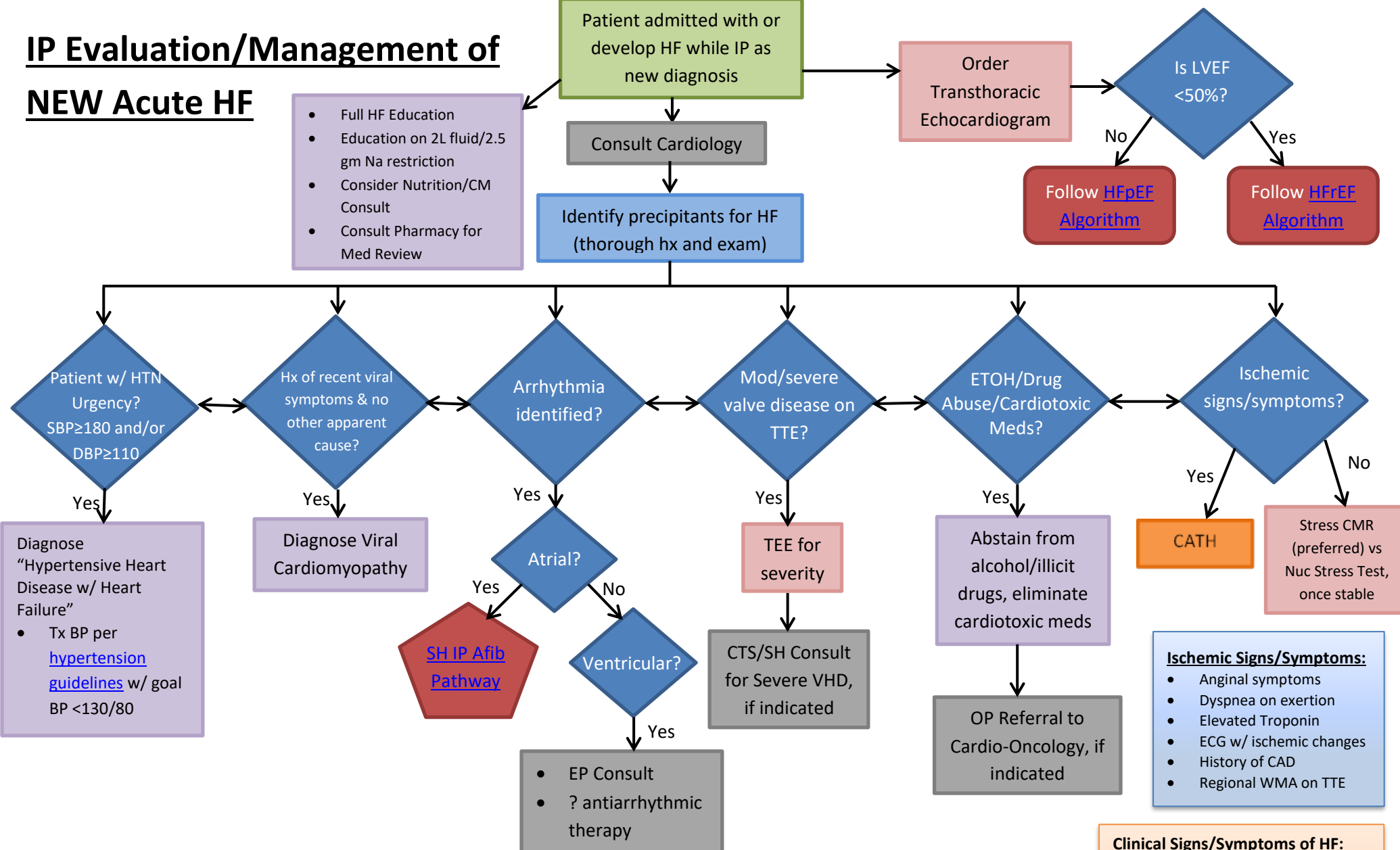
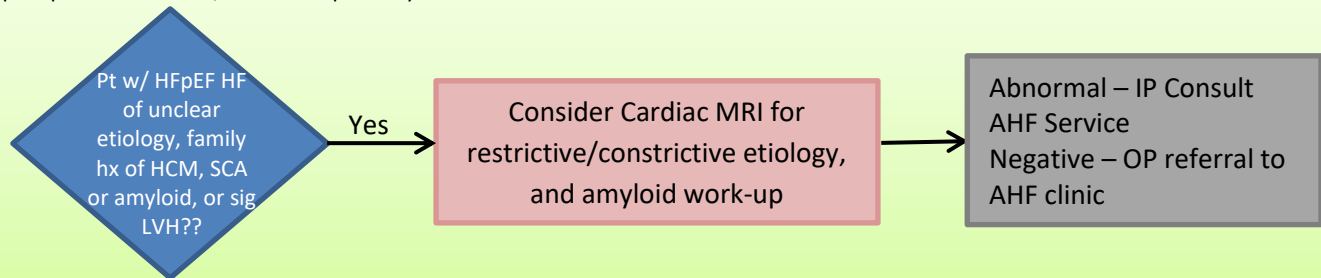


# IP Evaluation/Management of NEW Acute HF

- Full HF Education
- Education on 2L fluid/2.5 gm Na restriction
- Consider Nutrition/CM Consult
- Consult Pharmacy for Med Review

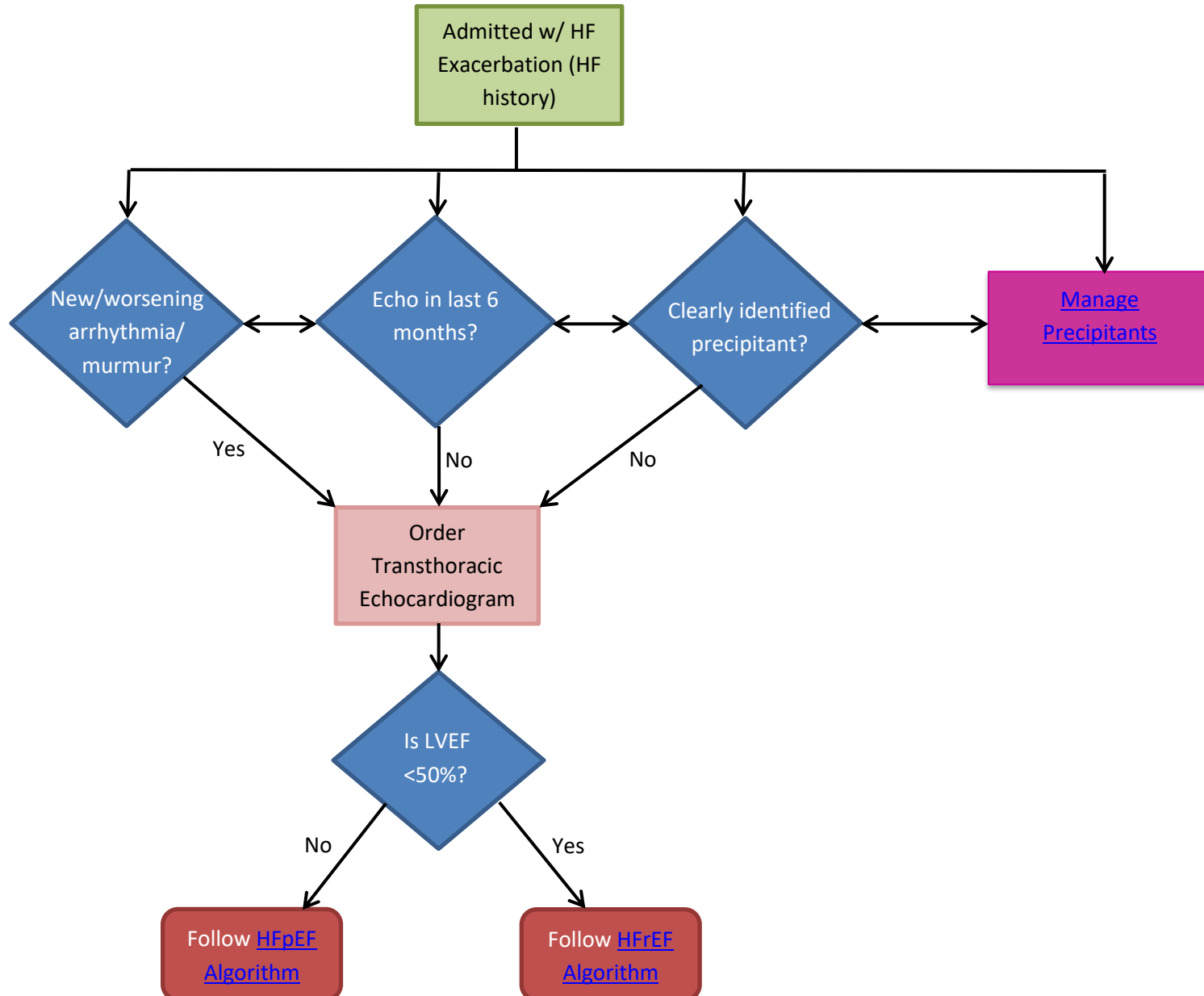


\*Once all other precipitants ruled out, follow this pathway

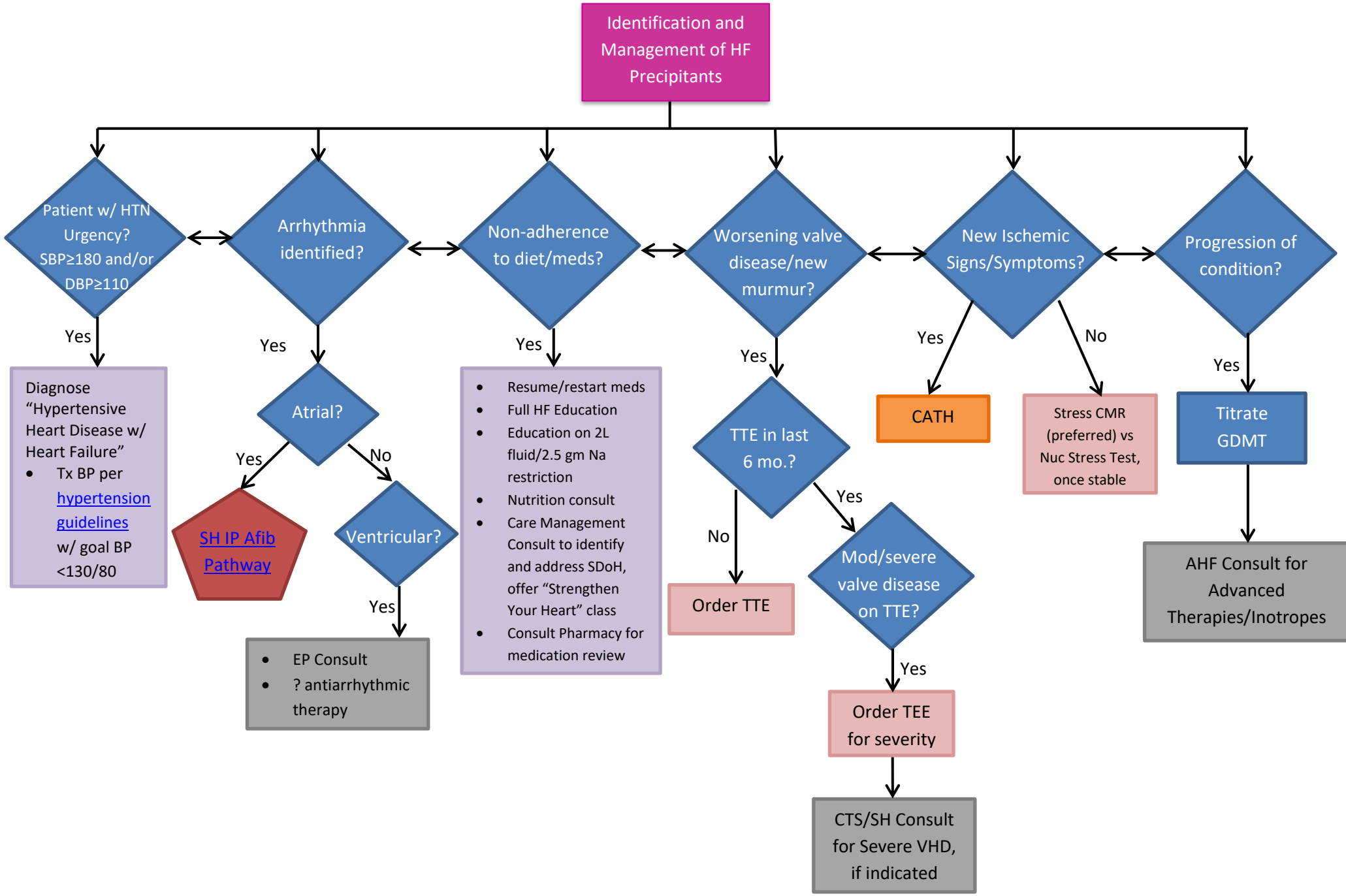


- Clinical Signs/Symptoms of HF:**
- Orthopnea, PND, Dyspnea
  - Elevated JVP, rales, S3, LE swelling, weight gain (3lbs in 1-2 days, 5 lbs in 1 week)
  - Abdominal distension/ascites
  - CXR w/ pulm edema/pleural effusion
  - Age stratified proBNP:
    - 450 pg/mL age <50
    - 900 pg/mL age 50-75
    - 1800 pg/mL age >75

# Echocardiography Guidance for IP Exacerbation of HF



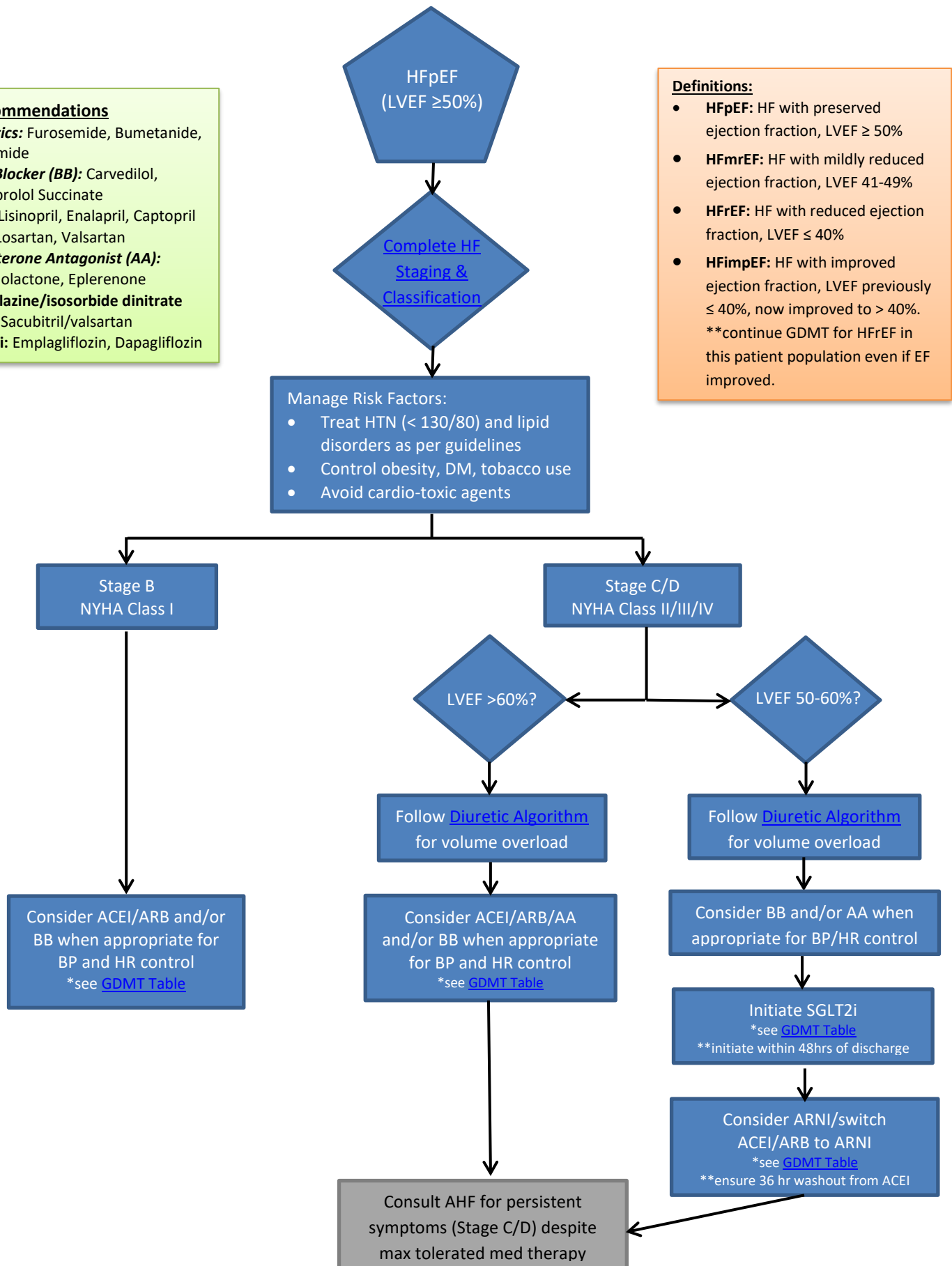
# Management of Precipitants for IP HF Exacerbation



# Heart Failure with Preserved Ejection Fraction

- Med Recommendations**
- **Diuretics:** Furosemide, Bumetanide, Torsemide
  - **Beta Blocker (BB):** Carvedilol, Metoprolol Succinate
  - **ACEI:** Lisinopril, Enalapril, Captopril
  - **ARB:** Losartan, Valsartan
  - **Aldosterone Antagonist (AA):** Spironolactone, Eplerenone
  - **Hydralazine/isosorbide dinitrate**
  - **ARNI:** Sacubitril/valsartan
  - **SGLT2i:** Empagliflozin, Dapagliflozin

- Definitions:**
- **HFpEF:** HF with preserved ejection fraction, LVEF  $\geq 50\%$
  - **HFmrEF:** HF with mildly reduced ejection fraction, LVEF 41-49%
  - **HFrEF:** HF with reduced ejection fraction, LVEF  $\leq 40\%$
  - **HFimpEF:** HF with improved ejection fraction, LVEF previously  $\leq 40\%$ , now improved to  $> 40\%$ .  
\*\*continue GDMT for HFrEF in this patient population even if EF improved.



# Heart Failure with Reduced Ejection Fraction

## GDMT Initiation of Medication Pearls:

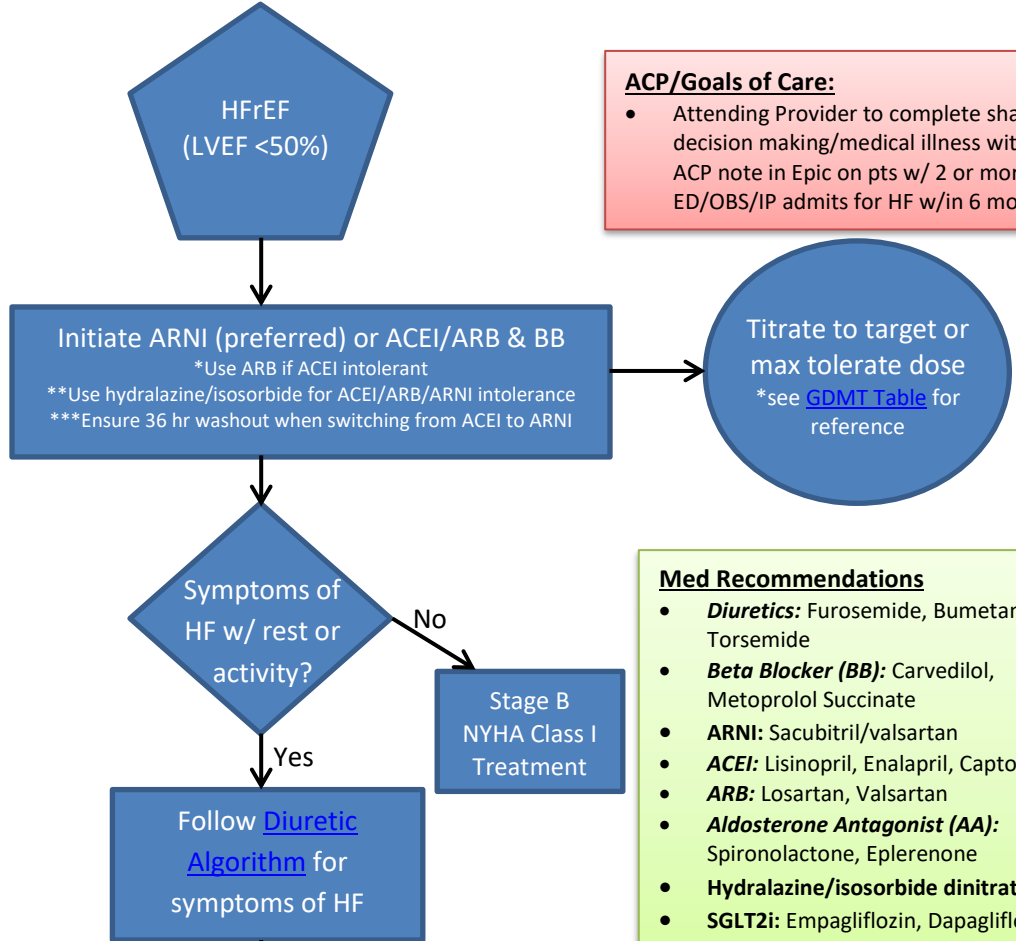
- Use metoprolol succinate for patients w/ tachycardia
- Use carvedilol for patients w/o tachycardia
- For stable BP (SBP>100, DBP>60) and HR (>60 bpm), start low dose BB and ARNI (preferred over ACEI/ARB), unless contraindicated
- For patients w/ HTN and HR <60, start ARNI (preferred over ACEI/ARB) first, and reconsider adding BB when HR stable
- Better for patient to be on low dose of multiple GDMT rather than max of 1 or 2 meds.

## Clinical Signs/Symptoms of HF:

- Orthopnea, PND, Dyspnea
- Elevated JVP, rales, S3, LE swelling, weight gain (3lbs in 1-2 days, 5 lbs in 1 week)
- Abdominal distension/ascites
- CXR w/ pulm edema/pleural effusion
- Age stratified proBNP:
  - 450 pg/mL age <50
  - 900 pg/mL age 50-75
  - 1800 pg/mL age >75

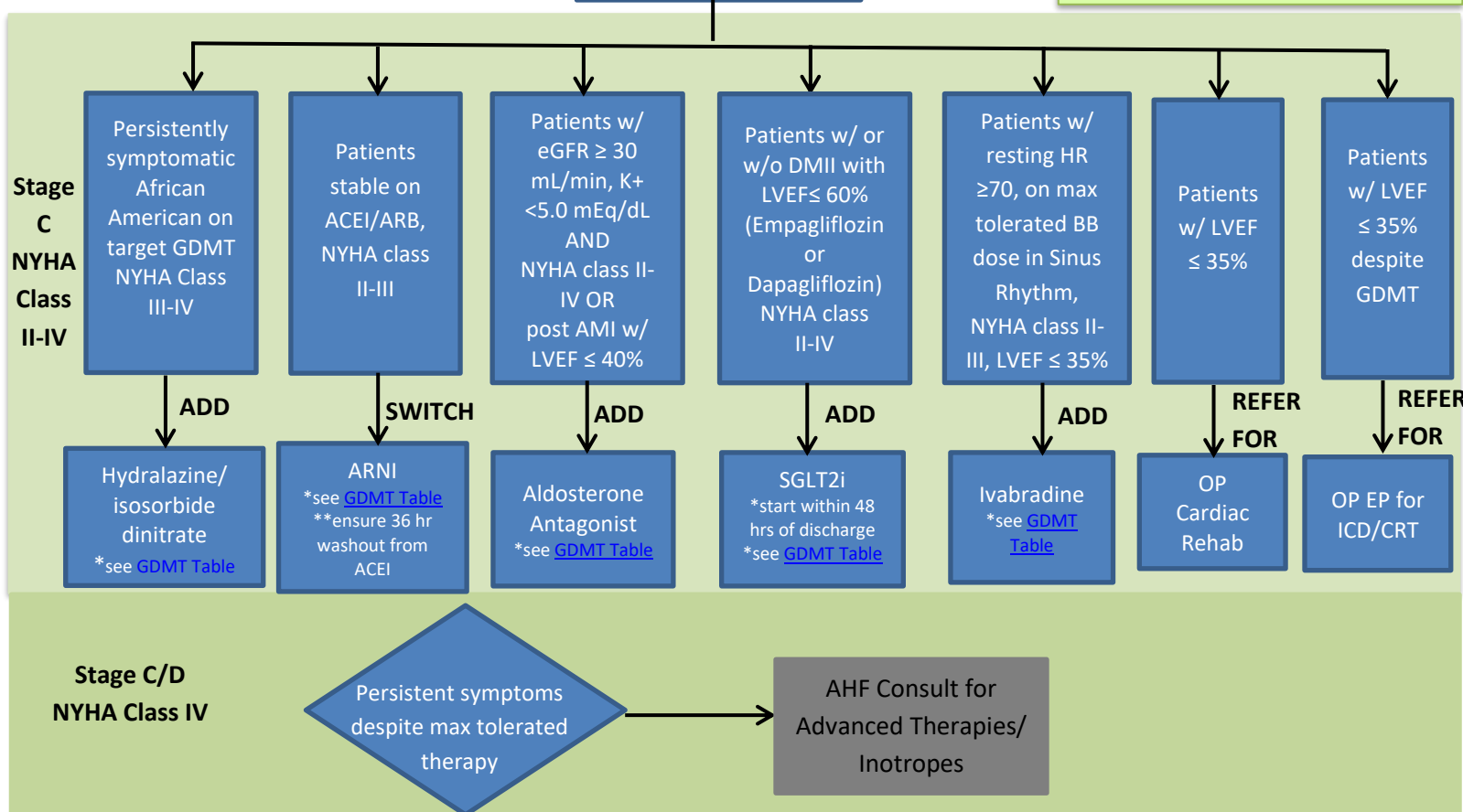
## ACP/Goals of Care:

- Attending Provider to complete shared decision making/medical illness within ACP note in Epic on pts w/ 2 or more ED/OBS/IP admits for HF w/in 6 mo.



## Med Recommendations

- **Diuretics:** Furosemide, Bumetanide, Torsemide
- **Beta Blocker (BB):** Carvedilol, Metoprolol Succinate
- **ARNI:** Sacubitril/valsartan
- **ACEI:** Lisinopril, Enalapril, Captopril
- **ARB:** Losartan, Valsartan
- **Aldosterone Antagonist (AA):** Spironolactone, Eplerenone
- **Hydralazine/isosorbide dinitrate**
- **SGLT2i:** Empagliflozin, Dapagliflozin



Stage C/D  
NYHA Class IV

Persistent symptoms despite max tolerated therapy

AHF Consult for Advanced Therapies/ Inotropes

## Heart Failure Staging & Classification

		Objective Assessment			
		At risk w/o Structural heart disease or symptoms	Structural heart disease w/o symptoms	Structural heart disease with symptoms	Structural heart disease with symptoms refractory to medical therapy
NYHA Functional Class	No symptoms at rest or with ordinary activity	Stage A NYHA Class I	Stage B NYHA Class I		
	No symptoms at rest. Symptoms with ordinary activity			Stage C NYHA Class II	
	No symptoms at rest. Symptoms with less than ordinary activity			Stage C NYHA Class III	Stage D NYHA Class III
	Symptoms at rest. Symptoms increase with any activity			Stage C NYHA Class IV	Stage D NYHA Class IV
		<b>Risk Factors for HF:</b> - HTN - DM - Metabolic Syndrome (any 3 of the following: abdominal adiposity, hypertriglyceridemia, low HDL, HTN, and fasting hyperglycemia). - Atherosclerotic Disease (coronary, cerebral or peripheral blood vessels)	<i>Once structural heart disease established, follow algorithm for HFpEF vs HFrEF</i>		

Diuretic Conversion			
	Furosemide	Bumetanide	Torsemide
<b>Relative IV potency (mg)</b>	40 mg	1 mg	20 mg
<b>Oral: IV dosing</b>	1:2	1:1	1:1

**TABLE: Starting and Target Doses, Indications, Contraindications and Follow-up Recommendations for Guideline-Directed Medical Therapy for Heart Failure**

	Starting Dose	Target Dose	Relative Cost	Indication	Contraindications	Titration/Follow-up Guideline
<b>Beta Blockers</b>						
Carvedilol	3.125 mg twice daily	25 mg twice daily for weight <85 kg and 50 mg twice daily for weight ≥85	\$	All patients w/ HFREF, and use for HTN for patients w/ HFpEF	Symptomatic hypotension, symptomatic bradycardia, acute congestion	Consider increase dose every 2 weeks or sooner for HR/BP needs until max tolerated/target dose is achieved. Monitor HR, BP, and for signs for congestion after initiation/during titration.
Metoprolol succinate	12.5-25 mg daily	200 mg daily (or divided 100 mg twice daily)	\$			
<b>ACEI</b>						
Lisinopril	2.5-5 mg daily	20-40 mg daily	\$	All patients with HFREF, and use for HTN for patients w/ HFpEF	Symptomatic hypotension, increase serum creat level >3 mg/dL, bilateral renal artery stenosis, elevated levels of serum K >5.0 mEq/L, hx angioedema w/ prior use of ACEI	Consider increase dose every 2 weeks or sooner for BP needs until max tolerate/target dose achieved. Monitor BP, renal function, and potassium within 1-2 weeks of initiation and during titration and periodically thereafter.
Captopril	6.25 mg 3x daily	50 mg 3x daily	\$\$			
Enalapril	2.5 mg twice daily	10-20 mg twice daily	\$			
Ramipril (OP ONLY)	1.25 mg daily	10 mg daily				
<b>ARB</b>						
Losartan	25-50 mg daily	150 mg daily	\$	All patients with HFREF and BP control for HFpEF for patients intolerant to ACEI	Symptomatic hypotension, increase serum creat level >3 mg/dL, bilateral renal artery stenosis, elevated levels of serum K >5.0 mEq/L	Consider increase dose every 2 weeks or sooner for BP needs until max tolerate/target dose achieved. Monitor BP, renal function, and potassium within 1-2 weeks of initiation and during titration and periodically thereafter.
Valsartan	40 mg twice daily	160 mg twice daily	\$\$			
<b>ARNI</b>						
Sacubitril/valsartan	24/26 mg - 49/51 mg twice daily* (If patient taking ≤10 mg BID of enalapril/≤160 mg daily of valsartan, start with 24/26 mg BID. If doses greater than above, start with 49/51 mg BID).	97/103 mg twice daily	\$\$\$	Class II-IV, LVEF ≤60% on stable dose of ACEI/ARB. Consider initiation on new diagnosis instead off ACEI/ARB	Within 36 hours of last ACEI dose, angioedema, pregnancy/lactation, eGFR < 30, symptomatic hypotension, current decompensated HF, severe hepatic impairment.	Every 2-4 weeks or sooner for BP needs, assess tolerability and titrate as able. Monitor BP, electrolytes, and renal function after initiation and during titration.
<b>Aldosterone Antagonists</b>						
Spironolactone	12.5-25 mg daily	25-50 mg daily	\$	Following acute MI in patients w/ LVEF ≤40% w/ HF symptoms, hx of DM, or NYHA class II-IV w/ LVEF ≤35% already on ACEI/ARB and BB (do not need to be at target/max doses).	For patients w/ eGFR ≤ 30 mL/min/1.72m2, Creat >2.5 in men or Creat >2 in women, serum K >5.0 mEq/dLm	Titrate dose at least every 2 weeks until max tolerated or target dose is achieved. Monitor potassium level and renal function 2-3 days following initiation, and then 7 days after initiation/titration, then check monthly for 3 months and every 3 months afterwards.
Eplerenone	25 mg daily	50 mg daily	\$\$			
<b>Vasodilators</b>						
Hydralazine	25 mg 3x daily	75 mg 3x daily	\$	Persistently symptomatic African Americans with NYHA class III-IV despite max med therapy, can utilize for patients where ACEI/ARB contraindicated.	Symptomatic hypotension	Consider increase in dose every 2 weeks or sooner for BP needs until max tolerated/target dose achieved. Monitor BP.
Isosorbide dinitrate	20 mg 3x daily	40 mg 3x daily	\$\$			
Fixed-dose combination isosorbide dinitrate/hydralazine (OP	20 mg/37.5 mg (one tab) 3x daily	2 tabs 3x daily				
<b>Ivabradine</b>						
Ivabradine	2.5-5 mg twice daily (2.5 mg BID for age ≥ 75, 5.0 mg BID for age < 75)	Titrate to HR 50-60 bpm. Max dose 7.5 mg twice daily	\$\$\$	LVEF ≤35% already receiving GDMT (including BB at maximally tolerated dose) and who are in Sinus Rhythm with a HR greater than 70 bpm at rest, NYHA class II-III	Evidence based BB not yet optimized, HFpEF, acute decompensated HF, symptomatic hypotension, SSS, 2nd or 3rd degree HB w/o ppm, resting HR <60 bpm, A-fib/flutter, severe hepatic impairment	Re-assess HR in at least 2-4 weeks. If HR <50 bpm, decrease or discontinue. If HR 50-60 bpm, maintain current dose. If HR > 60 bpm, increase by 2.5 mg twice daily until reaching max tolerated dose.
<b>SGLT2 Inhibitors</b>						
Dapagliflozin	10 mg every morning	10 mg every morning		Patients w/ or w/o DMII with NYHA Class II-IV Heart Failure with LVEF ≤60%	Type I Diabetes Mellitus, eGFR <30, ESRD on Hemodialysis/Peritoneal Dialysis, Hx serious reaction to drug class	No titration of dosing needed. BMP in 1-2 weeks for pts on concomittant diuretic. BMP in 1 month for pts not on diuretic. Monitor for dehydration and need to reduce diuretic dose. Follow-up provider managing DMII to ensure active monitoring of blood sugar (typically HgbA1C q3 months).
Empagliflozin	10 mg every morning	10 mg every morning		Patients w/ or w/o DMII with NYHA Class II-IV Heart Failure with LVEF ≤60%	Type I Diabetes Mellitus, eGFR persistently <20, ESRD on Hemodialysis/Peritoneal Dialysis, Hx serious reaction to drug class	No titration of dosing needed. BMP in 1-2 weeks for pts on concomittant diuretic. BMP in 1 month for pts not on diuretic. Monitor for dehydration and need to reduce diuretic dose. Follow-up provider managing DMII to ensure active monitoring of blood sugar (typically HgbA1C q3 months).



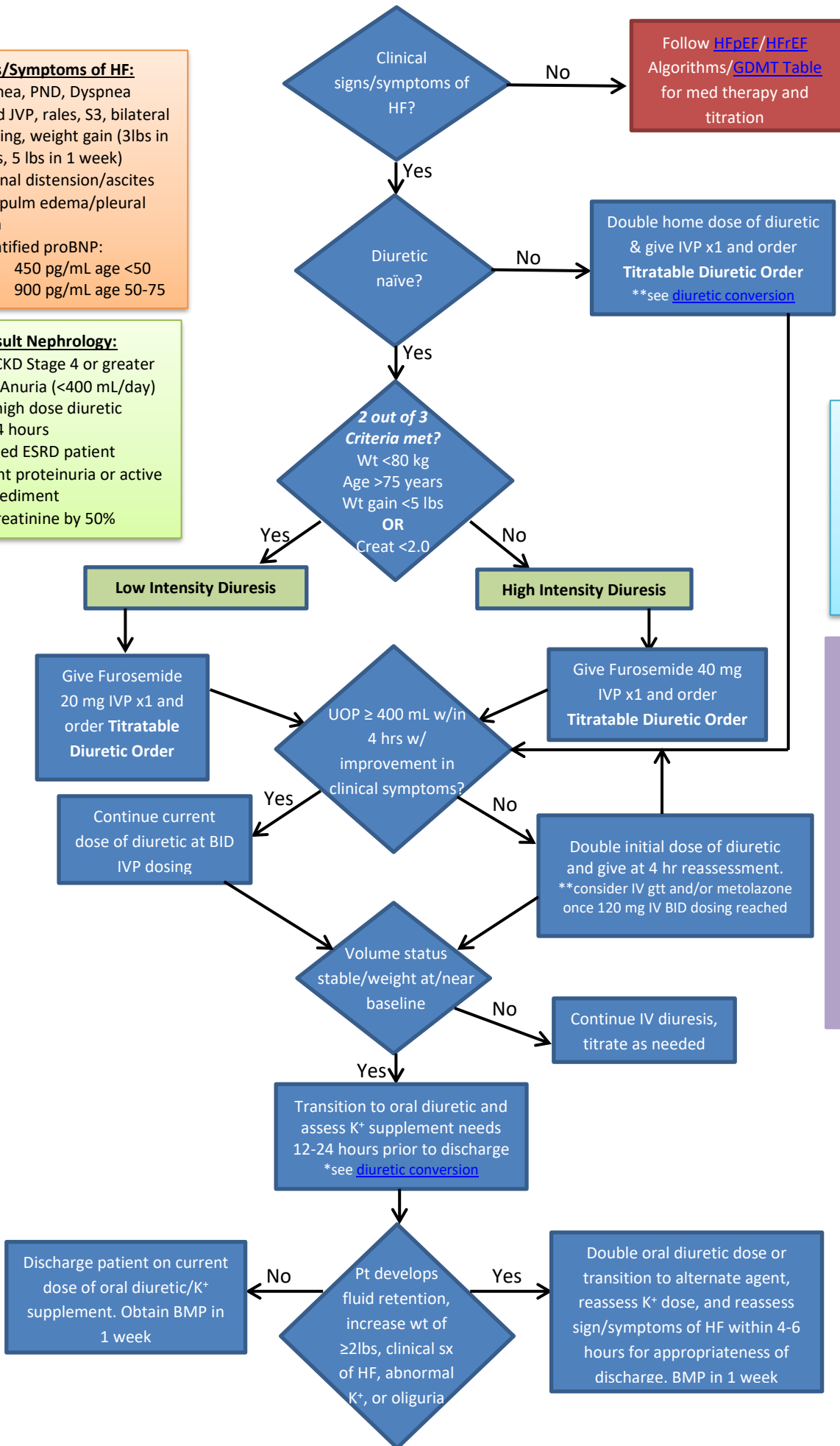
# Inpatient Diuretic Algorithm

## Clinical Signs/Symptoms of HF:

- Orthopnea, PND, Dyspnea
- Elevated JVP, rales, S3, bilateral LE swelling, weight gain (3lbs in 1-2 days, 5 lbs in 1 week)
- Abdominal distension/ascites
- CXR w/ pulm edema/pleural effusion
- Age stratified proBNP:
  - 450 pg/mL age <50
  - 900 pg/mL age 50-75

## When to consult Nephrology:

- CHF w/ CKD Stage 4 or greater
- Oliguria/Anuria (<400 mL/day) despite high dose diuretic within 24 hours
- Established ESRD patient
- Significant proteinuria or active urinary sediment
- Rise in creatinine by 50%



Utilize Heart Failure Order Set  
 Monitor I&O q 4 hours  
 2 L fluid/2.5 gm Na<sup>+</sup> restriction  
 Daily Weights  
 BID BMP during diuretic titration/gtt, then daily

**Diuretic Pearls:**

- Double home dose of PO diuretic for starting IV dose
- Order the **Titratable Diuretic Order** to assist in diuretic titration
- If patient already on high dose PO diuretic at home (i.e. furosemide 80 mg), consider high dose IV furosemide BID/TID or continuous drip.



### **When to refer to Cardiology:**

- New dx of HF
- Ongoing symptoms despite management of precipitants/diuresis/GDMT.
- Invasive Cardiology procedures warranted
  - Mod/severe valvular heart disease (VHD)
  - Ischemic signs/symptoms or high suspicion for CAD
  - LV Dysfunction with multiple ASCVD risk factors

### **When to refer to AHF Cardiology: I-NEED-HELP+**

- **I:** IV inotropes
- **N:** NYHA class III-IV, Stage C/D, with persistent symptoms despite max tolerated medical therapy
- **E:** End-organ dysfunction
- **E:** Ejection Fraction  $\leq 25\%$
- **D:** Recurrent appropriate defibrillator shocks
- **H:** Hospitalizations (ED/OBS/IP)  $>1$  within 6 months
- **E:** Edema despite escalating diuretics, in need for advanced fluid monitoring needs (PA sensor, Optivol, etc.)
- **L:** Low output signs/symptoms
  - Hypotension (SBP $<90$ ), tachycardia off antihypertensive therapy +/- inotropes required
  - “Cold and Wet” – cool extremities, volume overload, rising BUN/Creat
- **P:** Prognostic medication - Inability to up-titrate (or need to decrease/cease) ACEI/ARB, BB, ARNI or AA.
- **+:**
  - Unclear etiology of HF after initial workup
  - Severe Pulmonary Hypertension
  - Hyponatremia in setting of Heart Failure

### **When to consult Palliative Care:**

- All patients with persistent symptoms of Heart Failure despite max GDMT
- Life Expectancy less than 12 months.
- Advanced Cardiac Disease (CHF, CAD, LVEF  $<25\%$ )
- Lack of clarity of goals/plan of care
- 2 or more ED/OBS/IP admissions within 6 months
- Admission prompted by difficult-to-control physical or psychological symptoms
- Out-of-hospital cardiac arrest
- Current or past hospice program enrollee
- Limited social support (family stress / chronic mental illness)
- Patient is a candidate for LVAD, ICD placement, Transplant
- Intensive Care Unit length of stay  $>7$  days
- Ethics concerns and/or disagreements amongst the patient, staff and family concerning major medical treatment decisions and resuscitation preference
- Patient/family emotional, spiritual or relational distress